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8TH INTERNATIONAL RESEARCH CONFERENCE ON MULTIDISCIPLINARY IN SOCIAL SCIENCES AND TECHNOLOGY 2025

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PREFACE

It is a great honour to present the proceedings of the **8th International Research Conference on Multidisciplinary in Social Sciences and Technology 2025 (8th IRCMST 2025)**, held on **24th–25th May 2025** via **Online Video Presentation (OVP)**.

This conference continues its tradition of providing a dynamic platform for the exchange of knowledge, ideas, and experiences across a wide range of disciplines, including social sciences, education, business, innovation, information technology, and other related fields. The theme of multidisciplinary collaboration remains central to this year's conference, reflecting the growing need for integrated approaches to understanding and addressing the complexities of today's world.

The collection of papers compiled in this volume highlights diverse perspectives and innovations that contribute to academic discourse and practical solutions. We are pleased to offer these proceedings as a resource for scholars, educators, researchers, and practitioners seeking to explore current trends, theoretical developments, and emerging issues across various domains.

We extend our deepest gratitude to all contributors for sharing their work, and to everyone involved in organizing and supporting this conference. Your commitment and enthusiasm have made this event a meaningful and enriching experience for all participants.

We hope that the ideas presented in these proceedings will stimulate further dialogue, research, and collaboration well beyond the conference.

Thank you.

Sincerely,

Assoc. Prof. Dr. Adi Anuar Azmin
Conference Chair,
8th International Research Conference on Multidisciplinary
in Social Sciences and Technology 2025 (8th IRCMST 2025)

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EFFECT OF COCONUT COIR IN THE OUTSIDE TEMPERATURE AND HUMIDITY OF A LOCALLY MADE METAL MELTING FOUNDRY FURNACE

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Abstract: *Extremely high temperature can cause severe harm and become a safety hazard. However, by insulating mini metal furnace can protect workers of heat hazard over time. This study was conducted to determine the effect of coconut coir in the outside temperature and humidity of a locally made metal melting foundry furnace. This established a process of constructing mini melting furnace with insulator using cement and cementitious waterproofing materials with coconut coir content. This investigates the effect on outside temperature and humidity using used lubricant oil as fuel. The mini metal furnace was an initial study of melting furnace, which was constructed by implementing various enhancements incorporating an additional element into the apparatus and was used to investigate the effectiveness of coconut coir in regulating the dispersion of high temperatures beyond the equipment. This involved applying a partial covering of coconut coir with cement and cementitious waterproofing in order to examine the impact on temperature and humidities in areas covered and uncovered by the insulator. Coating the mini metal melting furnace with a mixture of coconut husk powder and pozzolan cement introduces new features. Some areas of the furnace walls adjusted to 16.67% increase in thickness and an additional weight of 8.33%. Despite this, the total weight attributed to the coconut coir remains negligible. Other technical features of the furnace remain unchanged from the original design. During a brief period of burning using lubricant oil as fuel, the precision hygrometer and thermometer were used to measure the temperature and humidity in the air. it was noted that the outside temperature increased more rapidly in areas without insulator. Additionally, humidity displayed a swifter decrease in the uncovered areas than in the sections coated with insulator. However, the insulator ignited at extreme temperature and perfect humidity.*

Keywords: *Coconut Coir, Outside Temperature, Metal Furnace, Humidity, Insulation*

Introduction

Metal melting furnaces range up to extremely high temperatures as they're required to melt down various metals, such as steel, into liquids for casting. Due to these high temperatures, there is a risk of metal penetration through the working lining, which can cause severe harm and become a safety hazard. It is thus highly necessary to have high temperature furnace insulation. Insulation helps to further improve the overall performance for it protects workers of heat hazard over time. Foundries where non-ferrous metals are casted are often very hot and is not uncommon in the height of summer for a foundry to be closed shortly on midday because condition is too hot for sustained work (Turner, 1957). There are studies conducted of applying thermal insulators on metal melting foundries for thermal insulators are essential in terms of making structures conducive for people to live in and a nice place to work on (Ganiron, 2013).

Among them are redesigning of mini compact crucible furnace using stainless steel plate cylinder combined with ceramic blanket in which a heat insulator was attached on inner wall to maintain temperature in the heating chamber and to avoid heat loss (Soemowidagdo et al 2020). A method to increase the service life of the heat-insulating insert in the air passage of the blast furnace tuyere suggested gluing heat-resistant siliceous fabric onto its outer surface, to reduce heat loss and increase the tuyere resistance to burnout, fixing a ceramic disk to the end of the tuyere's nose (Tarasov et al, 2020). Glass wool was used as insulating material in this furnace that can insulate temperature up to 250 0 C which is favorable to the aluminum melting (Bhamare et al, 2017) while Mineral wool is used for insulation which can withstand temperature up to 1200C making the fiber materials mostly used as thermal insulation in industrial furnace.

Coir which is a lignocellulosic natural fiber derived from the coconut's husk has some unique characteristics, such as its resistance to seawater, microbial attack, high impact, etc., but its low thermal conductivity or high thermal insulating property makes it suitable for being used as insulators, (Mahmud et al, 2023). Although it was found that the coconut fiber's main weakness was that it's easy to decay but the problem was solved by applying treatment process that was carried out on the fibers (Omar et al, 2020). The development of coconut coir into composite materials is an interesting alternative because they have a low thermal conductivity which would lead to the solving problem in simultaneous energy, environment, and thermal comfort (Isa & Majid, 2022). In economical point of view, coconut coir is cheaper compared to other expensive thermal insulating materials such as glass-wools or rock-wools (Chuen et al, 2015). As insulating material, this study was conducted to determine the effect of coconut coir on outside temperature and humidity of a locally made metal melting foundry furnace. Specifically, this study was aimed to:

1) To establish a process of insulating a mini melting furnace using cement, Cementous material and coconut coir
2) describe the technical aspect of the mini melting furnace
3) investigate the effect on outside temperature and humidity when ignited with used lubricant oil as fuel

Methodology

The method used are as follows:

Materials and Equipment Used

Among the materials used are old cylindrical tank, 10 mm Φ reinforced structural bar, 1/4 "Φ metal pipe, metal tube, welding rods, and steel epoxy, plastic bottles, plastic controllers, metal stand and plastic hose, coconut coir, hygrometers, thermometers, used lubrication oil, cement and Powermix Cementous water proofing materials. The equipment used are welding machine, electric grinder and electric cutter.

Fabrication Procedure and Assembly

The cylindrical tank was cut to dimension and shaped to form the cylindrical structure of the furnace. The reinforced structural bar was cut and welded to form as stand and frame of the

cylindrical furnace. The burner was provided with small holes and was attached through the metal tube serving as the exit of the airflow. The airflow was provided by a small fan which is attached to the metal tube. The small fan has a control selector than can be used to direct the fan rotation to produce air from either from minimum to maximum velocity. Metal pipe was attached to serve as the passage of used lubricant oil from container to the furnace. The metal pipes is attached to the oil plastic container through the plastic hose. The plastic container was mounted vertically serving as the injector of the oil to the furnace. The injection process is using gravitational force so that the oil container is attached to the metal stand at higher location. Metal epoxy which is heat resistant was used to attain stability in the attachment of the metal tube and pipes. Inovation was done by attaching coconut coir with cement and Cementous water proofing materials as additional feature on the constructed equipment. The purpose is to give way in order to determine if the coconut coir is effective to control the spread of hot temperature outside the equipment. Partial coating of coconut coir with cement and Cementous water proofing facilitated the investigation on the effect on temperature between portions that are coated and non-coated with the coconut coir. Used lubrication oil was utilized to fuel the furnace. Omari (2008) concluded that used lubrication oil is a very significant energy source and represents an energy management opportunity with great potential. There is an acute shortage of petroleum oils so that regeneration of fuels from used lubricating oils can be potential substitute of fossil fuels (Sharma et al, 2015). Two hygrometers were placed 15.00 cm besides the wall of the furnace. One of which is placed within the wall covered with coconut coir while the other is placed on the uncovered area as shown in Figure 1. Thermometers were also used to measure the temperature.

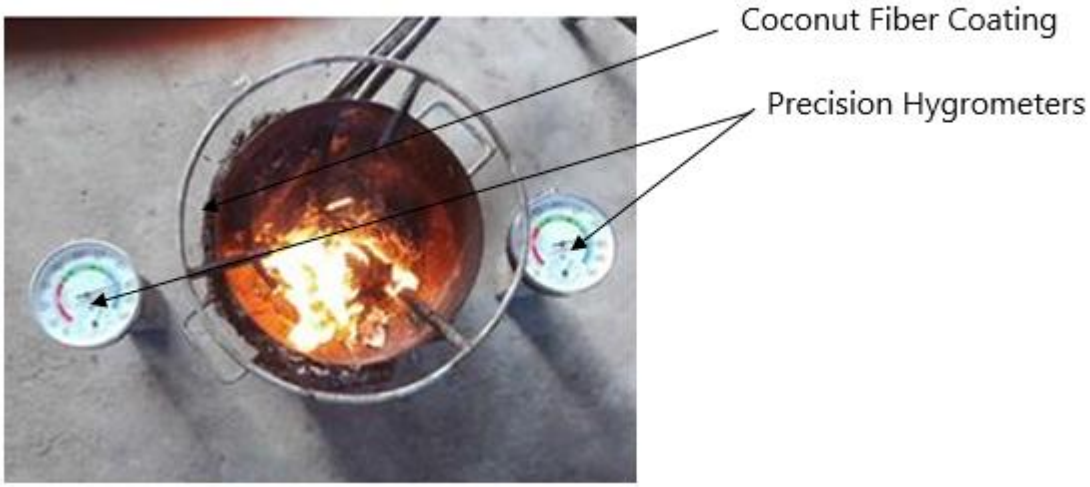


Figure 1: Position of the Hygrometers Within the Furnace

The outside temperature and humidity near the different parts of the melting furnace was investigated specifically that this study looked into the difference between parts coated and non-coated with the coconut coir insulation. Observation was done simultaneously between the area covered and noncovered with coconut coir insulation. A hygrometer is an instrument used to measure the temperature and humidity or moisture content in the air. It provides a quantitative measurement of the amount of water vapor present in the atmosphere. Humidity is an important parameter in meteorology, as it can impact weather conditions, human comfort, and various industrial processes. The parameters used to interpret the humidity of the air are the following:

Table 1: Parameters Used to Interpret the Humidity

Moisture Content (%) in the Air	Interpretation
0-35	Dry
35-65	Perfect
65-100	Humid

Maintaining perfect humidity levels is challenging, but there are several things that can be done to manage and improve humidity conditions, whether they are too high or too low. Suitable indoor air humidity can improve human comfort, optimize indoor air quality and protect indoor furniture items (Yu et al, 2016). The ideal humidity level can vary depending on personal comfort and health considerations. It was recommended to maintain indoor humidity levels between 35% and 565% for it is a perfect humidity based from the device used. Providing a high-quality indoor environment with appropriate indoor humidity levels for residential buildings is essential for good physical and mental health, occupant comfort, and long-term building performance (Liu et al. 2023).

Result and Discussion

The process of insulating the mini melting furnace, its technical aspect, the effect on outside temperature and humidity when ignited with used lubricant oil as fuel were discussed. Time versus temperature and time versus humidity were briefly deliberated.

The Process of Insulating the Mini Melting Furnace

The designed structure of the equipment was shown in figure 2. From the original structure, the partial portions of the metal melting furnace were covered with coconut husk using water,

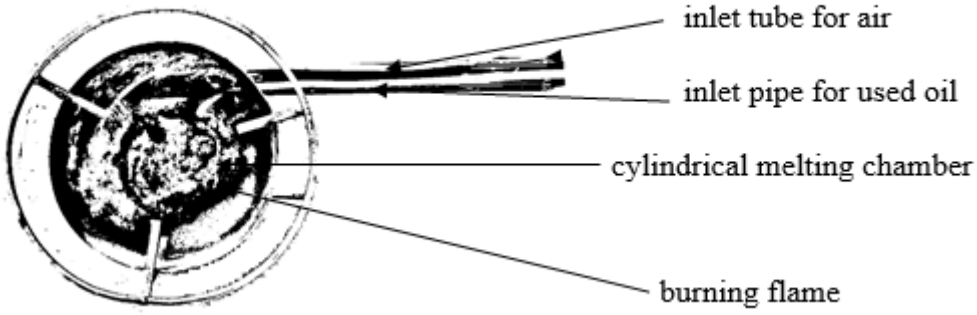


Figure 2: The designed Structure for Melting Operation

Powermix Cementous material and pozzolan cement as the binder. The ratio is 1:1:1 components of coconut husk, power mix and pozzolan cement by weight. The highlight of this study was when half portion of the cylindrical tank was covered with coconut coir using cement and Power mix, a flexible Cementous water proofing as the binding materials. With the designed structure shown in the figure 2 it was modified as shown in figure 3.

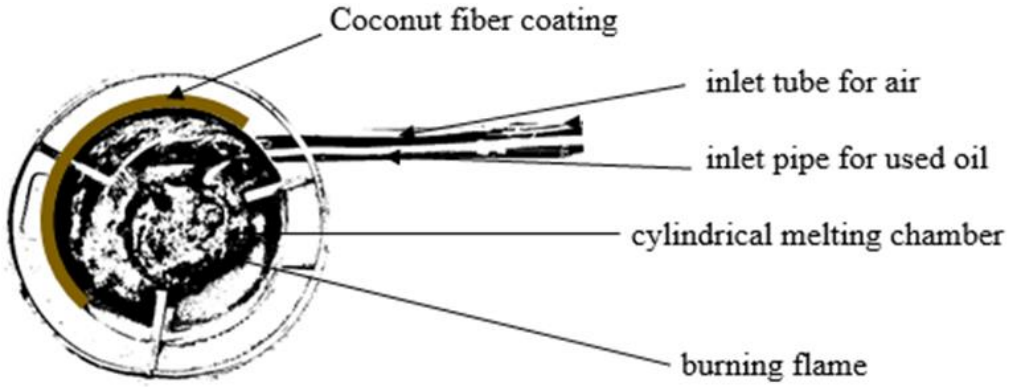


Figure 3: The Designed Structure with Portions Coated with Coconut Coir Fibers

Several steps were followed in order to attach the portion of the coconut coir to the metal melting furnace.

a) With coconut husks as the material, separate the coconut coir from the main bark.
b) Separate more coconut coir to gather substantial coir suited to cover the targeted area of the metal melting foundry furnace then clean it by removing dust particles.
c) Using scissor, cut the separated coir into smaller length to facilitate the pasting of the coir to the metal furnace.
d) Mix the coir with Power mix Cementous material, cement and water as the binding materials.
e) Install the mixture by pasting it to the identified portions of the metal melting furnace.
f) Do the pasting carefully to place the coir in a more stable position.
g) Let the mixture dry for several days.

Figure 4 shows the structure while the procedures were done in attaching the coir to the furnace.



Fig. 4a: The Separated Fibers from the Bark



Fig. 3b: The Cleaned Fibers



Fig. 3c: The cut fibers



Fig. 3d: The fibers mixed with binders



Fig. 3c: The fibers attached in stable condition

Figure 4: Procedures of Attaching the Coconut Fibers to the Furnace.

Technical Aspect of the Melting Furnace.

Insulating the equipment with coconut husk, power mix and pozzolan cement as binder provides new features from the originally built mini metal melting foundry furnace. There is an additional thickness of 16.67% to some area of the wall of the melting foundry furnace and an additional weight of 8.33%. This implies that the weight contributed by the coconut coir is very minimal. Other technical aspect of the equipment from the original structure does not change.

Effect on Outside Temperature Utilizing Used Lubricant Oil as Fuel

Shown in Table 2 is the result of the experimental study demonstrating a set of data related to temperature (t) and humidity (H) at different time points. Observations was also provided. With used lubricant oil burning in the furnace, recording was started at 2:05 PM. The observations indicate a consistent pattern of increasing temperature with decreasing humidity. The final entry at 2:16 PM was noted that the coconut coir cover started to burn, suggesting a significant rise in temperature. It's essential to monitor such changes, especially when there is a noticeable increase in temperature, as it could have safety implications. The conditions became extreme, possibly exceeding the safe operating limits, leading to the ignition of the coconut coir cover. It is apparent in the data that the coconut fiber ignited even when the air

Table 2: Effect on Outside Temperature Using Used Lubricant Oil as Fuel

Time (PM)	No Cover		With Cover		Observation
	T	H	t	H	
2:05	30	75	30	79	Start of recording the data
2:10	34	66	32	74	There is an increase in temperature but decrease in humidity. The air is humid in both area.
2:11	42	59	38	68	There is an increase in temperature with air in non-covered area is perfect while in covered area is humid.
2:12	59	50	43	62	There is an increase in temperature. Humidity becomes perfect in both areas.
2:13	70	44	48	56	There is an increase in temperature. Humidity is perfect in both areas.
2:15	103	39	49	48	There is an increase in temperature. Humidity is perfect in both areas
2:16	108	37	52	46	The temperature is so hot. Humidity is perfect in both areas. The coconut coir cover started to burn

temperature is at perfect condition. Monitoring and controlling temperature and humidity are crucial, especially in situations where materials may be sensitive to heat. Temperature is an important factor that affects thermal conductivity while the influence of humidity on the thermal conductivity was more obvious than that of temperature, hence the variations of thermal conductivity with humidity were studied at a constant temperature as Wang et al, (2023) cited that when building materials are exposed to different temperature and relative humidity conditions, their thermal insulation performance will change. Coconut coir is frequently used as a coating material in certain applications, but being organic can burn easily under high temperatures.

Used lubricant oil generate significant amounts of heat and create an environment where nearby materials, such as coconut coir, can easily catch fire. This contains residues, chemicals, and carbon particles that makes the material even more flammable leading to intense localized heat within the furnace. Although perfect humidity implies an environment where the coir's moisture content is low enough to be flammable, but is not so high that the material would be damp and difficult to ignite. Excessive carbon buildup or accumulation of oily residues possibly contributed to the ignition of nearby materials like the coconut coir. Although cement and Powermix are typically designed to be heat-resistant, but under extreme temperatures can undergo chemical changes or degradation, especially if they are exposed to high heat for extended periods. Powermix, as a cementitious material, could contain additives or polymers that might degrade under intense heat, potentially releasing flammable gases or chemicals contributing to the ignition of the underlying coconut coir.

Time Versus Temperature

The graph of time vs. temperature is shown in figure 5 where y axis represents the temperature and the x axis represents the time.

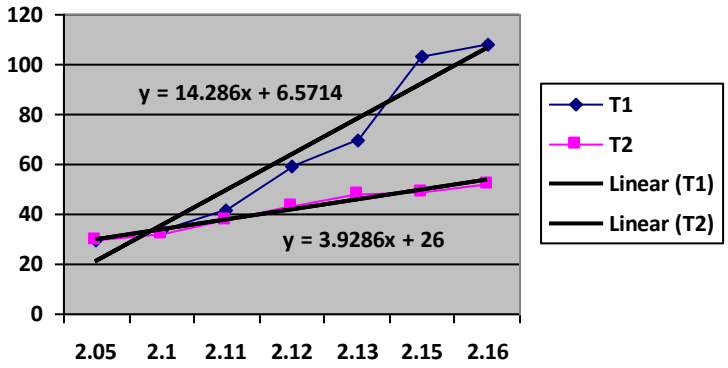


Figure 5: The Graph of Time Versus Temperature

The equations were determined representing linear relationships between two variables, where y is the dependent variable, and x is the independent variable. For the portion of the furnace not covered with the coconut fiver, the linear (T_1) equation is:

$$y=14.286x+6.5714$$

if differentiated the equation will become:

$$\frac{d_y}{d_x} = 14.286$$

The coefficient of 14.286 represents the slope which is the rate of change of temperature with respect to time while the constant 6.5714 is the y-intercept, representing the initial temperature when time is zero. On portions of the furnace covered by the coconut fibers, the linear (T_2) equation is:

$$y=3.9286x+26$$

if differentiated the equation will become:

$$\frac{d_y}{d_x} = 3.9286$$

the coefficient of 3.9286 represents the slope of the line which is the rate of change of temperature with respect to time while the constant 26 is the y-intercept, representing the initial temperature when time is zero for the covered parts of the furnace. The rate of change of temperature with respect to time is significantly higher for the portion of the furnace not covered with coconut fiber at 14.286 degrees per unit of time compared to the portion covered with the fiber at 3.9286 degrees per unit of time. This shows that the presence of coconut fiber has an effective cooling effect on the furnace environment by slowing down the temperature increase. The coconut fiber serves as an insulating material, acting as a barrier that delays the rapid transfer of heat. This is helpful in scenarios where temperature control is vital, as it helps sustain a more stable and moderate temperature in the covered portions of the furnace. However, a certain limitation is seen in the fact that the coconut fiber ignited in a shorter period of time while the used lubricant oil is burning inside the furnace. This shows a potential vulnerability in relying solely on coconut coir for insulation, as its flammability might compromise its usefulness in certain conditions. Balancing the benefits of temperature regulation with the fire risk associated with the chosen insulation materials becomes a critical consideration in the overall design and safety of the furnace system. Sharahi & Sawlan (2023) were used to estimate temperature and dependent thermal conductivity that has many engineering and industrial applications, such as those for the building sector and chemical reactors. Another approach to estimate thermal conductivity is using a simple integral approach considering the estimation of temperature as dependent parameters in a one-dimensional heat equation heated from one end and insulated from the other end (Kim et al, 2002).

Time Versus Humidity

The graph of time vs. humidity is shown in figure 6 where y axis represents the temperature and the x axis represents the time. The data was taken at the moment that the temperature was recorded for the same period of time. The equations were determined representing linear relationships between two variables, where y is the dependent variable, and x is the independent variable. For the portion of the furnace not covered with the coconut fiver, the linear (H_1) equation is: $y = -6.5357x + 79$

If differentiated, the equation will become:

$$\frac{d_y}{d_x} = -6.5357$$

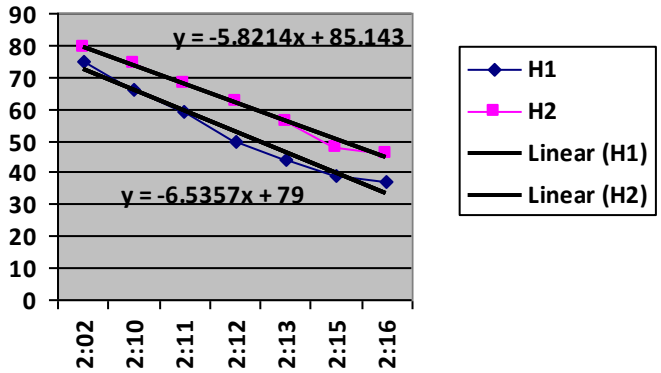


Figure 6: Graph of Time Versus Humidity

The coefficient of -6.5357 represents the slope of the line is the rate of change of humidity which is decreasing with respect to time while the constant term 79 is the y-intercept, representing the initial temperature when time is zero. On portions of the furnace covered by the coconut fibers, the liner (H_2) equation is:

$$y = -5.8214x + 85.143$$

If differentiated, the equation is:

$$\frac{d_y}{d_x} = -5.8214$$

The coefficient of 5.8214 is the rate of change of humidity which is decreasing with respect to time while the constant 85.143 is the y-intercept, representing the initial temperature when time is zero. It appears that the coconut fibers slow down the decrease in humidity during the burning of the furnace which is demonstrated by the different coefficients in the two equations. The initial humidity levels also vary between the two situations. Coconut fiber was found to be the preferred insulator because it has the required attributes to maintain thermal comfort and improve the energy efficiency specifically on residential dwellings (Iwaro & Mwasha, 2019).

Conclusion

The mini metal furnace was constructed by incorporating an additional element into the apparatus which was used to investigate the effectiveness of coconut coir in regulating the dispersion of high temperatures beyond the equipment. This involved applying a partial covering of coconut coir with cement and cementitious waterproofing to examine the impact on temperature and humidities in areas covered and uncovered by the coir. Coating the mini metal melting furnace with a mixture of coconut husk powder and pozzolan cement introduces new features. Some areas of the furnace walls adjusted to 16.67% increase in thickness and an additional weight of 8.33%. However, the total weight attributed to the coconut coir remains negligible. Other technical features of the furnace, aside from these changes, remain unchanged

from the original design. During a brief period of burning using used lubricant oil as fuel in the metal furnace, it was noted that the outside temperature increased more rapidly in areas without coconut coir coverage compared to those covered with the coir. Additionally, humidity displayed a rapider decrease in the uncovered areas than in the sections protected by coconut coir. However, the coconut coir coating ignited at extreme temperature and perfect humidity in air. The coconut coir as the materials used to control the increase of the outside temperature in the furnace can be adopted at higher temperature only but is not capable to resist the combustion at extremely high condition.

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FINANCIAL INCLUSION AND BANK EFFICIENCY: EVIDENCE FROM ASEAN-6 BANKING SECTOR

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***Abstract*:** Previous research extensively documents the influence of financial inclusion on economic growth, the stability of banks, and the alleviation of poverty. However, the empirical evidence on the influence of financial inclusion on bank efficiency is noticeably absent. It seems surprising because the banking sector remains important as a channel for saving and resource allocation. This paper delves into the relationship between financial inclusion and bank efficiency within the ASEAN-6 banking sector. This paper employed the Data Envelopment Analysis (DEA) method and Ordinary Least Squares (OLS) regression analysis from 2013 to 2021. Our findings show that the impact of financial inclusion and bank efficiency is not uniform within the ASEAN-6 banking sector. This suggests that as the global financial landscape undergoes transformative shifts, understanding the dynamics between these crucial variables becomes imperative to achieving financial inclusion policies. These policies should be targeted at finding a way that suits the nature of consumers, especially the unbanked and vulnerable populations, where it may hamper the financial inclusion goals.

Keyword: *Bank efficiency, Financial inclusion, DEA method, OLS regression, ASEAN-6 banking sector.*

1.0 Introduction

The banking sector is a critical pillar of financial systems in both developing and emerging economies, accounting for over 70% of total financial assets. A well-functioning and profitable banking sector enhances economic growth by ensuring efficient financial intermediation, optimal resource allocation, and increased liquidity for productive investments (Sufian et al., 2016). Banks also facilitate transactions through payment services, contributing to the smooth operation of economic activities.

Understanding the banking sector is essential for both developed and developing nations. In developing economies, regulators and policymakers must strike a balance between financial regulation and economic growth, considering measures such as capital requirements and activity restrictions (Admati & Hellwig, 2013). An efficient banking system serves as the primary channel for monetary transmission and provides crucial financial support to households and businesses (Fase & Abma, 2003; Andersen & Tarp, 2003).

In recent years, financial inclusion has gained prominence as a key policy objective due to its potential to enhance banking efficiency and economic stability. Financial inclusion fosters greater reliance on banking transactions, leading to improved financial sustainability and more effective monetary policies (Mehotra & Yetman, 2015). Research highlights its significant benefits, including economic growth (Kim et al., 2018), financial stability (Neaime & Gaysset, 2018), poverty alleviation (Koomson et al., 2020), reduced income inequality (Huang & Zhang, 2020), and financial risk mitigation (Ozili, 2021).

Within ASEAN, financial inclusion is a central component of the ASEAN Economic Community (AEC) 2025 vision, recognized as one of its three key pillars. A dedicated working group has been established to drive financial inclusion efforts (ADB, 2013). However, challenges persist, particularly in developing ASEAN nations, where financial inclusion gaps remain significant compared to advanced economies (Demirguc-Kunt et al., 2020). Furthermore, its impact on bank efficiency within the ASEAN-6 banking sector remains an open question (Nguyen & Du, 2020).

This study explores the impact of financial inclusion on the efficiency of the ASEAN-6 banking sector, considering the sector's critical role in promoting inclusion. Using data from 200 banks across ASEAN-6 economies—each with varying income levels—this study aims to provide a nuanced analysis of financial inclusion's effects across different economic conditions. The existing literature primarily consists of single-country studies (Muiruri & Ngari, 2014; Ikram & Lohdi, 2015; Chauvet & Jacolin, 2017; Oranga & Ondabu, 2018; Shihadeh et al., 2018), limiting generalizability. This study fills the gap by conducting a cross-country analysis that incorporates diverse financial inclusion indicators, considering both demand- and supply-side perspectives (Le et al., 2019).

To assess banking efficiency, this study employs Data Envelopment Analysis (DEA) along with the Ordinary Least Squares (OLS) regression model, providing a comprehensive examination of efficiency determinants. Findings will help bank managers implement strategies to enhance efficiency, contributing to the sector's long-term sustainability. Additionally, the study accounts for internal and external factors influencing bank efficiency. Internal factors include bank-specific characteristics such as size, credit risk, profitability, liquidity, capitalization, cost structure, and diversification. External factors encompass macroeconomic variables such as GDP growth, inflation, market concentration (CR3), and unemployment, which previous studies have identified as key determinants of bank efficiency.

The structure of this paper is as follows: Section 2 presents a detailed review of existing literature on financial inclusion and bank efficiency. Section 3 outlines the research methodology and data sources. Section 4 discusses key findings, while Section 5 provides conclusions and policy implications.

2.0 Literature Review

The literature on financial inclusion and bank profitability has gained significant attention in recent years, particularly in emerging markets, yet research on the ASEAN-6 banking sector remains limited. Financial exclusion is widely recognized as a barrier to economic growth, exacerbating poverty, increasing costs for vulnerable populations, and hindering overall development (Sinclair et al., 2009). In contrast, financial inclusion fosters economic growth,

reduces poverty, and enhances financial stability (Mehrotra & Yetman, 2015). Several studies emphasize that financial inclusion not only generates increased revenue for banks but also amplifies broader socio-economic benefits (Shihadeh et al., 2018; Issaka et al., 2020; Kumar et al., 2020; Aleitan et al., 2022).

In emerging Asian markets, financial inclusion has been found to significantly contribute to bank performance (Vo et al., 2021). Similarly, Kim et al. (2018) and Ali et al. (2021) found a strong positive correlation between financial inclusion and financial development in OIC countries, while Ahmad et al. (2020) demonstrated that financial inclusion benefits banks based on a global sample of 1,740 banks.

Financial inclusion enhances banking stability by expanding deposit bases, diversifying credit portfolios, and increasing savings (Mehrotra & Yetman, 2015). The accessibility dimension, particularly the number of bank branches and ATMs, has been found to be directly proportional to financial inclusion and bank performance (Arora, 2010; Sharma, 2016). Several studies highlight a positive relationship between financial inclusion indicators and bank performance, such as the number of bank accounts per 1,000 adults (Gupte et al., 2012) and commercial bank loan penetration (Sarma, 2008).

Income levels also play a crucial role in financial access, with higher-income East Asian countries having greater banking infrastructure compared to lower-income South Asian nations (Arora, 2010). Furthermore, studies indicate that banking services such as credit and debit card usage significantly enhance bank performance in emerging Asian markets (Akhisar et al., 2015; Vo et al., 2021; Le et al., 2019). Despite these positive findings, some studies present mixed or contradictory results. Ikram & Lohdi (2015) found that while financial inclusion positively impacted bank profitability in Pakistan, the effect was not statistically significant. Similarly, Kondo (2010) observed that ATMs did not significantly influence bank profitability in Japan. Shihadeh et al. (2018) noted that while financial inclusion increases bank profits through ATM usage and credit card penetration, it may also limit profitability by reducing SME deposits and increasing operational costs.

Financial inclusion can also expose banks to higher risks. While increased deposits reduce withdrawal risks during financial strain, greater loan volumes heighten credit risk (Han & Melecky, 2013). Banks serving financially excluded populations often face high transaction costs and administrative expenses (Burgess & Pande, 2005). Moreover, financial inclusion can contribute to rising nonperforming loans, which negatively impact bank profitability (Shihadeh & Liu, 2019; Athanasoglou et al., 2008; Tan et al., 2017).

3.0 Methodology and Data Sources

The panel dataset used in this study comprises data from 200 banks across six ASEAN countries—Singapore, Malaysia, Thailand, Vietnam, Indonesia, and the Philippines—from 2013 to 2021.

Table 1: Variables of Inputs and Outputs

Variable	Variable Name	Definitions
Input	Physical Capital	Fixed Assets
	Deposits	Total Deposits, Money Market and Short-Term Funding
	Labour	Personnel Expenses
Output	Loans	Total Loans
	Investment	Total Securities
	Net Interest Income	Other than Investment Fees

Sources: Fitch Connect Database

Table 1 presents the variables used in the non-parametric DEA to measure the dependent variable. The DEA method was first applied in banking by Benston (1965), while Sealey and Lindley (1977) introduced the intermediation approach, widely used to minimize costs in financial transactions. The selection of inputs and outputs follows previous DEA studies (Sufian & Habibullah, 2014; Kamarudin et al., 2017; Alexakis et al., 2019).

Explanatory variables, including bank-specific and macroeconomic factors, were sourced from the World Development Indicator (WDI) database. The final sample covers over 75% of total banking assets in Singapore, Malaysia, Thailand, Vietnam, Indonesia, and the Philippines. Table 2 summarizes the independent variables.

Financial inclusion is measured through accessibility and usage indicators. Accessibility includes five metrics, such as the number of bank branches and ATMs per 1,000 adults and per 1,000 km², and bank accounts per 1,000 adults. Usage is assessed through four indicators: the number of credit and debit cards per 1,000 adults, and outstanding deposits and loans. These variables were obtained from the Financial Access Survey (FAS) database.

The study applies OLS regression to analyse the relationship between financial inclusion and bank efficiency. Banker & Natarajan (2008) and McDonald (2009) confirm that using a two-stage DEA-OLS approach yields consistent estimators, making OLS a reliable method in this context.

3.1 Model Specification

To measure bank efficiency, the study employs the Data Envelopment Analysis (DEA) method to assess the technical efficiency (TE) of the ASEAN-6 banking sector, following the Ruggiero (1996) method. The DEA method is non-parametric, requiring no functional form for technical, cost, or revenue functions, and is individual-firm-based, making it suitable for studying scope economies. It solves the optimisation problem separately for each firm in the sample, optimising over individual firms. The DEA method can be applied effectively to situations with few decision-making units, unlike econometrics, which requires larger samples for statistical reliability.

The CCR model, introduced by Farrell in 1957, is a generalisation of efficiency and uses the constant returns to scale (CRS) assumption to calculate overall technical efficiency (OTE). However, this assumption is incorrect in markets with weak competition. Banker et al., (1984) modified the CCR model by allowing variable returns to scale (VRS), resulting in the BCC

model. The CRS assumption is valid only if every DMU operates at an optimal scale, preventing scale inefficiency (SIE) from contaminating OTE measures.

Banker et al., (1984) expanded the CCR model by relaxing the CRS assumption and used the BCC model to assess the efficacy of decision-making units (DMUs) described by VRS. VRS assumptions determine the aggregate efficiency (TE) result and divide it into PTE and SE. The TE score quantifies efficiency in ASEAN-6 countries, while the PTE measures managerial efficiency without scale contamination. The study suggests that VRS results may offer more reliable information on DMU efficiency than CRS results. If there is a disparity between the CRS and VRS TE scores for a DMU, it indicates the presence of scale inefficiency (SIE). To determine the type of SIE under VRS, an extra DEA problem with non-increasing return to scale (NIRS) is solved. This helps determine if decision-making units (DMUs) that are not efficient at scale have increasing (IRS) or decreasing returns to scale (DRS).

4.0 Results and Discussions

In Table 5, we present the results of our panel data regression analysis, which examines the relationship between bank efficiency and financial inclusion indicators.

Table 5: Regression Results for ASEAN-6 countries

	All Countries				
Explanatory Variables	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Constant	-1.06001***	-	-11.1573***	-11.4632***	-11.6953***
	(0.20176)	11.28973***	(1.21422)	(1.19654)	(1.23953)
		(1.20108)			
Bank-Specific Characteristics					
LN (LLP/TL)	-0.00467	-0.00555	-0.005545	-0.003444	-0.005226
	(0.00623)	(0.006268)	(0.00628)	(0.006277)	(0.006272)
LN (ROA)	0.021376*	0.0228308*	0.022539*	0.029398**	0.023952*
	(0.013038)	(0.012677)	(0.012696)	(0.012336)	(0.012693)
LN (NII/TA)	0.056723***	0.054432***	0.053983***	0.054016***	0.054706***
	(0.015587)	(0.015181)	(0.015176)	(0.015301)	(0.015270)
LN (NIE/TA)	-0.26139***	-	-	-0.227519***	-
	(0.038160)	0.244127***	0.241887***	(0.387185)	0.245657***
		(0.038847)	(0.038847)		(0.393372)
LN (EQASS)	0.109817***	-0.067866**	0.069323**	0.078321**	0.069163**
	(0.007002)	(0.03471)	(0.034769)	(0.378149)	(0.035353)
LN (TA)	-	-	-	-	-0.03909***
	0.018832***	0.035581***	0.034645***	0.0480082***	(0.008179)
	(0.007001)	(0.007488)	(0.007524)	(0.007536)	
LN (LOANS/TA)	-0.028967	-0.025023	-0.0252711	-0.016515	-0.023194
	(0.033209)	(0.032092)	(0.032108)	(0.031086)	(0.32284)
Macroeconomic Conditions					
LN (INF)	-	0.045331***	0.047582***	0.049752***	0.043410***
		(0.011795)	(0.011588)	(0.11515)	(0.012003)
LN (CR3)	-	1.63542***	1.56738***	1.29863***	1.71948***
		(0.288359)	(0.293778)	(0.291874)	(0.292455)
LN (UNEMP)	-	-	-	-0.101405***	-
		0.122193***	0.115302***	(0.293601)	0.135689***
		(0.308732)	(0.032286)		(0.033341)
LN (GDP)	-	0.152193***	0.151399***	0.243769***	0.167039***
		(0.024995)	(0.025173)	(0.27158)	(0.028668)
Financial Inclusion Indicators					

LN (ATM_ADULTS)	-	-	0.033969 (0.28249)	-	-
LN (BRANCH_ADULTS)	-	-	-	-0.286548*** (0.49383)	-
LN (ATM_KM2)	-	-	-	-	-0.065462 (0.54368)

Note: Bank risk can be calculated as LLP/TL = total loan loss provision over total loans. Capitalization can be calculated as EQASS= book value of shareholders equity as a fraction of total assets. Costs can be calculated as NIE/TA = non-interest expenses over total assets. Bank profitability can be calculated as ROA = profit after tax over total assets. Bank size can be calculated as TA = natural logarithm of total assets. Diversification can be calculated as NII/TA = non-interest income over total assets. Liquidity risk can be calculated as TL/TA = total loans over total assets. GDP = natural log of gross domestic products. INF = the rate of inflation. CR3= the three largest banks asset concentration ratio. UNEMP = unemployment rate. ATM_ADULTS = the number of ATM per 1,000 adults. BRANCH_ADULTS = the number of branches per 1,000 adults. ATM_KM2 = the number of ATM per 1,000 km^2 .BRANCH_KM2 = the number of branches per 1,000 km^2. BANK_ACC = the number of bank account. CRE_CARD = the number of credit card. DEB_CARD = the number of debit card. OUT_LOAN = the number of outstanding loans. OUT_DEPO = the number outstanding deposits.

***, ** and * indicate significance at 1, 5 and 10 % level

(cont.) Table 5: Regression Results for ASEAN-6 countries

	All Countries					
Explanatory Variables	**Model 7**	**Model 8**	**Model 9**	**Model 10**	**Model 11**	**Model 12**
Constant	-11.1817*** (0.006257)	-11.4059*** (1.24359)	-10.9248*** (1.24778)	-10.5421*** (1.16931)	-11.6024*** (1.20301)	-11.1906*** (0.00622)
Bank-Specific Characteristics						
LN (LLP/TL)	-0.005352 (0.006257)	-0.005581 (0.006275)	-0.004521 (0.006171)	-0.005139 (0.006401)	-0.003583 (0.006190)	-0.004824 (0.006222)
LN (ROA)	0.023825* (0.12668)	0.023652* (0.13003)	0.019122* (0.012859)	0.023674* (0.012604)	0.023637* (0.12341)	0.020072* (0.12606)
LN (NII/TA)	0.054223*** (0.015128)	0.056006** (0.015438)	0.049435** (0.15324)	0.051509** (0.15099)	0.051201** (0.014919)	0.048085** (0.015197)
LN (NIE/TA)	-0.240796*** (0.38983)	-0.249151** (0.039708)	-0.227749** (0.39447)	-0.230397** (0.396623)	-0.205269** (0.039999)	-0.228769** (0.038495)
LN (EQASS)	0.065418* (0.34509)	0.066127* (0.34747)	0.078356** (0.035989)	0.067687* (0.035746)	0.079698** (0.378201)	0.097282** (0.37857)
LN (TA)	-0.037062*** (0.007393)	-0.039037** (0.010589)	-0.020937* (0.011056)	-0.032449** (0.007559)	-0.029136** (0.007092)	N/A
LN (LOANS/TA)	-0.023199 (0.031999)	-0.025531 (0.319622)	-0.029767 (0.32539)	-0.021023 (0.032621)	-0.027651 (0.322403)	-0.032105 (0.32811)
Macroeconomic Conditions						
LN (INF)	0.0437844*** (0.11989)	0.042461** (0.111931)	0.047781** (0.011471)	0.053514** (0.12298)	0.045742** (0.114998)	0.052176** (0.011089)

LN (CR3)	1.60224*** (0.287460)	1.68358*** (0.306699)	1.44092*** (0.307977)	1.22602*** (0.30758)	1.200029*** (0.306249)	1.56963*** (0.284615)
LN (UNEMP)	-0.116484*** (0.029887)	-0.127572*** (0.031549)	-0.115412*** (0.31751)	-0.11795*** (0.30939)	-0.092285*** (0.306181)	-0.108068*** (0.317302)
LN (GDP)	0.161639*** (0.258234)	0.156209*** (0.26219)	0.145201*** (0.261137)	0.152149*** (0.02461)	0.194447*** (0.236181)	0.166929*** (0.258706)
Financial Inclusion Indicators						
LN (BRANCH_KM2)	-0.074688* (0.042348)	-	-	-	-	-
LN (BANK_ACC)	-	-0.022809 (0.32313)	-	-	-	-
LN (CRE_CARD)	-		0.082887** (0.03569)	-	-	-
LN (DEB_CARD)	-	-	-	0.125370** (0.051715)	-	-
LN (OUT_LOAN)	-	-	-	-	0.23296*** (0.455704)	-
LN (OUT_DEPO)	-	-	-	-	-	- 0.036537*** (0.006542)

Note: Bank risk can be calculated as LLP/TL = total loan loss provision over total loans. Capitalization can be calculated as EQASS= book value of shareholders equity as a fraction of total assets. Costs can be calculated as NIE/TA = non-interest expenses over total assets. Bank profitability can be calculated as ROA = profit after tax over total assets. Bank size can be calculated as TA = natural logarithm of total assets. Diversification can be calculated as NII/TA = non-interest income over total assets. Liquidity risk can be calculated as TL/TA = total loans over total assets. GDP = natural log of gross domestic products. INF = the rate of inflation. CR3= the three largest banks asset concentration ratio. UNEMP = unemployment rate. ATM_ADULTS = the number of ATM per 1,000 adults. BRANCH_ADULTS = the number of branches per 1,000 adults. ATM_KM2 = the number of ATM per 1,000 km^2 .BRANCH_KM2 = the number of branches per 1,000 km^2. BANK_ACC = the number of bank account. CRE_CARD = the number of credit card. DEB_CARD = the number of debit card. OUT_LOAN = the number of outstanding loans. OUT_DEPO = the number outstanding deposits.

***, ** and * indicate significance at 1, 5 and 10 % levels.

The coefficients for BRANCH_ADULTS and BRANCH_KM2 are statistically significant and negatively associated with bank efficiency in ASEAN-6, suggesting that reducing branch networks can enhance efficiency. Harimaya & Kondo (2016) argue that excessive branch expansion leads to inefficiencies due to rising operational costs, increased non-performing loans, and a shift toward digital banking (Kumar et al., 2021). However, studies by Chen et al. (2018) and Shihadeh & Liu (2019) suggest that branch expansion enhances financial intermediation and risk diversification, particularly in underserved areas (Bernini & Brighi, 2018).

The coefficients for ATM_ADULTS and ATM_KM2 are statistically insignificant but show opposite trends. While ATM_ADULTS positively correlates with efficiency, supporting findings from Holden & El-Bannany (2004), ATM_KM2 has a negative relationship, aligning with Shihadeh et al. (2018) and Kondo (2010), who argue that excessive ATM deployment leads to inefficiencies. Similarly, the coefficient for BANK_ACC is statistically insignificant and negatively related to efficiency, suggesting that increased bank account penetration alone does not enhance performance due to transaction costs and dormant accounts (Le et al., 2019; Shihadeh & Liu, 2019; Arora, 2010).

Conversely, CRE_CRD, DEB_CRD, and OUT_LOANS are statistically significant and positively associated with bank efficiency, indicating that digital payment adoption and credit expansion drive cost efficiency and financial performance (Alfonso & Florence, 2014; Frame & White, 2012; Vo et al., 2021). Digital banking innovations have played a key role in improving risk management and operational efficiency (Akhisar et al., 2015; Muiruri & Ngari, 2014).

However, OUT_DEPO is negatively and significantly related to bank efficiency, indicating that high deposit volumes may increase transaction costs and liquidity hoarding, leading to inefficiencies (Jose et al., 2016; Le et al., 2019; Petersen & Rajan, 1995). Inefficient deposit mobilization strategies can result in financial resource misallocation, further reducing profitability (Vincent & Sivakumar, 2019).

5.0 Conclusions and Policy Implications

This study examines the relationship between financial inclusion and bank efficiency in the ASEAN-6 banking sector using a sample of 200 banks from 2013 to 2021. Employing DEA to measure efficiency and regression analysis to test relationships, the findings reveal a mixed impact—financial inclusion does not always enhance efficiency and can sometimes lead to inefficiencies. Results indicate that excessive bank branches and high deposit volumes negatively affect efficiency by increasing operational costs and misallocating resources (Issaka Jajah et al., 2020). Optimizing branch networks and shifting toward digital banking can improve cost-effectiveness (Beck et al., 2018). Conversely, credit and debit card usage and outstanding loans positively impact efficiency by increasing transaction volumes and profitability (Sarma, 2010; Vo et al., 2021). However, strict customer identification requirements hinder financial access, necessitating regulatory adjustments like simplified KYC processes and digital identification (De Sousa, 2015; Shukur & Sufian, 2025).

ATM availability and bank account numbers show no significant effect on efficiency, aligning with research suggesting that financial inclusion efforts should prioritize active usage over mere account ownership (Kondo, 2010; Gupte et al., 2012). Policymakers should reassess branch expansion, balancing accessibility with cost efficiency by promoting fintech and agent banking (Park & Mercado, 2015). The positive impact of digital transactions suggests a need for financial literacy programs and incentives to expand digital payments (Vincent & Sivakumar, 2019).

Responsible lending plays a crucial role in efficiency, requiring risk-based pricing models and microfinance programs to expand credit while managing loan quality (Frączek, 2019; Arora, 2010). Additionally, financial education campaigns can empower low-income populations to

make informed financial decisions, fostering long-term inclusion (Arshad, 2022). Overall, financial inclusion strategies should balance access with banking efficiency. Future research should explore financial technology and alternative service delivery mechanisms to optimize inclusion policies in emerging economies (Le et al., 2019; Gupte et al., 2012).

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BALANCING PRIVACY AND INNOVATION: LEGAL CHALLENGES OF AGRICULTURAL DRONES IN MALAYSIA

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Abstract: *The use of unmanned aerial vehicles (UAVs), or drones, in Malaysian agriculture has introduced new efficiencies in crop monitoring, precision farming, and resource management. However, the deployment of drones raises significant privacy concerns, particularly regarding unauthorised data collection, surveillance, and potential misuse of farmers' personal and land information. The legal framework governing agricultural drones in Malaysia remains fragmented, creating uncertainties in balancing technological advancement with privacy protection. This study explores the legal implications of privacy issues related to agricultural drones in Malaysia. Using a library research methodology, it examines relevant laws, including the Personal Data Protection Act 2010 (PDPA), the Civil Aviation Regulations under the Civil Aviation Authority of Malaysia (CAAM), and other regulatory guidelines affecting drone operations. Findings indicate that Malaysia lacks specific regulations addressing privacy risks associated with drones in agriculture. Current laws primarily focus on general data protection and aviation safety but do not provide clear guidelines on aerial surveillance, consent requirements, and liability for privacy breaches. This regulatory gap leaves farmers vulnerable to unauthorised data collection and potential infringements of their privacy rights. The study highlights the urgent need for a comprehensive legal framework that explicitly addresses privacy risks in agricultural drone usage. Recommendations include updating existing laws to incorporate specific drones privacy protections, enforcing stricter consent mechanisms, and promoting awareness among farmers about their data rights. By addressing these legal gaps, Malaysia can promote responsible drone deployment while safeguarding the privacy of its agricultural sector.*

Keywords: *Unmanned Aerial Vehicles, Drones, Agriculture, Plantation, Legal*

Introduction

The use of unmanned aerial vehicles (UAVs), sometimes known as drones, in the Malaysian agriculture has transformed traditional farming operations. These modern technologies provide numerous advantages, including improved crop monitoring, precision farming, and effective resource management (Rishikesavan et al., 2024). Drones equipped with high-resolution cameras and sensors may collect extensive data on crop health, soil conditions, and insect infestations, allowing farmers to make more informed decisions and increase productivity (Barve et al., 2024).

However, broad usage of drones in agriculture creates serious privacy problems. Unauthorised data gathering, spying, and the possible exploitation of personal and land information all pose serious threats to farmers' privacy (Sindiramutty et al., 2024; Kaur, et al., 2022). The lack of explicit rules addressing these issues exacerbates the situation, making farmers vulnerable to privacy violations.

This study seeks to investigate the legal problems connected with balancing privacy and innovation in the use of agricultural drones in Malaysia. This research finds gaps and uncertainties in existing legislation by reviewing the present legislative framework, which includes the Personal Data Protection Act 2010 (PDPA) and the Civil Aviation Regulations under the Civil Aviation Authority of Malaysia (CAAM). The study's goals are to emphasise the need for a complete legislative framework that expressly tackles privacy threats, to propose changes to existing laws, and to promote tighter consent methods. The findings of this study are crucial because they highlight the urgent need for regulatory reforms to enable responsible drone deployment while protecting farmers' privacy rights. By fixing these legislative gaps, Malaysia may promote a sustainable and privacy-conscious agriculture sector that fully utilises drone technology.

State of Drone Technology in Agriculture

Recent advancements in drone technology have shown transformative promise for precision agriculture. These developments encompass enhanced airborne platforms, advanced sensors, and integration with artificial intelligence (AI) and Internet of Things (IoT) technologies, which augment data collection and analytical capabilities. Drones are progressively utilised for diverse agricultural purposes, including crop health assessment, precision application, and irrigation oversight, enhancing production and sustainability. Nonetheless, obstacles such as restricted battery longevity, regulatory constraints, and data processing intricacies persist. The subsequent sections outline the present innovations and prospective uses of drone technology in precision agriculture.

Monitoring Crop Health and Detecting Diseases

Drones outfitted with multispectral and hyperspectral sensors may acquire high-resolution images, facilitating the early identification of crop diseases and the assessment of crop health. This capability facilitates prompt interventions, mitigating yield losses and enhancing food security (Barve et al., 2024; Lajurkar et al., 2025). Advanced picture data analysis technologies, augmented by AI, facilitate the identification of damaged or faulty plants, offering farmers practical insights for crop management (Barve et al., 2024; Bafila & Singh, 2024). Moreover, the capacity to surveil extensive regions swiftly and effectively enables farmers to address problems more promptly, perhaps safeguarding entire harvests from disease epidemics.

Precision Application and Pest Control

Drones provide precise application of pesticides and fertilisers, fostering focused Interventions that reduce environmental effect relative to traditional ways (Rishikesavan et al., 2024; Barve et al., 2024). The utilisation of drone-mounted sprayers enhances coverage and chemical efficacy, rendering spraying operations more rapid and efficient (Barve et al., 2024). This accuracy diminishes the quantity of pesticides used, hence reducing expenses, and lessening

the environmental impact of agricultural methods. Furthermore, drones can penetrate inaccessible regions, guaranteeing that every section of a field has the requisite treatments.

Management of Irrigation

Drones outfitted with remote sensing technology deliver high-resolution data on soil moisture fluctuation, enhancing irrigation scheduling and resulting in water conservation and increased crop yields (Ashaq et al., 2024). The amalgamation of IoT with drones facilitates autonomous data acquisition from sensor networks, optimising irrigation management and diminishing manpower requirements (Elhesasy et al., 2024). This method guarantees the efficient utilisation of water resources, which is especially crucial in areas experiencing water scarcity. Drones facilitate accurate irrigation, thereby preserving soil health and averting overwatering, which may result in nutrient runoff and soil erosion.

Empirical Decision-Making Based on Data

Drones provide real-time, high-quality agricultural data, facilitating informed decisions that enhance yields and optimise farm management (Nithya et al., 2024; Marian et al., 2024). The amalgamation of AI and IoT in drones improves accuracy and precision in agricultural activities, facilitating data-driven decision-making processes (Komatineni et al., 2024). This data-centric methodology facilitates more accurate and prompt responses, resulting in enhanced crop management and increased yield. Moreover, the capacity to examine temporal trends enables farmers to foresee forthcoming issues and strategise accordingly.

The improvements in drone technology are transforming precision agriculture, providing substantial advantages while also posing obstacles that must be resolved to fully harness their potential. As technology advances, it is imperative for regulatory frameworks to adapt, maximising the advantages of drone technology while minimising associated hazards. By confronting these difficulties, the agricultural sector may advance towards more sustainable and efficient practices, thereby enhancing global food security.

Privacy Concerns in Agricultural Drone Usage

The use of drones in agriculture has raised serious privacy concerns, specifically about unlawful data collection and surveillance, as well as the potential exploitation of farmers' personal and land information. These issues originate from drones' ability to record high-resolution imagery and data across vast distances, which can be accessed and potentially utilised by unwanted individuals. While the integration of drones into precision agriculture benefits production and efficiency, it creates major data security and privacy concerns that must be addressed in order to protect farmers' interests.

Unauthorised Data Collection and Surveillance

Drones can collect massive amounts of data, including high-resolution photos and videos, which may mistakenly capture sensitive information about agricultural operations as well as personal information of farm workers (Sindiramutty et al., 2024; Bergstrom et al., 2022). Regulations like as the Remote Identification of Unmanned Aircraft (Remote ID) require the continuous disclosure of drone identify and location, which can increase privacy concerns by

allowing unauthorised parties to track drone activities (Sciancalepore, 2024). Furthermore, using drones for live video analytics raises additional privacy concerns, since sensitive visual data can be exposed to unauthorised access during transmission and processing, particularly when edge computing is used (Nagasubramaniam et al., 2024). In Malaysia, CAAM oversees drone activities, however the emphasis is mostly on safety and operational regulations, leaving privacy concerns unaddressed.

Possible Misuse Of Farmers' Personal And Land Information

Farmers are concerned about unlawful access, gathering, and sharing of their data with third parties, which might result in the misuse of personal and land information (Kaur et al., 2022). The ambiguity in agreements and legal frameworks for data collecting and sharing can lead to uncertainty and potential violations of data privacy norms, deterring farmers from embracing new technology (Kaur et al., 2022). Large-scale UAS platforms, while advantageous for data collecting, have additional privacy problems because the operating organisation may have more control over who has access to the data than the farmers (Bergstrom et al., 2022). The lack of explicit rules addressing these privacy hazards in Malaysia exacerbates the situation, as current laws such as the Personal Data Protection Act 2010 (PDPA) do not provide clear guidance on aerial surveillance and consent requirements. This regulatory gap exposes farmers to unauthorised data collection and potential violations of their privacy rights.

Addressing these privacy concerns is critical to building trust and increasing the use of drone technology in agriculture. Implementing comprehensive legal frameworks that explicitly address privacy risks, enforcing stricter consent mechanisms, and raising farmers' awareness of their data rights are critical steps toward ensuring responsible drone deployment while protecting agricultural privacy.

Current Legal Framework Governing Drones in Malaysia

The Civil Aviation Regulations under the CAAM and the Personal Data Protection Act 2010 (PDPA) provide the foundation of Malaysia's legal framework for drones. These regulations are intended to meet the issues faced by the rapid advancement of drone technology, balancing innovation with safety, privacy, and data protection. The CAAM laws address operational elements of drones, whereas the PDPA addresses issues about personal data protection. Together, these principles offer a complete strategy to dealing with the legal issues of drone use in Malaysia.

Civil Aviation Regulations under the CAAM

The Civil Aviation Regulations (CAR) 2016, developed by CAAM, are the principal legislative documents that govern drone activities in Malaysia. These laws aim to ensure the safe integration of drones into national airspace by addressing concerns such as airspace access, operational safety, and drone operator obligations (Rosli et al., 2024). Despite these efforts, present rules are deemed insufficient to keep up with emerging technology like Advanced Air Mobility (AAM) and self-driving drones. The regulations must be modified to reflect new operational ideas and international operations of remotely piloted aircraft systems (RPAS) (Rosli et al., 2024). The CAAM regulations also underline the importance of drone operators receiving training and keeping a log of all flights to ensure accountability and safety in drone

operations (Cracknell, 2017). Furthermore, CAAM laws compel operators to get the proper permissions and follow particular flying limits, which are critical for preserving airspace safety and reducing dangers to both manned and unmanned aircraft.

In addition, CAAM has issued directives such as the Civil Aviation Directive 6011 Part II (CAD 6011 Part II – UAS AGR) to regulate drones' operations in agriculture. These directives are crucial for ensuring the safe and efficient use of drones in agricultural settings, providing guidelines on operational procedures, airspace access, and the responsibilities of drone operators (Onn & Tahir, 2022). However, these directives primarily focus on safety and operational guidelines rather than privacy concerns. This narrow focus leaves significant gaps in addressing the privacy risks associated with drone usage, such as unauthorised data collection and surveillance. As drones become more integrated into agricultural practices, the need for regulations that encompass privacy protection becomes increasingly important.

Personal Data Protection Act 2010 (PDPA)

The PDPA is an important part of Malaysia's legal framework for drones, focused on the protection of personal data gathered by drones. This act is especially important considering the potential for drones to capture and misuse personal information via surveillance and data collection operations (Dei, 2023). The PDPA requires that personal data be treated in a way that protects its security and confidentiality. However, the statute does not extend to data acquired by government entities, raising questions regarding openness and accountability in government drone activities (Leng et al., 2021). The PDPA's efficiency in preserving personal data during the COVID-19 epidemic, when digital tracing was widely utilised, emphasises the importance of strong data protection procedures in the context of drone operations (Leng et al., 2021; Kamaruddin, et al, 2023). Furthermore, the PDPA compels enterprises to get individuals' explicit consent before collecting their data, which is critical for establishing confidence and adhering to privacy standards.

Legal Challenges and Considerations

The integration of drones into national airspace poses various issues, including privacy concerns, airspace congestion, and the need for a robust legislative framework that balances innovation, safety, and privacy (Singh, 2024). The ad coelom principle, which restricts the use of low-altitude airspace, adds new hurdles to Malaysia's commercial drone activities. The concepts of 'avigation easement' and 'drone corridors' are proposed ways to overcome these issues and promote drone incorporation into the airspace (Onn, 2022). A coherent legislative framework that tackles both the operational and data protection aspects of drone usage is essential for guaranteeing the safe and responsible integration of drones into Malaysian society (Ryan et al., 2020). While Malaysia's current legislative structure serves as a foundation for regulating drone activities, important loopholes must be filled to keep up with technological improvements. The CAAM laws and the PDPA provide a foundation, but more research and refinement are required to handle growing difficulties and assure the safe and ethical use of drones. Other nations' experiences in building comprehensive drone legislation, such as the United States and the European Union, can give useful ideas for Malaysia as it works to improve its legal framework (Dei, 2023; Heverly, 2015). Malaysia can create a more resilient and adaptable regulatory framework that encourages innovation while protecting privacy and guaranteeing safety by learning from international best practices.

Impact of Privacy Issues of Drones on Farmers

Farmers are especially concerned about data privacy, unlawful data access, and the possible exploitation of sensitive information obtained by drones. Despite the promise for drone technology to improve agricultural productivity and sustainability, these worries can stymie its implementation. The parts that follow go into detail about the specific impacts of privacy issues on farmers, as well as their perceptions and worries about drone use.

Privacy Issues and Data Security

Farmers are concerned about the privacy of drone-collected data, fearing unlawful access and sharing with third parties, which could result in competitive disadvantages or coercion in decision-making (Bergstrom et al., 2022; Kaur et al., 2022). The ambiguity in data agreements and regulatory frameworks exacerbates these issues, causing uncertainty about data privacy practices and a reluctance to adopt new technology (Kaur et al., 2022). Farmers in North Dakota are wary about large-scale UAS operations due to privacy concerns and a lack of control over who has access to the data (Bergstrom et al., 2022). Furthermore, the possibility of cyber dangers, such as data interception and illegal access, exacerbates these privacy concerns. Farmers are concerned that sensitive information about their agricultural operations, crop yields, and land conditions may be misused by competitors or other malevolent groups, damaging their competitive advantage and operational security.

Farmers' Perceptions and Attitudes

While farmers recognise the efficiency and precision benefits of drones, their adoption is limited by perceived risks, including privacy concerns (Barathkumar et al., 2024; Maulana, et al, 2024). In Thailand, farmers' opinions regarding drones are determined by product quality and perceived value, both of which are influenced by privacy concerns (Suvittawat, 2024). In Malawi, smallholder farmers see the potential of drones to improve farm management but are concerned about data privacy and the repercussions of open data (McCarthy et al., 2023). These perceptions are influenced by previous experiences with technology adoption and trust in regulatory frameworks to protect data. Farmers frequently assess the benefits of enhanced efficiency and productivity against the hazards of potential privacy violations, resulting in a cautious attitude to embracing drone technology.

Impact of Adoption and Use of Drones in Agriculture

Privacy concerns can have a significant impact on farmers' willingness to adopt drone technology, as shown in studies where farmers' attitudes and perceived risks are strong predictors of adoption intentions (Maulana, et al, 2024; Suvittawat, 2024). To address these concerns and enable widespread deployment of drones in agriculture, strong privacy and security safeguards are required (Ongadi, 2024). Government initiatives and legislation that address privacy concerns and establish clear data usage standards might boost trust and encourage farmers to include drones into their operations (Kaur et al., 2022). Authorities can increase farmer confidence by enforcing comprehensive data protection legislation and maintaining openness in data processing methods. Furthermore, giving education and training on data privacy and security will help farmers make informed decisions about drone use, resulting in a more widespread and successful adoption of this technology in agriculture.

Recommendations For Legal Reforms

The integration of drones in agriculture creates both potential and obstacles, particularly in terms of legislative reform. As drones become increasingly common in agricultural techniques, there is an urgent need to revise existing legislation to address privacy concerns and impose stricter permission protocols. This entails combining the advantages of drone technology with the preservation of personal rights and data privacy.

The current legal frameworks frequently lack particular protections for drones, resulting in possible privacy infringement. Hence, legal reforms should incorporate explicit privacy protections adapted to drones' special capabilities, such as high-resolution imaging and data collection (Dei, 2023; Bergstrom et al., 2022). This would entail developing clear criteria for how drone-collected data should be handled, kept, and shared, ensuring that farmers' personal and land information is protected from unwanted access and misuse. Furthermore, implementing worldwide best practices can lay a solid framework for these improvements. Countries such as the United States, the European Union, Japan, and the Netherlands have created rules that can be used as models. These include restrictions on airspace access, minimum distances from settlements, and control over data gathering equipment (Dei, 2023; Reger et al., 2018). By drawing on these models, Malaysia can create comprehensive privacy guidelines that meet the special difficulties faced by agricultural drones. Establishing explicit privacy guidelines for data obtained by drones is critical. This includes norms for data storage, access, and sharing that secure farmers' data from unlawful usage (Kaur et al., 2022; Kotal et al., 2023).

Additionally, legal frameworks should require farmers to provide explicit agreement before any data collecting occurs. This ensures that farmers understand and agree to the data being gathered and its intended use (Kaur et al., 2022; Bergstrom et al., 2022). Transparent data-use regulations are critical for fostering trust among farmers. Agricultural technology vendors should be forced to explain how their data will be used, shared, and preserved. This transparency can assist farmers gain trust and stimulate the use of drone technologies (Kaur et al., 2022; Kotal et al., 2023). Implementing a uniform code of practice for drone operations can assist guarantee that operators follow privacy and consent guidelines. This could include instructions for gaining consent and using data responsibly (Shelley, 2016). Such measures would protect farmers' privacy while also promoting ethical farming practices.

Conclusion

Establishing clear liability for drone operators in the event of privacy violations or data misuse is critical. This involves clarifying drone operators' obligations and the repercussions of noncompliance (Dei, 2023, Shelley, 2016). Liability frameworks should ensure that operators are held liable for any breaches of privacy, thereby discouraging negligent or criminal data management practices. Educational activities are also important for addressing privacy concerns. Educating farmers and drone operators on their privacy rights and obligations can help alleviate privacy issues. This includes training on data protection best practices and the legal ramifications of drone use (Dei, 2023; Kaur et al., 2022).

By raising awareness and giving practical information, these programs can help farmers make educated decisions about drone use. Using privacy-preserving technologies, such as synthetic

data generation, can assist preserve sensitive information while also allowing for data analysis and dissemination (Kotal et al., 2023). These technology solutions can improve data security and protect privacy even as agricultural operations become more data-driven.

Therefore, it could be mentioned that the use of drones in agriculture demands significant legal revisions to address privacy concerns and implement tougher permission systems. Malaysia can ensure that the benefits of drone technology are fully realised while protecting the rights and interests of its agricultural community by revising current legislation, adopting international best practices, and instituting rigorous privacy requirements.

Future research could be directed towards a comparative review of privacy regulations governing drone use in agriculture across different countries. This research could identify best practices and make recommendations to Malaysia to improve its legislative system. By studying how nations such as the United States, the European Union, Japan, and the Netherlands address privacy problems, Malaysia can adopt and adapt effective techniques to secure farmers' data. Additionally, further investigation could be taken on the current and planned privacy rules affect the uptake of drone technology among Malaysian farmers. This study could look at the relationship between regulatory frameworks and farmers' desire to include drones into their agricultural methods. Understanding these dynamics can help legislators develop policies that promote innovation of drones in agricultural setting while protecting privacy.

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INNOVATING DEVELOPMENT PLANNING: INVESTIGATION INTO SELECTED DEVELOPMENT MANAGEMENT SOFTWARES USED BY PLANNERS IN MALAYSIA

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Abstract: *For generations, literature has emphasised that for an area to be beneficial to the community, its development must be well-planned and strategically executed. The development process should be carried out systematically to ensure the community reaps the benefits. Nowadays, most development planners use different software in their planning, which has various impacts on the implementation of development projects. Most development planners in Malaysia use software such as Microsoft Project, Geographical Information System (GIS), Building Information Modeling (BIM), Decision Support System (DSS), Spatial Planning and Decision Support System (SPDSS) and other planning and development tools. However, these software tools have limitations and disadvantages. Data leakage, high subscription costs, software complexity or difficulties in integrating with other software are among the weaknesses that prevent these tools from being fully utilised by planners in Malaysia. The use of digital technologies such as artificial intelligence is necessary to ensure that development planning can be carried out according to the schedule, specifications, and standards set by the government. Conducting a thorough analysis of key references on software used in development, along with related literature, it was found that CentralSquare Community Development or Citizen Engagement Software are relevant to be used in the development planning in Malaysia. The use of these tools needs to be integrated with AI digital technology to revolutionise development planning methods. Thus, this study suggests that further research should be conducted to determine the extent to which the use of these tools impacts sustainable development in Malaysia. Hopefully, this paper can contribute to the body of knowledge on development management and IR 4.0.*

Keywords: *Development Management, Technological Advancement, Development Innovation, Development Planning, Development Planners*

Introduction

Development within a region is vital for ensuring that the local community reaps its benefits. The effectiveness of a development initiative is not determined by a single factor but by the interplay of these three elements. A successful project requires meaningful community engagement, a thorough understanding of the location's characteristics, and a well-planned and executed development plan (Mohd Karim & Sakdan, 2019). Balancing these elements ensures that the project is not only impactful but also sustainable and beneficial in the long term (Mohd Karim et al., 2019).

In the rapidly evolving landscape of urban and regional planning, the integration of advanced technological tools has become indispensable. Malaysia, a nation characterized by its dynamic growth and diverse development challenges, stands at the forefront of adopting innovative solutions to enhance development planning (United Nations Development Programme, 2020; Yigitcanlar et al., 2020). This investigation delves into the utilization of selected development management software by planners in Malaysia, aiming to uncover the transformative impact these tools have on planning processes (Fauzi et al., 2019).

Development management software encompasses a range of applications designed to streamline and optimize various aspects of planning, from data collection and analysis to project management and stakeholder engagement. These tools offer planners the ability to visualize complex data, simulate development scenarios, and facilitate collaborative decision-making (Turban et al., 2005; Ismail et al., 2018). By leveraging these technologies, planners can address critical issues such as urban sprawl, environmental sustainability, and infrastructure development more effectively. The processes of evolution, functionality, and dissemination are crucial in harmonizing community development with regional development (Mohd Karim & Mohamad, 2024).

Urban and regional planning in Malaysia has increasingly embraced digital tools to address complex challenges such as rapid urbanization, environmental sustainability, and resource management. Geographic Information Systems (GIS), Building Information Modeling (BIM), and other planning software have become critical in facilitating data-driven decision-making and improving the efficiency of planning processes (Yigitcanlar et al., 2020). These tools enable planners to visualize spatial data, simulate development scenarios, and optimize resource allocation, thereby enhancing the overall quality of planning outcomes (Klosterman, 1999; Geertman & Stillwell, 2009). In addition, the quality development planning will benefit the community surrounding it (Mohd Karim & Sakdan, 2019).

Malaysia has made significant strides in adopting development management software to streamline planning processes. For instance, the Malaysian Urban-Rural National Indicators Network for Sustainable Development (MURNInets) is a notable platform that integrates data from various sources to monitor and evaluate urban and rural development (Fauzi et al., 2019). This system allows planners to assess development trends, identify gaps, and formulate evidence-based policies. Additionally, the use of GIS in Malaysia has been instrumental in land-use planning, disaster management, and environmental conservation (Abdul Rahman et al., 2020). The integration of development management software has revolutionized planning processes in Malaysia. Planners can now leverage real-time data and advanced analytics to make informed decisions. For example, the use of BIM in infrastructure projects has improved collaboration among stakeholders, reduced construction costs, and minimized errors (Azhar et al., 2015). Furthermore, the adoption of smart city technologies, such as Internet of Things (IoT) sensors and big data analytics, has enabled Malaysian cities to optimize traffic management, energy consumption, and waste disposal (Tan et al., 2021).

This article will explore several key software solutions currently in use by Malaysian planners, examining their features, benefits, and practical applications. Through desk research and analysis of case studies, this article will give insights into how these tools are being implemented to tackle real-world planning challenges.

Additionally, the investigation will highlight the role of these software solutions in promoting more efficient, sustainable, and inclusive development outcomes. By providing a comprehensive overview of the current state of development management software in Malaysia, this article aims to contribute to the broader discourse on technological innovation in planning. Ultimately, the findings will serve as a valuable resource for planners, policymakers, and stakeholders seeking to harness the power of technology to drive positive change in the development planning process.

Literature Review

The Use of Current Software in Development Planning

Development planners in Malaysia leverage a range of software tools to boost the efficiency and effectiveness of their planning processes. These tools are utilized across various sectors, such as construction, urban planning, and software development, addressing the diverse needs and challenges faced by planners in the country. Malaysian planners primarily use basic software for storage, communication, CAD, graphic design, and GIS, with varying skill levels. However, there is a notable gap in the adoption of advanced technologies like AI due to financial constraints and a lack of skilled workers (Abdullah et al., 2023). Tools like Citizen Connect are used to foster community participation and social change, highlighting the importance of digital platforms in engaging citizens in planning processes and in the decision-making process (Citizen Connect: Engaging Communities for Change, 2024; Mohd Karim et al., 2019).

Key software tools such as Microsoft Project, Geographical Information Systems (GIS), Building Information Modeling (BIM), and various Decision Support Systems (DSS) are being used in development management in Malaysia. These tools play a crucial role in managing complex projects, optimizing resource utilization, and enhancing decision-making processes.

Microsoft Project

Microsoft Project is a powerful project management tool that helps planners organize tasks, track progress, and manage resources (Osei-Kyei & Chan, 2021). It offers features such as Gantt charts, Kanban boards, and built-in templates, which facilitate the planning and execution of complex projects. Planners can use Microsoft Project to create detailed project timelines, allocate resources efficiently, and monitor project milestones, ensuring that development projects stay on track and within budget (Khan & Khan, 2019; Mubarak, 2020; Niazi & Ali, 2022).

Geographical Information Systems (GIS)

Geographical Information Systems (GIS) is integrated into the Malaysian development planning system, providing analytical and quantitative methods for urban and regional planning (Kerzner, 2022). It supports the formulation and implementation of development plans at both macro and micro levels, as seen in case studies like the Pahang State Structure Plan (Yaakup et al., 2004). The adoption of Multi-Criteria Decision-Making (MCDM) techniques alongside GIS enhance the formulation of spatial development strategies (Yaakup et al., 2004).

Building Information Modeling (BIM)

Building Information Modeling (BIM) is a digital-first method that integrates the entire design process of a construction project. BIM generates and maintains data about a constructed asset from the beginning of a project to its conclusion, even aiding in operations and maintenance. Tools like Revit, Navisworks and BIM 360 facilitate collaborative project execution with minimal errors by combining various dimensions (4D, 5D, 6D, etc.) into a single visualization. BIM helps reduce costs, time, and waste, making it a valuable tool for urban planning and smart city development (Chen et al., 2023). BIM is integrated with GIS to form Highway Information Management (HIM), which is used in large-scale infrastructure projects like the Pan Borneo Highway. This integration allows for the creation of 3D parametric models that enhance planning and operational efficiency (Liu et al., 2021; Lu et al., 2022). The use of BIM in conjunction with GIS provides precise geospatial data, which is crucial for minimizing errors and managing risks in construction projects (Lu et al., 2022).

Decision Support Systems (DSS)

Decision Support Systems (DSS) is an aid decision-making system by providing unbiased data analysis, real-time monitoring and rich reporting. DSS uses analytical models, statistical tools, and human insights to support decision-making processes. These systems are particularly useful for resolving complex, unstructured problems and making data-driven decisions. DSS can help planners evaluate different development scenarios, optimize resource allocation, and improve overall decision-making efficiency. DSS including tools like What if?, Definite, and ILWIS are employed in the formulation of spatial development strategies. These systems utilize GIS capabilities to support decision-making at both macro and micro levels (Yaakup et al., 2004).

Spatial Planning and Decision Support System (SPDSS)

Spatial Planning and Decision Support System (SPDSS) provides information to town planners and decision-makers, enhancing informed decision-making in Malaysian town and country planning. Initiatives since the mid-1990s have explored SPDSS's potential, with public planning agencies leading its application in real-life projects (Zhou et al., 2023). Efforts are ongoing to introduce SPDSS to a broader audience, including decision-makers beyond town planners (Abdullah et al., 2009). SPDSS are also explored for their potential in town and country planning, helping planners make informed decisions by providing relevant information (Chen et al., 2023; Wang et al., 2021). There is a growing interest in SPDSS among Malaysian planners, although many are still unfamiliar with its applications (Abdullah et al., 2009).

Other Software Development Tools

In the software development sector, tools such as Fourth-Generation Languages (4GLs), Data Flow Diagrams (DFDs), and Computer-Aided Software Engineering (CASE) tools are widely used for analysis, design, and project management (Hossain, 2023). These tools support a structured approach to software development, enabling developers to streamline processes, improve efficiency, and ensure high-quality outcomes. These tools are used for analysis, design, and project management activities, indicating a structured approach to software development in Malaysia (Gheda et al., 2025).

Each of these tools offers unique capabilities. Their integration can significantly enhance development planning processes. For example, combining GIS with BIM allows planners to visualize spatial data alongside detailed building models, providing a more comprehensive understanding of the development area (Gerges et al., 2022). Similarly, integrating DSS with Microsoft Project can help planners make informed decisions based on real-time project data and analytics (Osei-Kyei & Chan, 2021). By leveraging these software tools, development planners in Malaysia can manage complex projects more effectively, optimize resource use, and improve decision-making processes, ultimately leading to more efficient, sustainable, and well-organized urban and regional development.

While these systems significantly contribute to development planning in Malaysia, challenges remain in fully integrating environmental considerations into planning processes. The emphasis on economic and social factors often overshadows environmental aspects, indicating a need for improved policies and implementation strategies to enhance environmental quality and sustainable development (Johar, 2003). Additionally, the New Economic Model (NEM) and the concept of a 'Green World Order' highlight the importance of aligning development activities with environmental limitations to achieve sustainability goals (Mustafa & Saad, 2011). These perspectives underscore the ongoing need for innovation and adaptation in development planning to address both current and future challenges effectively.

The integration of software and AI digital technology in development planning is crucial for revolutionizing planning methods in Malaysia. The current landscape shows that Malaysian planners predominantly use software like CentralSquare Community Development and Citizen Engagement Software. However, there is a growing need to incorporate AI technologies to enhance these tools' capabilities, thereby improving planning efficiency and decision-making processes. This analysis explores the current use of development management software in Malaysia, the challenges faced, and the potential for AI integration.

The adoption of development management software in Malaysia faces several challenges. These include limited technical expertise, high implementation costs, and resistance to change among traditional planners (Ismail et al., 2018). Further, the limitations of using GIS and DSS in development planning have led to the emergence of other software to complement the shortcomings of GIS and DSS (Longley et al., 2015; Kwan & Lee, 2004).

To overcome these barriers, there is a need for capacity-building initiatives, public-private partnerships and policy support to promote the widespread adoption of these technologies. In conclusion, the integration of advanced technological tools in urban and regional planning has significantly enhanced the efficiency and effectiveness of development processes in Malaysia. By addressing existing challenges and fostering innovation, Malaysia can continue to lead in the adoption of cutting-edge solutions for sustainable development.

Enhanced and Comprehensive Tool for Development Planning
CentralSquare Community Development Software

CentralSquare Community Development software constitutes an innovative instrument devised to enhance community engagement and development through digital methodologies. It amalgamates diverse functionalities to bolster community interactions, urban planning, and

service management, with the objective of elevating the quality of life and participation within communities. The software employs contemporary technological advancements to confront challenges in community development and urban design, thereby furnishing a platform conducive to effective communication, collaboration, and management.

CentralSquare Community Development software encompasses communication tools that align with intrinsic styles of knowledge dissemination and problem resolution. It integrates seamlessly with conventional relational patterns to extend the community experience, harnessing technologies such as the Internet, email, and various communication systems to augment immediacy and relevance in community interactions (Strickholm & Globa, 2001). The software undergirds community service management by offering a cohesive platform for an array of virtual online services, optimizing intelligent living modalities for residents, and enhancing public satisfaction through agile and precise service delivery.

The software assists urban designers by simulating three-dimensional geometrical constructs and urban quality parameters, thereby facilitating a more integrative approach to urban design. The software encompasses the application of computer-aided design and virtual reality technologies to rigorously test and refine designs with user comfort as a paramount consideration (Charlton et al., 2009). Furthermore, it promotes public engagement in urban development through instruments such as the Community Futures Project, which employs GIS to incorporate community feedback into urban planning. This methodology serves to bridge the divide between community residents and technical experts, thereby fostering a collaborative design paradigm (Wandrey et al., 2010).

The software champions community development by equipping individuals and collectives with the requisite skills to induce positive transformations within their communities. This includes the provision of online training modules focused on entrepreneurship management and product marketing, thus enabling communities to attain self-sufficiency in their developmental initiatives (Indra & Nurhayati, 2018). Additionally, it integrates gamification elements to incentivize community-driven open-source software development, thereby encouraging active participation in various development endeavors and enhancing the overall quality of open-source projects (Niazi & Rotzow, 2016).

Despite the multitude of advantages presented by CentralSquare Community Development software, it is imperative to contemplate the challenges associated with its deployment. The intricacy of incorporating digital tools into conventional community planning frameworks can pose significant barriers, as can the necessity for technical proficiency to effectively leverage these tools. Moreover, ensuring equitable access to technology and addressing the digital divide represent critical considerations for optimizing the software's impact. Notwithstanding these challenges, the software epitomizes a substantial advancement in the utilization of technology for community development and urban planning.

Citizen Engagement Software

Citizen engagement software includes digital platforms and tools designed to facilitate interactions between citizens and government entities, thereby enhancing participatory democracy and collaborative governance. These tools are increasingly integrated into smart

city initiatives, policy-making processes, and educational environments to foster active citizen participation and improve public services.

Co-creation techniques are essential for incorporating citizen participation in the development of ICT services for smart cities. These techniques involve citizens in the focus, definition, development, and validation stages of software system development, ensuring that the resulting products meet community needs (Ricardo et al., 2024). The SEMAT standard structures these co-creation practices, including activities from software engineering disciplines to stimulate idea generation and facilitate the creation of necessary documents and components (Ricardo et al., 2024). Participatory citizen platforms are innovative solutions that engage citizens in policy-making and deliberative democracy. These platforms can be linked to requirements engineering to better align large socio-technical software systems with public needs (Ruohonen & Hjerppe, 2024). The potential advantages of these platforms include improved citizen input in the design and implementation of public sector projects, although challenges such as ensuring broad participation and managing diverse opinions remain (Ruohonen & Hjerppe, 2024).

For example, in India, Digital platforms, such as MyGov, enable citizens to engage directly with government departments, providing input on policies and plans. These platforms reflect a commitment to transparency and participatory governance (Platform for Citizen Engagement for Good Governance in India, 2022). Successful models of citizen engagement leverage digital technologies to facilitate dialogue, collaboration, and action among citizens, driving social change and community cohesion (Citizen Connect: Engaging Communities for Change, 2024).

Mobile applications empower citizens to report issues and interact with city administrations, enhancing real-time communication and problem-solving. These apps cover topics like mobility and environment, providing diverse information from city services (Beutelspacher et al., 2022). The use of gamification in these apps, although not yet widely implemented, holds promise for increasing citizen motivation and engagement (Beutelspacher et al., 2022). Interactive data mining tools help manage information overload on e-participation platforms by visualizing and analyzing citizen participation content. These tools support decision-making processes by grouping citizen proposals and providing insights into public deliberation (Bachiller et al., 2021).

While citizen engagement software offers numerous benefits, challenges such as ensuring equitable access, managing diverse inputs, and maintaining citizen interest must be addressed. Additionally, integrating these tools into existing governance structures requires careful planning and adaptation to local contexts. The ongoing development and refinement of these platforms will be crucial for maximizing their impact on participatory democracy and public service improvement.

Indirectly, the use of these tools opens up opportunities for community participation in the planning, monitoring, and evaluation of development projects in a given area. Using the right software can help development planners produce projects that have a positive impact on the community.

Integration of Artificial Intelligence and Development Software in Development Planning

The integration of artificial intelligence (AI) into software development planning has emerged as a transformative approach, enhancing efficiency, reducing cost, and addressing the scarcity of skilled developers. AI technologies, such as machine learning and neural networks, have automated repetitive tasks, improved project management, and facilitated data-driven decision-making. This synthesis explores the multifaceted impact of AI on software development planning, highlighting both its benefits and challenges.

Benefits of AI Integration in Software Development

One of the most significant benefits of AI integration in software development is the automation and efficiency it brings to the process. AI has significantly automated time-consuming tasks like debugging and documentation, leading to more efficient software development processes. This automation allows developers to focus on complex and creative tasks, enhancing overall productivity (Adeyemo, 2024; Udoidiok et al., 2024). By reducing the time spent on mundane tasks, AI enables developers to allocate their efforts towards innovative aspects of software creation, thereby accelerating the development cycle.

Another crucial advantage is cost reduction and resource optimization. By automating mundane tasks and improving project management, AI reduces development costs and minimizes dependency on human resources. Tools like GitHub Copilot and Vercel's v0 exemplify AI's role in optimizing resource allocation (Udoidiok et al., 2024). These tools streamline workflows, reduce the need for extensive manual intervention, and ensure that resources are utilized more effectively, resulting in significant cost savings for organizations.

AI-driven project management tools also enhance project management by providing intelligent recommendations, automating administrative tasks and offering data-driven risk predictions. These capabilities improve the quality and competitiveness of software development projects (Kanbur et al., 2023). By leveraging AI, project managers can make more informed decisions, anticipate potential issues, and adjust plans proactively, leading to smoother project execution and higher success rates. AI can enhance decision-making by providing predictive analytics and data-driven insights, which are crucial for effective planning. The development of systems like the Klang Valley Regional Planning Support System (KV-RPSS) demonstrates the potential for AI to assist in monitoring and predicting urban changes (Wang & Yorke-Smith, 2025).

Improved software quality is another notable benefit of AI integration. AI techniques, such as machine learning and deep learning, have enhanced software quality through defect prediction, code recommendation, and vulnerability detection, particularly in the development and testing phases (Durrani et al., 2024). These AI-driven methods help identify and rectify issues early in the development process, ensuring that the final product is robust, secure, and meets high-quality standards.

Challenges in AI Integration

Despite the numerous benefits, the integration of AI in software development is not without challenges. Technological barriers, such as data quality and model interpretability, can hinder

the effective application of AI tools in project planning (Benítez & Serrano, 2024; Mohammad & Chirchir, 2024). Ensuring that AI models are trained on high-quality data and can be easily interpreted by developers is crucial for their successful implementation. Without addressing these issues, the reliability and effectiveness of AI tools may be compromised.

Organizational challenges also pose significant obstacles to AI integration. Resistance to change within organizations and the need for skilled personnel to manage AI tools are major barriers. A small number of skilled workers in operating advanced hardware and software is a significant barrier. This includes technologies like GPS, drones, and cloud computing (Abdullah et al., 2023). The lack of methodological support for building and managing AI planning software further complicates integration efforts (Mohammad & Chirchir, 2024; Georgievski, 2023).

Organizations must invest in training and development to equip their teams with the necessary skills to leverage AI effectively. The annual budget for most planning organizations is below RM30,000, with software subscriptions being the largest expense. This financial limitation hinders the adoption of more advanced technologies (Abdullah et al., 2023). Additionally, fostering a culture that embraces innovation and change is essential for overcoming resistance and ensuring smooth integration. Further, limited network infrastructure further complicates the integration of advanced digital technologies in planning processes (Abdullah et al., 2023).

Environmental concerns, although less emphasized in the literature, also impact AI integration in software development. Regulatory compliance and ethical considerations are critical factors that must be addressed (Mohammad & Chirchir, 2024).

While AI integration in software development planning presents significant opportunities for enhancing efficiency and reducing costs, it also poses challenges that need to be addressed. The successful integration of AI requires a balanced approach that considers technological, organizational, and environmental factors, alongside continuous research and innovation to overcome existing barriers and maximize the benefits of AI in software development.

The integration of AI in development planning offers numerous benefits. It is essential to consider the socio-technical challenges that accompany such advancements. The need for a robust e-participation framework to involve citizens in public policy formulation is critical, as it ensures that technological advancements align with societal needs (Al Araby,2024). The government's role is crucial in ensuring that development planning actively involves the local community (Mohd Karim & Sakdan, 2019). Additionally, the success of public information systems in Malaysia underscores the importance of continuous research and adaptation to ensure these systems meet evolving demands (Masrek, 2009). Balancing technological innovation with community engagement and policy considerations will be key to successful development planning in Malaysia.

Conclusion

In conclusion, the incorporation of new digital technologies, especially AI, into development planning software is essential for overcoming the existing constraints and drawbacks encountered by planners. The integration of advanced digital technologies, particularly AI, into development planning software is crucial for addressing the current limitations and

disadvantages faced by planners in Malaysia. The use of software tools such as Microsoft Project, GIS, BIM, DSS, and SPDSS has proven beneficial but also presents challenges such as data leakage, high subscription costs, software complexity, and integration difficulties. These challenges hinder the full utilization of these tools by development planners in Malaysia.

To address challenges in development planning, it is essential to implement AI-driven solutions such as CentralSquare Community Development and Citizen Engagement Software. These tools, integrated with AI, can revolutionize planning methods by enhancing efficiency, reducing costs, and ensuring projects meet government standards. Ideally, AI can automate tasks, provide intelligent recommendations, and facilitate data-driven decision-making, improving project quality and competitiveness. Additionally, AI integration can enhance transparency and public participation, allowing citizens to voice opinions and access information, leading to more inclusive and sustainable outcomes.

Accordingly, further research is needed to evaluate the impact of AI-integrated tools on sustainable development in Malaysia. By examining real-world applications, researchers can identify best practices and develop guidelines. This research can significantly contribute to development management and IR 4.0 advancements, paving the way for innovative planning methodologies.

Given the above discussion, it can be concluded that successful AI integration in planning software can transform Malaysia's planning landscape, ensuring projects are efficient, cost-effective, and aligned with environmental and socio-economic goals. Continuous research and innovation are necessary to overcome barriers and leverage AI advancements for better software development processes.

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THE EFFECTS OF PHYSICAL ACTIVITIES DESIGN PROGRAM ON BODY COMPOSITION AND CARDIORESPIRATORY FITNESS AMONG PHYSIOTHERAPY STUDENTS

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Abstract: *Sedentary lifestyles among university students contribute to low fitness levels, which is particularly concerning for physiotherapy students preparing for clinical training. To address this, the PhysioFit Program was introduced under PHYTAS at UiTM Bertam Campus. This study evaluated its effectiveness in improving students' fitness. All Semester 1 and 3 physiotherapy students participated in individual exercises, group workouts, and educational sessions from October 16 to December 20, 2024, with weekly sessions on Fridays. Body composition parameters (body weight, BMI, body fat, subcutaneous fat, skeletal muscle, and visceral fat) and cardiorespiratory fitness were assessed before and after the program using bioelectrical impedance analysis (BIA) and the Beep Test, respectively. Non-parametric tests (Wilcoxon Signed-Rank and Mann-Whitney U) were used for analysis. Results showed a significant improvement in cardiorespiratory fitness ($p = 0.006$) but no significant changes in body composition parameters. While gender comparisons showed no differences, Semester 3 students had significantly better cardiorespiratory fitness than Semester 1 students ($p = 0.025$). These findings suggest that increased physical activity effectively enhances cardiorespiratory fitness, even in the absence of substantial changes in anthropometric parameters. The lack of significant improvements in body composition may be attributed to most participants having BMI values within the normal range. In conclusion, the PhysioFit Program effectively improved cardiorespiratory fitness but had limited impact on body composition. Future programs may benefit from more structured and supervised training sessions.*

Keywords: *Body Composition, Cardiorespiratory Fitness, Exercise, Physiotherapy*

Introduction

Physical activity is crucial for maintaining overall health and well-being, particularly among university students transitioning into adulthood. Studies show a concerning decline in physical activity levels among college students, leading to a more sedentary lifestyle (Teuber & Sudeck, 2021). This trend is observed globally, with various studies highlighting the increasing prevalence of inactivity among university students. This is concerning, as physiotherapy students, in particular, require a high level of physical fitness to meet the demands of their clinical training and future profession (Diehl et al., 2018; Piñeiro-Cossio et al., 2021).

The demanding nature of physiotherapy education requires students to maintain this high level of physical fitness to meet the demands of their clinical training and future careers. Their coursework involves extensive theoretical study, developing manual and communicative skills, and undertaking clinical training (Schramlová et al., 2024). The physical demands of patient care, including repetitive tasks, high-force manual techniques, and awkward postures, contribute to the risk of musculoskeletal injuries among practicing physiotherapists (Mohd Nordin et al., 2011). Therefore, maintaining physical fitness throughout their education is essential for physiotherapy students to meet these demands and minimize future occupational health risks. A study on the level of physical fitness among physiotherapy students in public universities in Malaysia found that the overall level of physical fitness was below average (Mirza et al., 2022, 2022). This underscores the need for interventions and programs aimed at promoting physical activity and improving fitness levels among these students.

To address the issue of low fitness levels among physiotherapy students, the PhysioFit Program was implemented under the Physiotherapy Student Association at UiTM Bertam Campus. The aim of this study is to evaluate the effectiveness of the PhysioFit Program in improving the fitness levels of physiotherapy students at UiTM Bertam Campus.

Literature Review

Physical activity plays a crucial role in maintaining overall health, particularly in university students, who often experience increased academic stress and a decline in physical fitness due to sedentary behaviors (Segrave et al., 2024). Engaging in regular physical exercise has been shown to improve cardiovascular health, body composition, and overall well-being, making it an essential component of a healthy lifestyle (Zhou et al., 2024). Among the various exercise modalities, aerobic training, high-intensity interval training (HIIT), and resistance training have been widely studied for their effectiveness in improving fitness parameters and body composition (Huang et al., 2023).

Physical Activity and Fitness among University Students

University students often struggle to maintain adequate levels of physical activity due to academic demands, social commitments, and environmental constraints. A systematic review by Kljajević et al. (2021) highlighted that university students generally exhibit low levels of physical activity, which negatively impacts their physical fitness and overall health. The study also emphasized the importance of structured exercise programs in university settings to enhance students' fitness levels. Similarly, Li et al. (2022) found that motivation-based interventions, such as goal setting and social support, significantly improved students' adherence to exercise programs, leading to better physical fitness outcomes.

For physiotherapy students, maintaining an optimal level of physical fitness is not only essential for personal health but also for professional competency. Juhkam and Vaher (2020) examined the physical fitness levels of physiotherapy students and found that insufficient engagement in exercise could compromise their ability to perform physically demanding tasks in clinical settings. These findings highlight the necessity of integrating structured physical activity into physiotherapy curricula to ensure that students develop and maintain adequate fitness levels.

Effects of Exercise on Body Composition

Regular exercise plays a significant role in modifying body composition by reducing body fat percentage and increasing lean muscle mass. A meta-analysis by Huang et al. (2023) demonstrated that different exercise frequencies have varying effects on body composition, with higher-frequency training yielding greater reductions in fat mass and improvements in lean body mass. However, the study also emphasized the importance of combining exercise with dietary modifications for optimal results. Similarly, Santos et al. (2023) found that interventions combining physical activity with dietary adjustments were more effective in improving body composition than exercise alone.

Despite the well-documented benefits of exercise, some studies have reported minimal changes in body composition, particularly when exercise frequency is low. For example, Li et al. (2022) observed that participating in physical activity just once per week may not be adequate to produce meaningful changes in body composition. This is consistent with the findings of the current study, where minimal improvements in body composition could be linked to the infrequent exercise sessions and the lack of dietary modifications.

Impact of Exercise on Cardiorespiratory Fitness

Cardiorespiratory fitness is a critical component of overall health and is strongly influenced by aerobic exercise. The beep test is widely used as a measure of aerobic capacity, with research indicating that structured aerobic training can lead to significant improvements in test performance (Zhou et al., 2024). In a study on university students, Li et al. (2022) found that those who engaged in HIIT and continuous aerobic training showed marked improvements in their beep test scores, suggesting that both exercise intensity and consistency play key roles in enhancing cardiorespiratory fitness.

However, research also indicates that improvements in aerobic capacity depend on several factors, including exercise frequency, duration, and individual baseline fitness levels. A study by Diehl et al. (2018) reported that students who participated in structured aerobic training twice a week experienced significant gains in cardiorespiratory fitness, whereas those who exercised less frequently showed minimal improvements. This suggests that the relatively low training frequency in the present study may have contributed to the limited enhancement in beep test performance.

Conclusion

The existing literature underscores the importance of physical activity in improving body composition and cardiorespiratory fitness among university students. However, the effectiveness of exercise interventions depends on various factors, including frequency, intensity, and the inclusion of dietary modifications. Physiotherapy students, in particular, require structured physical activity programs to maintain fitness levels essential for their professional roles. Future research should explore the long-term impact of structured exercise programs and investigate strategies to integrate fitness training into university curricula to enhance students' health and professional preparedness.

Methodology

This study employed a quasi-experimental design to assess the effectiveness of the PhysioFit Program in improving the fitness levels of physiotherapy students. A total of 46 participants from Semester 1 and Semester 3, all residing on campus, were included in the study. All participants were healthy and had no physical limitations that would prevent them from engaging in exercise.

The PhysioFit Program was conducted over a nine-week period, from October 16 to December 20, 2024, with structured weekly exercise sessions every Friday afternoon. Each session lasted one hour and consisted of two main components: individual exercises and group-based sports activities. The individual exercise component involved a 1 km run around the campus track. The group-based sports activities included ultimate frisbee, netball, tag game, dodgeball, table tennis, futsal, and relay running games.

Baseline measurements were recorded before the program began, and post-intervention measurements were collected at the end of the program. Body composition parameters, including body weight, BMI, body fat percentage, subcutaneous fat, skeletal muscle mass, and visceral fat, were assessed using the OMRON Body Composition Monitor (HBF-702T). During measurement, participants stood barefoot on the device, grasped the handles with both hands, and extended their arms forward at a 90-degree angle to ensure accurate readings.

Cardiorespiratory fitness was evaluated using the Beep Test (20-meter shuttle run test), which was conducted in groups of 5 to 10 participants at a time. Participants ran continuously between two 20-meter lines, keeping pace with the recorded beeps, which progressively increased in speed. If a participant failed to reach the line in time, they received a warning. Upon missing the line twice, the test was stopped for that individual, and their final score was recorded. Prior to testing, participants were briefed on the procedure, provided informed consent, and underwent a health risk screening. A proper warm-up was conducted before the test to ensure optimal performance. The Beep Test was repeated after the intervention to measure changes in cardiorespiratory fitness.

All data were recorded, sorted, and analyzed using IBM SPSS Statistics Version 26 for Windows. Given that the data were not normally distributed, non-parametric tests were applied. The Wilcoxon Signed-Rank Test was used for within-group comparisons (pre- vs. post-intervention), while the Mann-Whitney U Test was applied for between-group comparisons (gender and semester levels). A significance level of $p < 0.05$ was used to determine statistical significance.

Results

A total of 46 participants completed the PhysioFit Program, comprising 16 males and 30 females. In terms of academic level, 29 participants were from Semester 1, while 17 participants were from Semester 3.

Descriptive Analysis

The BMI classification of participants showed that the majority fell within the normal BMI range (18.5–22.9 kg/m²), with 22 participants. Meanwhile, 8 participants were underweight

(<18.5 kg/m²), 2 were classified as overweight (23.0–24.9 kg/m²), and 14 were classified as obese (≥25.0 kg/m²).

Changes in Body Composition

The Wilcoxon Signed-Rank Test revealed no significant changes in body weight, BMI, body fat percentage, subcutaneous fat, skeletal muscle mass, or visceral fat after the program ($p > 0.05$). These findings suggest that while participants engaged in regular physical activity, the intervention did not lead to substantial alterations in body composition over the nine-week period.

Changes in Cardiorespiratory Fitness

A significant improvement was observed in cardiorespiratory fitness, as measured by the Beep Test. The Wilcoxon Signed-Rank Test indicated a statistically significant increase in Beep Test scores following the program ($p=0.006$), demonstrating that increased physical activity effectively enhanced participants' aerobic capacity.

Comparisons Between Groups

When comparing gender differences, the Mann-Whitney U Test found no significant differences in body composition or cardiorespiratory fitness between male and female participants ($p > 0.05$). Similarly, no significant differences were observed in body composition when comparing Semester 1 and Semester 3 students ($p>0.05$). However, a significant difference in cardiorespiratory fitness was found between semesters, with Semester 3 students showing greater improvement ($p=0.025$).

Summary of Findings

These results suggest that while the PhysioFit Program effectively improved cardiorespiratory fitness, it did not produce significant changes in body composition within the study duration. The lack of improvement in body composition could be attributed to the majority of participants having BMI values within the normal range, limiting the potential for noticeable changes.

Discussion

The PhysioFit Program aimed to enhance physical fitness among physiotherapy students through structured weekly exercise sessions. The findings revealed a significant improvement in cardiorespiratory fitness, as measured by the Beep Test, but no substantial changes in body composition parameters such as body weight, BMI, body fat percentage, subcutaneous fat, skeletal muscle mass, and visceral fat. These results are consistent with some existing literature but diverge from others, indicating potential areas for program improvement.

Improvement in Cardiorespiratory Fitness

The significant increase in cardiorespiratory fitness aligns with previous studies demonstrating the positive impact of structured physical activity on aerobic capacity. Li et al. (2022) reported that university students participating in regular exercise programs exhibited notable improvements in cardiovascular endurance. Similarly, Zhou et al. (2024) found that structured exercise programs enhanced cardiopulmonary function among college students, particularly those with initially low fitness levels. The improvement observed in our study suggests that engaging in structured exercise, even on a weekly basis, can contribute to better aerobic endurance among university students.

The greater improvement in cardiorespiratory fitness observed in Semester 3 students compared to Semester 1 students may be attributed to differences in baseline fitness levels and adaptation to physical demands. Previous studies suggest that individuals with prior exposure to structured physical activity tend to experience greater fitness adaptations compared to those with lower baseline fitness levels (Segrave et al., 2024). Further investigation is needed to determine whether academic workload, stress, or other lifestyle factors influenced this difference.

Lack of Significant Changes in Body Composition

Although the program successfully improved cardiorespiratory fitness, body composition parameters did not show significant changes. One possible explanation is the relatively low frequency of exercise sessions. The PhysioFit Program was conducted only once per week, which may not have been sufficient to induce measurable changes in body composition. Research suggests that for significant reductions in body fat and increases in muscle mass, exercise should be performed at least three to five times per week (Huang et al., 2023). For instance, Li et al. (2022) noted that engaging in physical activity only once a week may not be sufficient to induce significant changes in body composition. This aligns with the findings of the present study, where limited improvements in body composition may be attributed to the low frequency of exercise sessions.

Another factor is the absence of dietary intervention. Nutritional intake plays a crucial role in body composition changes, particularly in fat loss and muscle gain. A systematic review by Santos et al. (2023) found that exercise interventions combined with dietary modifications resulted in greater improvements in body composition compared to exercise alone. Since the PhysioFit Program did not incorporate dietary education or meal planning, participants may have maintained their usual eating habits, limiting the extent of body composition changes.

Furthermore, most participants had BMI values within the normal range, meaning that they were less likely to experience drastic changes in body composition compared to individuals who were overweight or obese. Studies have shown that individuals with higher baseline body fat percentages tend to exhibit more significant reductions in fat mass following exercise interventions (Segrave et al., 2024). Since more than half of the participants in this study had normal BMI, any changes in body fat or muscle mass may have been too subtle to be statistically significant.

Gender and Academic Semester Comparisons

The analysis revealed no significant differences in body composition or cardiorespiratory fitness improvements between male and female participants. This finding aligns with research suggesting that, when subjected to similar exercise protocols, both genders can achieve comparable enhancements in physical fitness (Li et al., 2022). Physiological differences between male and female participants, such as muscle mass distribution and metabolic rates, might influence long-term adaptations, but for short-term interventions like this study, such variations appear minimal.

However, a significant difference was found in cardiorespiratory fitness improvements between Semester 1 and Semester 3 students. The greater improvement among Semester 3 students may be due to their prior exposure to academic and physical demands, which might have influenced their adaptation to exercise. Additionally, their familiarity with clinical practice may have motivated them to engage more actively in the program. Future studies should explore whether academic experience plays a role in fitness adaptations among physiotherapy students.

Implications for Future Programs

The findings suggest that while structured exercise programs can effectively enhance cardiorespiratory fitness, increasing the frequency of sessions and integrating nutritional guidance may be necessary to achieve significant changes in body composition. Future iterations of the PhysioFit Program could benefit from incorporating resistance training, dietary education, and more frequent exercise sessions to optimize outcomes.

Additionally, further research should examine the long-term effects of such programs and whether more individualized exercise prescriptions based on baseline fitness levels yield better results. Given that physiotherapy students are expected to be physically fit for their clinical training, improving both aerobic fitness and body composition remains an essential goal for future program development.

Conclusion

The PhysioFit Program effectively improved cardiorespiratory fitness among physiotherapy students, demonstrating the positive impact of structured physical activity on aerobic endurance. However, no significant changes were observed in body composition parameters, likely due to the limited frequency of exercise sessions and the absence of a dietary intervention. Additionally, while no gender-based differences were found, Semester 3 students showed greater improvement in cardiorespiratory fitness compared to Semester 1 students, possibly due to differences in baseline fitness levels and academic exposure.

These findings highlight the importance of incorporating more frequent and structured exercise sessions, as well as nutritional education, to achieve broader fitness improvements. Future iterations of the PhysioFit Program should consider integrating resistance training, dietary guidance, and increased session frequency to enhance both aerobic fitness and body composition. Given the physical demands of clinical practice, ensuring optimal fitness among physiotherapy students remains a crucial objective for future program development.

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THE EFFECTIVENESS OF AI IN ASSESSING ESL UNIVERSITY STUDENTS' ARGUMENTATIVE WRITING IN COMPARISON TO RUBRIC-BASED ASSESSMENT AND TOULMIN'S MODEL OF ARGUMENTATION

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***Abstract*:** *Mastering argumentative writing is essential for ESL university students, yet many continue to face challenges in structuring logical arguments, providing evidence, and articulating ideas effectively. This study examines their writing proficiency through rubric-based assessment and Toulmin's Model of Argumentation, while also comparing AI-assisted grading with human evaluation. A total of 72 student essays were analysed to assess argument structure, reasoning, and language proficiency. Results indicate that while students consistently present claims and grounds, they often struggle with incorporating warrants, backing, and rebuttals. Additional issues include weak organisation, repetitive reasoning, and frequent grammatical errors that impair clarity. AI-based grading demonstrated efficiency in evaluating grammar and structure but tended to be stricter than human evaluators. The findings highlight the importance of explicit instruction in argumentation, the integration of Toulmin's Model into ESL pedagogy, and targeted grammar interventions. While AI tools offer valuable support for assessment, they should be used to complement, not replace, human evaluation. Strengthening these areas can enhance students' critical thinking and overall writing performance.*

Keywords: *ESL writing, argumentative writing, Toulmin's Model, AI assessment, rubric-based evaluation.*

Introduction

Argumentative writing skills are vital for university students, especially for those enrolled in English as a Second Language (ESL) courses. An effective argument relies on logical organisation, critical thinking and strong language proficiency. Unfortunately, many ESL students struggle in these areas despite over a decade of formal instruction (Ramli, Abdul Kadar, & Rafek, 2024).

The Malaysian Ministry of Higher Education (MOHE) emphasises mastering argumentative writing (Malaysian Education Blueprint, 2015). Despite this, students still face challenges in structuring their arguments, providing evidence and expressing their ideas clearly (Sabri et al., 2021; Joannes & AlSaqqaf, 2022). This deficiency highlights the necessity for a much deeper evaluation of ESL students' argumentative writing proficiency. This study critically compares the reliability of AI assessment and human evaluation of argumentative writing skills of degree-

level university students by employing rubric-based assessment and Toulmin's Model for Argumentation (Toulmin, 2003). Additionally, the study compares AI-based grading with human evaluation to assess the reliability of automated writing assessment tools.

Background of the Study

Argumentative writing is a challenging genre for ESL students (Aziz, Salam & Mat Said, 2023; Aziz, 2021; Aziz & Mat Said, 2020a, 2020b, 2019; Aziz & Ahmad, 2017; Sabri et al., 2021). Despite their exposure to English writing during their primary and secondary school years, many students enrolled in university still lack the skills to develop strong, evidence-based arguments (Bahari et al., 2021; Ramli et al., 2024). This outcome is the result of schools being exam-oriented, which teaches the students how to answer their exams rather than develop critical thinking skills (Aziz & Mat Said, 2019). Therefore, students need to cultivate critical thinking skills as they need them to compose well-reasoned academic reports (Sundari & Febriyanti, 2021; Goldman, 2019).

Toulmin's Model (2003) is widely used to improve argumentative writing instruction as it provides a clear approach to composing logical arguments (Aziz, Salam, & Mat Said, 2023). Additionally, rubric-based assessment also offers clear evaluation criteria, which allow students to identify key areas for improvement (Rock, 2021). With how advanced Artificial Intelligence (AI) has become, automated writing assessment tools have been introduced to provide accelerated feedback and to complement traditional grading (Almegren et al., 2024). This, however, raises concerns about AI's ability to accurately evaluate the thematic consistency and quality of the students' arguments compared to human evaluators (Jonäll, 2024).

Research Objectives

This study aims to:

1. Evaluate ESL students' persuasive writing proficiency using a rubric-based assessment.
2. Analyse the structural effectiveness of arguments using Toulmin's Model.
3. Compare AI-based grading with human evaluation in identifying key weaknesses in students' argumentative writing.

Significance of the Study

This study examines the argumentative writing challenges faced by ESL students and provides recommendations to improve their argumentation skills, organisational skills, and language proficiency. In addition, this study contributes to the ongoing discussion on the role AI plays in academic writing assessment, determining its potential to improve human evaluation (Bouziane & Bouziane, 2024). By highlighting the students' weaknesses and judging the effectiveness of traditional and AI-assisted assessment methods, this study hopes to enhance ESL writing instruction and support the development of critical thinking in university students.

Literature Review

Challenges of ESL Argumentation in Malaysia

Argumentative writing, which is an essential skill that students need to master (Sabri et al., 2021; Joannes & AlSaqqaf, 2022), is one of the many genres included in the English second language (ESL) syllabus (Bahari, Kussin, Harun, Mohamed & Jobar, 2021). However, argumentative writing is difficult to master due to its complexity (Sabri et al., 2021; Joanne & AlSaqqaf). Even though the Ministry of Higher Education (MOHE) emphasises students mastering argumentative skills, they still experience difficulties (Sabri et al., 2021). Just as they did in secondary school, students in university are faced with multiple forms of academic writing (Ramli, Abdul Kadar & Rafek, 2024). However, they are still hindered by their limited English vocabulary, poor grammatical skills and difficulties in generating ideas (ibid). These challenges are further compounded by various internal and external factors, such as the complexity of argumentative writing, inconsistent assessment criteria, and limited engagement in effective writing activities. Students' writing proficiency is also influenced by the frequency of writing practice, support from teachers, their general knowledge and reading habits, which are essential for producing relevant content. Additionally, language-based games and activities have been shown to positively impact their persuasive writing development (Aziz, 2021).

Toulmin's Model of Argumentation (Theoretical Framework)

Over the years, many models and strategies have been designed as solutions to reduce argumentative writing challenges and improve argumentative writing skills (Flower & Hayes, 1981;Fei-Wen, 2010; Harris & Graham, 2018; Sampson et al., 2013; Manz, 2015). However, the Toulmin's Model (Toulmin, 2003; Hitchcock, 2017) is widely considered the most definitive framework for argumentative writing due to its practicality and potential to enable students to structure effective arguments and generate ideas (Aziz, Salam & Mat Said, 2023; Aziz & Mat Said, 2020; Hitchcock, 2017; Zainuddin & Rafik-Galea, 2016).

According to Toulmin (2003), an argument is composed of two sets of elements. The first set of elements includes claim, grounds and warrants, which provide the foundation of the argument. The second set of elements helps strengthen the foundation. These comprise backing, qualifiers, and finally, rebuttals, or counterarguments.

As a tool for content analysis, Toulmin's Model is capable of discerning the deficiencies within written arguments. In one study, Toulmin's Model was used to analyse essays written by 15 second-year ESL undergraduates from a public university in East Malaysia, revealing that rebuttals were largely absent from their arguments (Osman & Januin, 2021). In another study by Novianti (2021), the response essays from 29 undergraduate students enrolled in a compulsory Composition II course were examined. The students were from different faculties and cohorts, all enrolled in the same compulsory course. Through purposive sampling, the essays of 16 students who had received grades of A, B, or C were selected for analysis. The findings of these studies revealed that fewer than seven of these students incorporated warrants, and only three included rebuttals in their essays, indicating that the majority still demonstrated limited analytical skills.

Rubric-Based Writing Assessment

Rubric-based writing assessment is widely recognised as a tool for evaluating written works both reliably and accurately (Toscu, 2023). Across the world, the assessment of English writing skills is considered a fundamental aspect of ESL education, with grammar, vocabulary, sentence structure, coherence, and clarity being key elements (Zahid, Anwar & Azim, 2023). Rubrics play a critical role in enhancing student writing skills by fostering awareness of writing criteria, promoting self-regulation, encouraging critical thinking, and facilitating peer feedback that supports writing skills through structured guidance and scaffolding (Kunnel, 2021).

Furthermore, rubric-based assessment provides clear guidance for ESL learners, facilitating comprehension, self-awareness, and self-improvement via self-assessment. However, its effectiveness depends on the students' engagement and reinforcement from the teacher's feedback (Dyrdal, 2021). In addition to assessment, rubrics also serve as a reference tool for language learners, strengthening their genre knowledge and tracking their progress in genre-specific writing (Rock, 2021). More importantly, rubrics constructed based on actual performance data can provide a valid method for assessing second language writing and function as a learning tool that guides students in developing their writing skills (Rock, 2021).

Assessment via Artificial Intelligence

Manually grading exam papers and written assignments is a crucial yet time-consuming and tedious task for educators, often leading to inconsistencies due to evaluator fatigue (Seßler et al., 2025; Vijaya Shetty et al., 2022). Artificial Intelligence (AI) has the potential to provide high-quality and consistent feedback, free from human biases, while also assessing a large volume of essays within a short period (Almegren et al., 2024). However, despite its efficiency, AI is unable to recognise the nuanced aspects of students' writing that human evaluators can discern (Jonäll, 2024). Research by Wetzler et al. (2024) further highlights discrepancies between grades assigned by human instructors and AI, even when using the same rubric.

While AI-based programs like ChatGPT offer speed and efficiency in assessment, they are not without limitations. ChatGPT demonstrates superior performance in evaluating fundamental language mechanics, including grammar, spelling, sentence structure, relevance, and supporting evidence. However, human evaluators continue to outperform AI in assessing thematic consistency, which remains a critical aspect of comprehensive evaluation (Bouziane & Bouziane, 2024). Ultimately, AI should serve as a complementary tool to assist educators in doing assessments rather than a complete replacement for human evaluation.

Research Methodology

Research Design

This is a mixed-methods research design study. 72 essay samples were collected from degree-level university students during the final week of a semester-long Reading and Writing English course. Before the students wrote their essays, they received instruction on how to write multiple genres of essays, with emphasis given to persuasive/argumentative writing.

The essays were written by students who belong to the Labuan Faculty of International Finance (FKAL) and the Faculty of Computer and Informatics (FKI). As for their English proficiency, most of the students claim to have achieved a MUET score of Band 3.5, which falls between modest (Band 3.0) and competent user (Band 4.0).

Mobile devices were collected to prevent plagiarism, and the students were instructed to write essays based on a set of prompts provided by the researcher. Two evaluation frameworks were used for content analysis:

Rubric-Based Assessment

A rubric specifically designed for assessing critical thinking in English argumentative essays was adopted for this study. Beyond serving as a reliable tool for evaluating second-language writing (Rock, 2021), the rubric also facilitated the identification of weaknesses in the students' essays based on clearly defined argumentative writing criteria (Kunnel, 2021). These criteria include (i) organisation, (ii) content, and (iii) language and vocabulary.

AI Assessment

Along with the rubric, a ChatGPT app called "Essay Grade Professor" was used to grade the essays by feeding it the rubric. Another ChatGPT app called "Toulmin Essay Analysis" was also used to assist in analysing the essays.

Toulmin's Model Analysis

Toulmin's Model (2003) was employed to examine the essays and verify how the students utilise the six persuasive elements: claim, grounds, warrant, qualifier, backing and rebuttal. The Toulmin's Model analysis was aided by the ChatGPT app entitled "Toulmin Essay Analysis".

Research Tools & Data Collection

Essays were collected from tertiary ESL students, written based on a set of prompts provided by the researcher. A rubric designed with critical thinking in mind was utilised to assess the essays, with ChatGPT-assisted analysis used to accelerate data categorisation and reduce personal bias in evaluation. An evaluator was also employed, using the rubric, to ensure the reliability of the data. The rubric was not only used to assess the essays but also revealed key areas of weakness within them based on the rubric criteria.

Findings

Table 1 The Frequency and Percentage of the Essay Prompts Chosen

Essay Prompt	Number of Essays	Percentage (%)
A. Do you agree that online classes are better than face-to-face classes?	34	47.2%
B. Should all COVID-19 restrictions be lifted?	1	1.4%
C. Should all school examinations be abolished?	11	15.3%

D. Should university course textbooks be provided for free?	5	6.9%
E. Are e-books better than physical textbooks?	21	29.2%
Total	**72**	**100%**

The table shows that the three most popular prompts are "Do you agree that online classes are better than face-to-face classes?", "Are e-books better than physical textbooks?" and "Should all school examinations be abolished?". The students most likely relate to the three most popular prompts, which is why they were chosen.

Rubric-Based Analysis of Essays

To compare human and AI grading, a two-sample t-test was conducted for each evaluation category: Organisation, Content, Language & Vocabulary, and Total Score.
The null hypothesis (H_0) for all tests was: **There is no significant difference between the Evaluator (human) scores and AI scores.**

Table 2 T-Test Results

Criteria	Evaluator Mean	AI Mean	Differences	p-value
Organisation	7.58	4.93	2.65	0.00
Content	12.22	11.94	0.28	0.631
Language & Vocabulary	11.06	6.26	4.79	0.00
Total	30.86	23.14	7.72	0.00

The table displays the results of the t-test. Since the p-value of the "Organisation", "Language & Vocabulary", and "Total" essay scores is less than 0.05, the null hypothesis can be rejected, and therefore, there is a large difference between the scores assigned by the evaluator and the AI. However, the p-value for the "Content" scores is shown to be more than 0.05, and therefore fails to reject the null hypothesis, which means that there is no significant different between the scores provided by the evaluator and the AI.

The scores assigned by the AI for both "Organisation" and "Language & Vocabulary" are significantly lower than the human evaluator's scores. As for "Content", both the AI and evaluator's scores are similar, which means that the AI's grading aligns closely with the evaluator in this area. When comparing the mean total scores of essays according to the evaluator and the AI, it is shown that the AI consistently gives lower scores. We can conclude that the AI to be stricter in grading "Organisation" and "Language & Vocabulary" as it focuses mainly on mechanics rather than overall fluency and coherence. While AI grading is more consistent overall, the evaluator demonstrates more variability when giving scores.

This rubric-based analysis evaluates students' essay performance across key areas: organisation, content, language use, and supporting evidence. Overall, the essays scored an average of 7.58/12 for Organisation, 12.22/20 for Content and 11.06/18 for Language and Vocabulary.

According to the evaluator, the essays scored fairly well across the board. They also stated that, "*Some introductions were missing clear thesis statements, and a few students who included thesis statements presented their main points in the body paragraphs in an order that did not*

align with the order outlined in their thesis. This, for me, impacted the coherence of their essays. Also, many students struggled to develop their main points fully. Elaboration was either lacking or, in some cases, repetitive and redundant. I think limited vocabulary can cause the students to not be able to elaborate on their ideas, and this hinders the overall clarity and comprehension of their writing. Most students are still struggling with the basic grammar concepts, as some of them are still making simple grammar mistakes like subject-verb agreement. Another noticeable mistake that I found was spelling. Lastly, the comprehension part. I had quite a hard time digesting what some students were trying to say in their essay."

The AI-based assessment, on the other hand, provided a lot more details, including common issues in the writing and recommendations to improve the essays.

The common issues seen in their organisation are the weak transition between the ideas, a lack of a clear thesis statement in the beginning of their essays, disjointed paragraphs and abrupt conclusions. The AI recommended that the students be taught how to write proper topic sentences and logical progression between ideas. The students are recommended to use transitional phrases to allow for smoother connections. The students need to learn how to formulate essay outlines to improve their essay structure.

For content, the arguments within the essays lacked depth or strong supporting examples, while some essays were repetitive or went off-topic. To solve this, students are encouraged to think more critically while justifying their opinions. They need to be taught how to apply counterarguments to create a stronger argument. They should also be assigned exercises to help expand their ability to compose arguments.

Finally, they were shown to demonstrate poor grammar and limited vocabulary as they use words repetitively. There were also constant verb tense and subject-verb agreement mistakes, and awkward phrasing. To fix these problems, they need stronger grammar lessons to improve all their affected areas, assign reading to students to improve their general knowledge and academic writing, and encourage the students to practice peer-editing.

Toulmin-Based Analysis of Essay Samples

According to Toulmin's Model, a strong persuasive argument consists of a claim, grounds, warrant, qualifier, backing and rebuttal. Using the model as a framework to analyse the essays, their contents are broken down to verify the presence of each element and how effectively they are presented. According to the analysis, each essay provided a clear and direct claim through a well-defined thesis statement. To support the claim, they provide logical grounds, even if many of them lack sufficient evidence. Despite these strengths, common weaknesses were found in the essays as well. The essays lacked qualifiers, as most of them made absolute statements. For example: "E-Books are always better". Few of the essays addressed counterarguments or opposing perspectives. The essays were lacking in supporting evidence, as none included data, facts, expert opinions or research studies. Instead, the arguments are only supported by the students' personal opinions, which are overused and repetitive.

Discussion

This study assessed the argumentative writing proficiency of university ESL students of various academic programmes using a rubric-based evaluation and Toulmin's Model. The findings highlight key weaknesses in organisation, argument depth, and language proficiency, reinforcing the need for targeted instructional support.

Based on the rubric-based evaluation, the essays show that the students can perform fairly well when developing their essays. However, despite this, there are several glaring flaws in their composition.

First of all, they demonstrate weak organisational structure in their essays as they struggle with logical flow. There is a weak transition between their ideas as they try to elaborate on the details. A lack of a clear thesis statement is also observed in the essays. Finally, their paragraphs appear to be disjointed and end with abrupt conclusions. Toulmin's Model (Toulmin, 2003) analysis supports this, as many arguments lacked explicit warrants, making reasoning difficult to follow.

In terms of their content, their arguments lacked depth or strong supportive details. The students do not use examples, statistics, or facts to support their arguments. Rather, they only employ their own opinions. When attempting to make an argument, some essays present points repetitively, and there are even cases of essays presenting ideas that are off-topic from the original idea. Additionally, there is a severe lack of rebuttals in the essays, which shows that the majority of students can only recognise one side of the argument instead of both.
Finally, there are significant errors that are observed in their grammar and vocabulary, which affect the essays' clarity. There are frequent verb tense and subject-verb agreement mistakes, awkward phrasing as a result of direct translations, and limited vocabulary, which causes the students to use words repetitively.

When comparing the grades assigned by the evaluator and AI, the AI appears to be far stricter when assigning scores for 'organisation' and 'language & vocabulary', as shown by the difference in mean scores. However, the scores for 'content' are quite similar to each other, showing a close agreement between the two scores. While the AI grading is stricter towards grammar and vocabulary errors, both the AI and the evaluator agree that frequent language errors can impact comprehension, which also reduces the effectiveness of the argument.

ESL students struggle with argumentative structure, critical thinking, and language skills (Sabri et al., 2021; Joannes & AlSaqqaf, 2022). Similar studies (Osman & Januin, 2021) found that ESL learners often fail to include rebuttals and supporting evidence, reinforcing the need for explicit instruction. Discrepancies in AI vs. human grading (Almegren et al., 2024) highlight concerns about AI's effectiveness in evaluating coherence and argument depth. However, AI can still highlight and present a summary of the errors that are present within the essays.

Limitations of the Study

The sample size was small as it was limited to only 72 essays from a single university, which limited the generalizability. There was also AI grading bias as the AI applied a much stricter criteria for the grading.

Pedagogical Implications

To enhance ESL students' argumentative writing skills, several pedagogical strategies are recommended. First, explicit instruction in argumentation should be incorporated by using Toulmin's Model, enabling students to structure their arguments more effectively by including essential elements such as backing and rebuttals. Second, grammar and writing support is crucial; students should participate in workshops that focus on improving verb tense accuracy, sentence structure, transitions, and engage in peer editing activities to strengthen their overall language proficiency. Third, AI should be used as a supplementary tool rather than a replacement for human evaluation. While AI can efficiently detect mechanical errors and provide summaries of issues with recommendations, it cannot fully assess thematic coherence or argument depth. Lastly, integrating evidence-based writing practices is vital. Students should be trained to find and incorporate external sources, statistics, and expert opinions into their essays, which can be supported by assigning topics that require research and guided source selection.

Conclusion

This study examined the persuasive writing proficiency of university ESL students using rubric-based assessment and Toulmin's Model. Findings indicate that students struggle with organisation, depth of argumentation, and language proficiency, limiting the effectiveness of their persuasive essays. Many essays lacked supporting evidence and rebuttals, relying heavily on personal opinions. Additionally, grammar and structural issues further affected clarity and coherence.

To improve ESL students' argumentative writing skills, several measures need to be enforced. First, explicit argumentative instruction that integrates Toulmin's Model into writing lessons should be implemented to help students practice constructing logical arguments with claims, backings, and rebuttals. Second, provide students with grammar and vocabulary support. This can be done through workshops that focus on sentence structure, transitions, and common ESL errors to improve clarity and fluency. Once the students recognise their errors and learn how to fix them, they can improve their language skills. Next, AI-based grading tools should be used to provide quick and easy feedback. Finally, evidence-based writing training encourages the students to incorporate external sources, real-world examples, and statistics into their essays.

This study provides invaluable insights into improving ESL argumentative writing instruction, reinforcing the importance of structured writing frameworks, targeted pedagogical interventions, and the responsible use of AI in assessment. In the future, a much larger study with an expanded sample size should be done, including students from multiple universities to provide broader insight. An evaluation of Toulmin-based writing lessons should be done to assess the effectiveness of Toulmin's Model in the classroom. Finally, calibration can be done to better improve how AI can align with human assessment.

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CONSTRUCTIVISM VS. BEHAVIORISM OF PEDAGOGICAL THEORIES TO THE DIGITAL CLASSROOM: PRACTICAL STRATEGIES FOR HIGHER EDUCATORS

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Abstract : *In the rapidly evolving background of higher education, the digital classroom has emerged as a trans-formative atmosphere where traditional pedagogical theories are being re-imagined to meet the needs of contemporary learners. This paper explores the application of two prominent pedagogical theories—Behaviorism and Constructivism in digital learning environments, highlighting their distinct approaches and practical implications for higher education. The paper discusses that a blended method, integrating both Behaviorist and Constructivist tactics, can create a more inclusive and dynamic digital learning environment. By leveraging the strengths of each theory, higher educators can design courses that cater to diverse learning needs, promote student engagement, and enhance learning results. Practical recommendations include the usage of Learning Management Systems (LMS) for structured content delivery, personalized learning through adaptive tools, and fostering social interaction through collaborative platforms. This paper concludes that while Behaviorism and Constructivism offer distinct theoretical foundations, their combined application in the digital classroom can lead to a more effective and student-centered learning experience. Behaviorism emphasizes observable behaviors, reinforcement, and structured learning experiences while Constructivism, on the other hand, focuses on active learning, cognitive processes, and the co-construction of knowledge. By thoughtfully integrating these pedagogical approaches, higher educators can better prepare students for the challenges of the digital age and foster a culture of lifelong learning.*

Keywords: *Pedagogical Strategies, Constructivism, Behaviorism, Digital Classroom, Higher Education*

Introduction

In the contemporary landscape of higher education, the digital classroom has emerged as a pivotal platform for teaching and learning, driven by rapid technological advancements and the increasing demand for flexible, accessible education. This shift towards technology-enhanced learning environments necessitates a re-evaluation of traditional pedagogical theories and their application in the digital age. Among these theories, Constructivism and Behaviorism stand out as two dominant frameworks that have significantly influenced educational practices for decades (Kahu, 2013). However, their relevance and effectiveness in the context digital classrooms remain a subject of ongoing debate and exploration.

Behaviorism, rooted in the principles of observable behavior, reinforcement, and conditioning, has long been a cornerstone of traditional educational practices. It emphasizes structured learning experiences, repetition, and the use of external stimuli to shape student performance. In the digital classroom, Behaviorist strategies manifest through gamified learning platforms, drill-and-practice software, and adaptive learning technologies that provide immediate feedback and reinforcement. These approaches are particularly effective for teaching foundational skills and ensuring consistent performance, making them a valuable component of digital pedagogy (Sam May-Varas et al., 2023).

In contrast, Constructivism focuses on the learner's active role in constructing knowledge through exploration, social interaction, and meaningful experiences. This theory aligns with the principles of student-centered learning, critical thinking, and the application of knowledge in real-world contexts. In digital environments, Constructivist strategies are implemented through project-based learning, collaborative group work, immersive simulations, and virtual reality experiences. These methods encourage students to engage deeply with content, fostering a deeper understanding and more durable learning outcomes.

The juxtaposition of these two pedagogical theories—Behaviorism and Constructivism—raises important questions for higher educators: How can these distinct theoretical frameworks be effectively integrated into digital classrooms? What practical strategies can be employed to leverage the strengths of each approach while addressing their limitations? (Snijders et al., 2020). And, ultimately, how can educators create a balanced, technology-enhanced learning environment that meets the diverse needs of modern students?

The paper aims to explore these questions by examining the application of Behaviorism and Constructivism in digital classrooms. It will provide an overview of each theory, discuss their practical implications for higher education, and offer evidence-based strategies for integrating these approaches in a blended learning model. By examining the strengths and challenges associated with each pedagogical framework, this paper seeks to provide higher educators with actionable insights for designing effective, inclusive, and engaging digital learning experiences.

In an era where technology continues to reshape the educational landscape, understanding the interplay between Behaviorist and Constructivist theories is essential for educators striving to meet the evolving needs of their students (Stangor & Walinga, 2014). This paper argues that a balanced, theory-informed approach to digital pedagogy can enhance student engagement, foster deeper learning, and ultimately prepare students for the complex demands of the 21st-century learning environment.

Constructivism in the Digital Classroom

Constructivism is a learning theory that emphasizes the active construction of knowledge by learners through exploration, collaboration, and real-world experiences. In the digital classroom, constructivist strategies focus on engaging students in meaningful learning experiences that promote critical thinking, problem-solving, and the development of deeper understanding.

Combine online and offline teaching methods. Using online platforms to deliver lecture videos and learning materials before class, and then conduct in-depth discussions, case analyses, and practical operations in face-to-face classes. This allows students to learn at their own pace and facilitates better knowledge absorption.
Divide teaching content into small, focused modules or micro-lessons. Each module can be completed in a short period, such as 10-15 minutes, which is convenient for students to learn fragmented knowledge and is suitable for the characteristics of online learning where attention is easily distracted.

Design problem scenarios based on real-world issues and guide students to use digital resources to find solutions. For instance, in a business management course, students can be asked to analyze and solve a company's actual operational problems through online data research and case analysis(Basri et al., 2020).

Make full use of LMS such as Blackboard or Moodle to manage courses. Teachers can upload course materials, assign and grade homework, and track students' learning progress. Through data analysis functions in LMS, teachers can understand students' learning behaviors and difficulties and adjust teaching strategies in a timely manner.

Use video conferencing tools such as Zoom or Tencent Meeting for live teaching and discussions. These tools support features such as screen sharing, interactive whiteboards, and breakout rooms, enabling real-time interaction between teachers and students and among students.

Incorporate various educational apps into teaching. For language learning, apps like Duolingo can be used to help students practice vocabulary and speaking; for mathematics and science courses, apps like Wolfram Alpha can assist with problem-solving and concept understanding.

Key Principles of Constructivism including Active Learning, Prior Knowledge, Social Interaction, Real-World Contexts and Student-Centered Approach.
Active Learning: Learners construct knowledge through hands-on activities, problem-solving, and exploration.

Prior Knowledge: New learning is built upon existing knowledge, making it essential to activate prior understanding.

Social Interaction: Collaboration and discussion with peers and instructors enhance learning outcomes.

Real-World Contexts: Learning is more effective when situated in authentic, real-world scenarios (Fredricks & McColskey, 2012).

Student-Centered Approach: Educators act as facilitators, guiding students to construct their own understanding.

Furthermore, Project-Based Learning (PBL), Collaborative Learning, Interactive Simulations and Virtual Labs, Flipped Classrooms, Personalized Learning Paths and Reflective Learning are the practical Strategies for Digital Classrooms.

Project-Based Learning (PBL)

Digital tools enable students to engage in complex, long-term projects that require research, collaboration, and application of knowledge. For example, students can use online platforms to work on interdisciplinary projects, such as developing a digital marketing campaign or solving a community problem.

Collaborative Learning

Online collaboration tools like discussion boards, wikis, and virtual group projects allow students to share perspectives and co-construct knowledge. Virtual communities and social learning platforms can also enhance peer interaction and support.
Interactive Simulations and Virtual Labs

These tools provide immersive experiences that allow students to explore complex concepts and apply theoretical knowledge in virtual environments. For example, science students can conduct virtual experiments, while business students can simulate market scenarios (Wu et al., 2023).

Flipped Classrooms

In a flipped classroom model, students review lecture materials online before class, allowing class time to be used for interactive activities, discussions, and problem-solving. This approach leverages digital resources to maximize active learning during face-to-face sessions.

Personalized Learning Paths

Digital platforms can offer personalized learning experiences tailored to individual student needs, allowing them to explore topics at their own pace and in their preferred learning style. This aligns with constructivist principles by supporting the construction of knowledge based on individual prior knowledge and interests (Bovill, 2020).

Reflective Learning

Digital portfolios, blogs, and reflective journals provide students with opportunities to document their learning journey, reflect on their progress, and integrate new knowledge with existing understanding. These tools support metacognitive skills and deeper learning.
Set up online discussion forums on the course platform where students can post questions, share ideas, and discuss course-related topics. Teachers should actively participate in the discussions, guide the direction of the topics, and encourage students to express their opinions. Organize students to complete group projects through online collaboration tools. This can cultivate students' teamwork skills and communication skills. In a software development course, students can use tools like GitHub to collaborate on code development. Introduce gamification elements into teaching, such as setting up points systems, badges, and leaderboards. For example, students can earn points by completing learning tasks, participating in discussions, and getting good grades in assignments. This can increase students' motivation and enthusiasm for learning. Formative Assessment: Adopt a variety of formative assessment

methods, such as online quizzes, assignments, and peer reviews. Online quizzes can be set to automatically grade and provide immediate feedback to students. Peer reviews can help students learn from each other and improve their critical thinking skills. Use learning data to evaluate students' learning outcomes. Analyze data such as students' learning time, participation in discussions, and assignment completion to comprehensively understand students' learning situations and provide personalized learning suggestions. Provide timely and specific feedback to students (Zainullah et al., 2023). Whether it is in response to questions in class, comments on assignments, or evaluations of project progress, feedback should focus on students' strengths and areas for improvement and offer guidance on how to improve.

Benefits and Challenges

Constructivist strategies promote active participation and intrinsic motivation. By connecting new knowledge to real-world contexts and prior understanding, students develop a more profound and lasting grasp of concepts. Constructivist approaches support the development of critical thinking, collaboration, creativity, and communication skills (Msed, 2023).

Implementing constructivist strategies may require significant digital resources and infrastructure. Educators need to shift from traditional teaching roles to facilitators, which may require additional training and support. Evaluating student learning in constructivist environments can be more challenging due to the focus on process and individual growth (Zainullah et al., 2023).

Constructivism offers a powerful framework for enhancing learning in digital classrooms by emphasizing active engagement, collaboration, and the construction of knowledge. By leveraging digital tools and strategies such as project-based learning, interactive simulations, and personalized learning paths, educators can create dynamic and meaningful learning experiences that prepare students for the demands of the 21st century. However, successful implementation requires thoughtful planning, adequate resources, and a willingness to embrace a student-centered approach.

Behaviorism in the Digital Classroom

Behaviorism, as a learning theory, emphasizes the role of external stimuli and reinforcement in shaping observable behaviors. In the context of the digital classroom, Behaviorism offers practical strategies to enhance student engagement, manage behavior, and promote structured learning experiences (Jabsheh, 2024). Below are key applications of Behaviorism in digital education, supported by recent research and best practices. Behaviorists believe that behavior is a response to a stimulus. In the digital classroom, this could mean that when students are presented with specific digital content such as a video lecture (stimulus), they are expected to respond by learning the information or performing a related task.

Positive Reinforcement

Positive reinforcement involves rewarding desirable behaviors to encourage their repetition. In the digital classroom, this can be achieved through: Verbal Praise and Feedback: Providing immediate, positive feedback on online assignments or during virtual

discussions. Using digital badges, points, or certificates to motivate students. For example, awarding points for completing online modules or participating in discussion forums. Incorporating game-like elements (e.g., leaderboards, progress bars) into learning management systems (LMS) to make learning more engaging (Anderson et al., 2020).

Negative Reinforcement

Negative reinforcement involves removing an unpleasant stimulus to increase the frequency of a desired behavior. In the digital classroom, allowing students to skip certain tasks if they achieve high performance in assessments. Offering flexibility in deadlines for students who demonstrate consistent progress.

Punishment

Punishment involves applying negative consequences to discourage undesirable behaviors. However, its use should be judicious to avoid negative impacts on student motivation and self-esteem. Temporarily restricting access to certain online resources or activities for non-compliance. Providing corrective feedback on assignments or behavior, focusing on improvement rather than punishment.

Modeling

Modeling involves demonstrating desired behaviors for students to observe and imitate. Creating instructional videos that model problem-solving or task completion. Using avatars or simulations to demonstrate appropriate behaviors in online group activities.

Shaping

Shaping involves reinforcing successive approximations of a desired behavior until it is fully mastered. In digital education: Breaking down complex tasks into smaller steps and providing reinforcement at each stage. For example, gradually increasing the complexity of online assignments. Using software that adjusts the difficulty level based on student performance, providing scaffolded support.

Cueing

Cueing involves providing hints or prompts to guide student behavior or performance. Using on-screen prompts, reminders, or virtual gestures to guide students through tasks. Incorporating interactive elements (e.g., clickable hints, pop-up guides) in digital content to support learning.

Many digital learning platforms use gamification elements based on behaviorism. Math learning apps might reward students with coins or stars for answering questions correctly. These rewards act as positive reinforcement, motivating students to continue practicing math problems. Adaptive Learning Systems use behaviorist principles to adapt to students' responses. If a student answers a series of questions incorrectly, the system (stimulus) might present more practice problems on that particular topic until the student shows improvement (response). Digital platforms often provide immediate feedback on

assignments and quizzes. This feedback serves as a form of reinforcement. Positive feedback can boost students' confidence and motivation, while constructive criticism can help them understand where they went wrong and how to improve.

Benefits and Limitations of Behaviorism in the Digital Classroom

Behaviorism offers several advantages in digital education. Provides clear expectations and consistent routines, which are essential in the digital environment. Emphasizes observable behaviors and measurable results, allowing for effective assessment and feedback. Through reinforcement and gamification, Behaviorism can significantly increase student motivation and participation (Bakker, 2015). Behaviorism in the digital classroom provides a clear structure for learning. Students know what is expected of them and what behaviors will lead to rewards or punishments. This clarity can help students stay focused and motivated. The ability to receive immediate feedback allows students to quickly correct their mistakes and learn from them. This is particularly beneficial in digital environments where students can progress at their own pace. The use of rewards and incentives can increase students' motivation to engage with the learning material. This is especially effective for younger students or those who need an extra push to stay on track.

However, it also has limitations. Behaviorism primarily focuses on observable behaviors, potentially overlooking deeper cognitive processes. The heavy use of rewards and punishments may reduce intrinsic motivation over time. Behaviorism provides valuable tools for managing and enhancing learning in digital classrooms (Choi & Han, 2023). By leveraging techniques such as positive reinforcement, modeling, and shaping, educators can create structured, engaging learning environments that promote consistent performance and skill development. Focusing solely on stimulus-response and reinforcement may lead to shallow learning. Students might memorize information to receive rewards but not truly understand or be able to apply it in different contexts. Behaviorist approaches often rely on external rewards and punishments, overlooking students' internal desires to learn and explore. Some students may lose interest once the rewards are taken away. It assumes that all students will respond similarly to the same stimuli and reinforcements, which may not be the case. Different students have different learning styles and motivations. Nevertheless, it is important to balance Behaviorist approaches with other pedagogical theories, such as Constructivism, to address the diverse needs of students and foster deeper, more meaningful learning (Jabsheh, 2024).

Conclusion

In the digital classroom, both Constructivism and Behaviorism offer valuable yet distinct approaches to teaching and learning. Behaviorism, with its focus on observable behaviors, reinforcement, and structured learning, provides a practical framework for ensuring consistent performance and mastering foundational skills. This approach is particularly effective in digital environments where immediate feedback and repetitive practice can be facilitated through adaptive learning platforms and gamified elements. On the other hand, Constructivism emphasizes active learning, social interaction, and the construction of knowledge through real-world contexts. It encourages students to engage deeply with content, fostering critical thinking and problem-solving skills. In the digital classroom, Constructivist strategies such as project-based learning, collaborative tools, and interactive

simulations can enhance student engagement and promote deeper understanding (Rehman et al., 2025). Despite their differences, both theories share common ground in their focus on the learning process and the role of the environment in shaping educational outcomes. They also highlight the importance of structuring learning materials and aligning instructional strategies with clear objectives. However, their effectiveness varies based on the learning context and the specific needs of students.

In practice, a blended approach that leverages the strengths of both Behaviorism and Constructivism is recommended (Jang et al., 2010). Foundational skills can be taught through Behaviorist strategies, while deeper learning and application can be supported through Constructivist methods. This balanced approach allows educators to create dynamic, inclusive digital classrooms that cater to diverse learning needs and promote both skill acquisition and critical thinking. The digital classroom environment has the potential to blend these two theories. While behaviorism can be used to ensure that students master the fundamental knowledge and skills through structured practice and rewards, constructivism can be employed to foster higher - order thinking, creativity, and problem - solving abilities (I et al., 2025). A well - designed digital curriculum might start with behaviorist - based drills to build a knowledge base and then transition to constructivist - led projects where students apply and expand upon that knowledge.

Ultimately, the choice between Behaviorism and Constructivism should not be seen as mutually exclusive. Instead, educators should critically analyze the learning context and flexibly integrate elements from both theories to enhance teaching practices and achieve optimal learning outcomes. By doing so, higher educators can better prepare students for the demands of the digital age, fostering a culture of lifelong learning and adaptability. Neither constructivism nor behaviorism can be considered the sole ideal pedagogical theory for the digital classroom. Instead, a judicious integration of the two, tailored to the learning objectives, the nature of the content, and the characteristics of the learners, holds the key to maximizing the educational potential of digital learning environments. By leveraging the strengths of both theories, educators can create a rich, engaging, and effective digital learning experience that promotes both knowledge acquisition and deep understanding.

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LEGAL POSITION OF E-COMMERCE IN MALAYSIA

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Abstract: *The early years of e-commerce, 2008-2011, saw significant growth in Malaysia. The adoption of e-commerce during these years was encouraged by the improved accessibility of internet infrastructure and computer use in households and offices. The legal framework governing e-commerce in Malaysia is crucial for ensuring consumer protection, data security, and fair business practices in the rapidly evolving digital economy. Despite its archaic nature, the Contract Act 1950 has yet to adapt to modern business transactions. The Electronic Commerce Act 2006 (ECA) makes electronic transactions legal, and the Consumer Protection Act 1999 (CPA), as amended, applies its rules to online transactions. This ensures that the protection of online shoppers is equivalent to that of in-store shoppers. But even with these efforts by regulators, it's still hard to make sure that e-commerce laws are followed properly, especially when it comes to transactions that happen across borders, disputes over who has jurisdiction, cyber threats, and illegal activities done online. Accordingly, this paper examines the current legal position of e-commerce in Malaysia, its challenges, and potential reforms to create a more secure and reliable online marketplace. Using a library research methodology, it examines relevant laws and other regulatory guidelines affecting e-commerce transactions in Malaysia. Findings indicate that certain significant provisions are missing in these laws, which make their provisions lack harmony, and above all, many legal issues have not been properly addressed. Current laws primarily focus on general data protection but do not provide standardised dispute resolution mechanisms, which further complicates legal remedies for consumers who encounter issues with online transactions. This regulatory gap leaves consumers vulnerable to unauthorised data collection and potential privacy violations, making them hesitant to engage in e-commerce due to perceived risks such as identity theft, data breaches, and unfair business practices. This study is expected to contribute to the body of knowledge on e-commerce and consumer legal protection in general.*

Keywords*: E-Commerce, Consumer Protection, Legal Position, Regulatory Framework*

Introduction

In Malaysia, online shopping becomes the new trend and phenomenon that has seen rapid growth in this modern lifestyle. This phenomenon is due to the internet penetration and digitalization which involved e-commerce platform in handling the transaction. According to Business Encyclopedia, e-commerce refers to the act of selling and buying the products or any of goods or services, which used the internet as the medium of transactions. This includes the conduct of transferring the money and data to accomplish these transactions (Almarabeh & Majdalawi, 2019).

E-commerce is referred as the online selling of physical goods, but it may also describe any form of commercial transaction using the internet. E-commerce means trade and business through the Internet (Billah, 2008). E-commerce also can be refers as a general exchange of goods and services via the Internet. It is an act of conducting business online and may include buying and selling conducts with digital cash and via electronic data interchange (Billah, 2008).

E-commerce was founded with the considerations of some noble goals. Some of the advantages of e-commerce are that it depends on the intent of each participant and e-commerce provides many benefits for both merchants and consumers. For merchants, this online transaction brings more performance, greater responsiveness and lowers costs in conducting their business. This helps small businesses and entrepreneurs to expand their scope well beyond what was previously possible. The consumers would also stand to gain from wider choice, increased availability of specialized products, more comprehensive product information, lower costs and more responsive services (Rachagan, 1997).

On the other hand, this remarkable growth has given rise to some new problems and concerns about the legal protection of consumers. The way in which e-commerce is conducted is contrasting to the conventional transaction, through which it has become more complex, revealing and growing the vulnerability of customers to unfair market practices (Pynter & Lim, 2001). A customer may face different problems, such as placing an order, incorrect products delivered or no delivery at all, given the fact that payment was made to the supplier by credit or debit card of the customer (Nor, et al, 2019). Furthermore, another problem relating to e-consumers in the selling of products is when the correct products are shipped but the consumer discovers that the goods are faulty in some way after the cooling-off time has elapsed.

This paper will discuss the current legal position of e-commerce in Malaysia with its challenges and potential reforms to create a more secure and reliable online marketplace for the consumer in Malaysia.

E-Commerce in Malaysia

In Malaysia, e-commerce has been growth in 2008-2011 which called as early year for e-commerce. The use of e-commerce during these years was encouraged by the improved accessibility of internet infrastructure and computer use in households and offices. A study by the Multimedia University Malaysia shown that due to the rapid rise in the number of computer users and faster Internet connections in each year, e-commerce has a strong growth potential.

According to an official website of Techwire Asia, e-commerce is among Malaysia's fastest-growing industries. A report in The Star IN-TECH April, 18 2000, indicated that in 1995 there were only 7,000 Internet users. However, in 1999, the size increased by hundred percent which was 700,000. In addition, the e-commerce investment in 1997 was RM 12.54 million, which is projected to grow to RM 2.46 billion by 2002. (Sulaiman, Jani & Bahri, 2001).

The increase in Malaysia's Internet use and e-commerce expenses is led by the Malaysian Government, via the creation of the Multimedia Super Corridor (MSC). The MSC provides low tariffs for telecommunications, no Internet surveillance, plus a well-developed fiber optic cabling IT network. Malaysia has given a serious emphasis on the ICT development by introducing the Multimedia Super Corridor (MSC) in 1996.

C2C platforms such as eBay and Lelong evolved during this period because it gave individuals the ability to efficiently and conveniently sell goods. By using cash on delivery (COD) methods, users who are unfamiliar with payment gateways may easily buy or sell products. So, instead of inserting your credit card or bank data, buyers and sellers will meet to inspect goods face to face and accept payments (Yean, 2019).

The popularity of C2C platforms also encouraged the use of payment gateways and other online payment methods. For example, e-Bay, which offered Malaysian access to goods sold abroad, obliged users to sign up using PayPal which triggered the country's use of electronic bank transfer, credit and debit cards.

Online boutiques, also known as vendors, have also seen a rise, especially post-pandemic, selling a wide range of goods from tech products to lifestyle and fashion items. They are using the entire medium in online marketplaces to sell their products. This includes Amazon, Shopee, Lazada, Tiktok, Zalora, Rakuten, Hermo, Alibaba, Shein, eBay and Ezbuy. Every player struggled hard to gain the largest market share and in 2023, Shopee received 342.8 million visits a month, making it the most visited marketplace in the Asia Pacific region. Over the years, Shopee has secured it’s position as a leading e-commerce platform in Malaysia.

Legal Position of E-Commerce in Malaysia

According to Billah (2008), the sources of law that affecting e-commerce includes historical sources, legal sources, institutional sources, written laws and unwritten laws. Institutional source includes judicial precedents, textbooks or the Internet. As for written law, it includes the Constitution and the legislations. The constitution is the supreme laws of the country which lays down the power of the government. The constitution also provides regulatory facilities and safeguards on aspects like privacy, rights, obligations and jurisdictions in the digital environment of today’s reality.

The subsidiary legislation also source of cyber laws especially on e-commerce. These include any proclamation, rules, regulations, notifications, orders, by laws or other instruments made under Ordinances, Enactments or any other lawful authority having legislative effect.

The general legislation on contracts and the selling of goods can be found in the Contracts Act 1950 and the Sale of Goods Act 1957. However, these pre-independence laws are quite archaic and have not yet been updated to match current business transactions (Amin & Mohd Nor, 2013).

Contracts Act 1950

The Contracts Act 1950 laid down the main principles of the law of contract. It starts with Section 2 of the Act which provides the definition of offer or proposal, acceptance, consideration, agreement, contract, void, voidable and reciprocal promises. As for the requirements of a valid contract, Section 3 until Section 24 of the Act laid down the elements to be fulfilled to create a legal binding contract. The most important elements of contract are the offer, acceptance of that offer, intention to create legal relationship and consideration. The Act also provides on the capacity of the party to a contract which the related to the minor and

insanity of the party. Only competent person may enter into a contract (Jayabalan & Randawar, 2017).

Furthermore, if the element of coercion, undue influence, fraud and misrepresentation arises in a contract, then the contract is a voidable and if the considerations and objects are unlawful, then the contract is a void contract. This Act also provides for the result of a breach of contract (Abdul Ghaffar, 2003).

Electronic Commerce Act 2006

In Malaysia, the primary legislation governing e-commerce transactions is the Electronic Commerce Act 2006 (ECA) under the jurisdiction of the Ministry of Domestic Trade, Cooperatives and Consumerism. The preamble of the Act stated that this Act is to provide for legal recognition of electronic messages in commercial transactions, the use of the electronic messages to fulfill legal requirements and to enable and facilitate commercial transactions through the use of electronic means and other matters connected therewith (Makhtar & Asuhaimi, 2019).

With regards to the provision of the Act, Section 6 (1) of the ECA provides that electronic communication has the same legal impact as non-electronic communication, legitimacy and enforceability. In addition, Section 7(2) of the ECA further provides that electronic offers and acceptance have exactly the same legal impact, validity and enforceability as non-electronic offers and acceptance. Moreover, Section 9(1) of the ECA provides on electronic signatures where the electronic signature is legally legitimate and enforceable if it complies with the criteria laid down therein.

In view of the fact that e-commerce enables cross-border transactions to be carried out with great ease and convenience, determining the appropriate legal jurisdiction in the event of any disputes arising from such transactions will be a significant issue, especially for e-commerce merchants whose business model operates globally. With regard to traditional contract laws, the situation adopted by common law countries such as Malaysia is that the relevant jurisdiction should be the place nearest to the contract's underlying transaction, which would usually be the place of reception of an offer in effect, in the absence of any provision on the choice of law or questions relating to the justiciability (Ayub, et al, 2007).

Furthermore, Section 23 of the ECA upheld the common law stance, even though some minor amendments had been made to make the ECA provisions consistent with the stance adopted by the United Nations Commission on International Trade Law (UNCITRAL) Model Law on Electronic Commerce 1996 (“UNCITRAL Model Law”) with regard to Article 15 which specifies that the place of reception of the offer shall be the principal place of business or residence of the offeror, whereas the place of reception of the offer shall be the place of receipt of the offer only in the absence of that place which has the closest connection to the transaction to which the offer relates. It is contended that the position received by the ECA and the UNCITRAL Model Law gives more prominent lucidity to the law contrasted with the common law position, since under the position embraced by the ECA and the UNCITRAL Model Law it would just be important to decide the spot closest to the agreement's fundamental exchange if the offeror didn't have a chief spot of business.

In the case of *Odin Oilfield Services Sdn Bhd V. Omega Completion Technology Ltd* [2015] 7 CLJ 616, which Section 20, 21, 22 and 23 of ECA 2006 have been referred in this case. The court held that the act of repudiation is complete upon the communication being sent to the other side which the receipt of such communication by the latter is not a pre-requisite to the crystallization of a cause of action. In this case, the alleged breach of contract occurred in Scotland which was the place where the defendant had made the decision to terminate the agreement and communicated it by sending the letter of termination as an attachment to an e-mail. Thus, in law and on the facts, the alleged repudiation of contract took place in Aberdeen, Scotland and it was therefore not a proper case for the grant of leave for service of the notice of writ out of jurisdiction. In addition, the judge in this case opined that the provisions of the ECA are irrelevant as this is not a commercial transaction which was conducted through electronic means. Even if the ECA applies, it still does not affect the outcome as there is no issue as to when the email was sent and when it was received.

Accordingly, the legal jurisdiction applicable to cross-border e-commerce disputes involving Malaysian vendors will be determined by the location of the customer's place of business or domicile. However, if none exists, the decision should be made on the basis of the jurisdiction most closely connected to the transaction in dispute which, from a practical point of view, largely depends on the subject matter of the transaction and the reason for which the consumer obtained the underlying goods.

Consumer Protection Act 1999

The main statute on consumer protection in Malaysia is the Consumer Protection Act 1999 (CPA). The CPA became the first law expressly providing for consumer rights in relation to the supply of goods and services (Wu Min Aun, 2000). This is expressly stated in the preamble of the purpose of the Act “to provide for the protection of consumers, the establishment of the National Consumer Advisory Council and the Tribunal for Consumer Claims, and for matters connected therewith”. Section 2(2(g) of the CPA initially provided expressly that the Act does not apply “to any trade transactions affected by electronic means unless otherwise prescribed by the Minister” (Amin, 2013).

Fortunately, the exclusion was amended by amending the CPA in 2007 to include "any trade transactions conducted through electronic means" to protect the e-consumers' rights. It is thus known that the CPA is the legislation regulating the delivery of goods and services online or offline. This ensures that CPA security extends to all customers, regardless of the form or process of their transactions. In putting aside the privity clause, where a mere purchaser of products would make a claim under the assurances and a producer can be held liable, the CPA has made a significant shift in the legal framework. Many of the CPA's rights cannot be negotiated and this addresses the question of exemption clauses in consumer contracts to some degree. Similarly, in 2010 the Direct Sales and Anti-Pyramid Scheme Act 1993 was also amended to include e-commerce in the scope of mail order sales.

In this regard, the Consumer Protection (Electronic Trade Transactions) Regulations 2012 ("CPR") which was instituted by the Minister of Domestic Trade and Consumer Affairs in accordance with his forces under section 105(2)(a) of the Consumer Protection Act 1999 requires e-commerce merchants to set out details, for example, their own name (or that of their business) and contact details including their email address, phone number and address on their

sites (Nor, et al, 2019). Furthermore, the CPR also requires e-commerce vendors operating in Malaysia to specify the full price of the goods offered by them, including any costs that may apply, such as delivery and taxes, in order to prevent any situation whereby the customer finds only after placing an order that the total price payable is higher than the initially estimated price.

Other Relevant Statutes

Malaysia has also established a set of laws which regulate activities generally taking place in cyberspace. These includes the Computer Crimes Act 1997 and Digital Signature Act 1997 which in practice, the Computer Crimes Act 1997 (CCA) allows unauthorized access to devices, services, data and other IT information an offense (Mohamed, 2017). Certain crimes classified under the CCA include unauthorized access to computer data, unauthorized alteration of any computer's contents, unauthorized access for the purpose of committing or encouraging further crimes, and inappropriate communication of the means of access. Such acts are criminalized and sentences for these acts are levied. With regards to online shopping, the CCA somewhat ensures e-consumer' enthusiasm concerning a security of online payment.

Besides that, the Digital Signature Act 1997 (DSA) is another Act that could protect e-consumers in terms of securing payments in online shopping (Kadir, 2012). The Act facilitates the growth of e-commerce through the use of digital signatures as a means for secure online transactions (Ng & Sulaiman, 2001). The DSA sets the legal validity, enforceability and receivability of digital signatures. It addresses the duties of the certification authorities, the general criteria for an approved certification authority and the procedures for applying to become a licensed certification authority.

Additionally, the Personal Data Protection Act 2010 (PDPA) plays a crucial role in regulating e-commerce in Malaysia by establishing a legal framework that safeguards personal data during commercial transactions. As Malaysia transitions towards a digital economy, the PDPA aims to enhance consumer trust and protect individual privacy rights, which are essential for fostering a secure online shopping environment. The following sections outline the key aspects of the PDPA's impact on e-commerce.

The PDPA regulates the processing of personal data by data users, ensuring that individuals' information is handled ethically and securely (Mohamed, 2011). This regulation mandates that data users obtain consent from individuals before collecting, using, or disclosing their personal data. Additionally, the PDPA requires data users to implement appropriate security measures to protect personal data from unauthorized access, loss, or misuse. By aligning with international standards, such as the GDPR, the PDPA enhances Malaysia's global competitiveness in e-commerce (Yusoff, 2011). This alignment not only facilitates cross-border data transfers but also assures international businesses and consumers that Malaysia adheres to robust data protection practices. When consumers are assured that their personal data is secure, they are more likely to engage in online transactions. Studies indicate that consumers are more likely to engage in online transactions when they feel their personal data is secure (Moric et al., 2024). This increased consumer trust can lead to higher transaction volumes and a more vibrant e-commerce market. Furthermore, the PDPA's emphasis on transparency and accountability encourages businesses to adopt best practices in data management, thereby fostering a culture of trust and reliability in the online marketplace.

Another legislation that is related to e-commerce is the Competition Act 2010. The Act plays a crucial role in shaping the e-commerce landscape in Malaysia by establishing a regulatory framework aimed at promoting fair competition and consumer protection. This act, along with the Competition Commission Act 2010, empowers the Malaysia Competition Commission (MyCC) to oversee and enforce competition laws, ensuring that businesses operate fairly and transparently (Manap & Shukor, 2015). It prohibits anti-competitive agreements and the abuse of dominant positions, which are particularly relevant in the context of multi-sided e-commerce platforms (Lee & Ong, 2023). By addressing these issues, the Act helps create a level playing field for businesses and enhances consumer confidence in online transactions.

The Act also aims to safeguard consumer interests by addressing unfair and exploitative practices prevalent in the e-commerce sector (Lee & Ong, 2023). It ensures that consumers are protected from deceptive practices, such as false advertising and hidden charges, and promotes transparency in online transactions. Consumer complaints highlight the need for stronger enforcement mechanisms to ensure compliance with competition laws (Ong & Lee, 2024). Effective enforcement by the MyCC is crucial for maintaining consumer trust and confidence in the digital marketplace, providing redress for affected consumers, and imposing penalties on businesses that violate competition laws. Overall, the Competition Act 2010 is instrumental in fostering a competitive and fair e-commerce environment in Malaysia.

Billah (2008) in his book titled Applied Islamic E-Commerce, Law and Practice under chapter two topic Sources of E-Commerce Law explained that transactions involving computers such as e-commerce, e-banking, e-government etc. need to be regulated so as to achieve the goals of computer technology. E-commerce laws encourage the doing of what is right or just in a particular circumstance. A good example of a computer crime is the theft of credit card numbers or execution of denial service accounts by hackers just to sabotage a company. Such activities are not considered good by any society.

Legal Challenges of E-Commerce in Malaysia

The legal challenges of e-commerce in Malaysia are multifaceted, stemming from an inadequate legal framework, insufficient consumer protection, and evolving competition laws. Despite the rapid growth of e-commerce, the existing laws have not adapted effectively to address the unique issues posed by digital transactions.

First and foremost, the current legal framework does not sufficiently address the complexities of e-commerce, leading to gaps in regulation (Loh, 2023). These gaps create uncertainties for both consumers and businesses, as the laws governing traditional commerce do not always translate well to the digital environment. For instance, issues such as electronic contracts, digital signatures, and cross-border transactions require specific legal provisions that are often missing or inadequately covered in existing legislation. Proposed reforms include the introduction of new laws to better protect vendors, consumers, and the government in the digital marketplace (Loh, 2023). These reforms aim to create a more comprehensive and cohesive legal framework that can effectively address the unique challenges of e-commerce.

Additionally, e-commerce fraud is a significant concern, with many consumers falling victim to scams due to inadequate legal protections (Razali et al., 2022). Fraudulent activities such as

phishing, identity theft, and counterfeit goods are prevalent in the online marketplace, and the current legal provisions are often insufficient to deter these practices or provide adequate remedies for affected consumers. Studies indicate that existing laws fail to provide sufficient safeguards for e-consumers, highlighting a need for greater awareness and legal reform (Roslan et al., 2022). Enhancing consumer protection laws to include specific provisions for e-commerce can help mitigate these risks and build consumer confidence in online transactions.

Along the same vein, the Competition Act 2010 is not fully equipped to handle the dynamics of e-commerce, resulting in unfair practices and consumer complaints (Lee & Ong, 2023). The rapid evolution of digital markets has introduced new forms of anti-competitive behavior, such as algorithmic pricing, platform dominance, and data monopolies, which are not adequately addressed by the current competition laws. There is a call for stricter competition laws to enhance consumer welfare and ensure fair practices in the e-commerce sector (Nasution, 2023). Strengthening competition regulations can help prevent market abuses and promote a level playing field for all participants in the digital economy.

While these challenges are significant, some argue that the rapid evolution of technology may outpace legal reforms, complicating the establishment of effective regulations. This highlights the need for ongoing dialogue and adaptation in the legal landscape to keep pace with e-commerce developments. Continuous monitoring and updating of laws, as well as collaboration between regulators, industry stakeholders, and consumers, are essential to ensure that the legal framework remains relevant and effective in addressing the evolving challenges of e-commerce.

Proposed Legal Reforms for E-Commerce in Malaysia

The proposed legal reforms for e-commerce in Malaysia focus on enhancing privacy, competition, and consumer protection. These reforms aim to address the challenges posed by the rapid growth of online transactions and the associated risks to consumers and their data.

First and foremost, the PDPA serves as a significant legislative effort aimed at safeguarding user privacy in e-commerce. It addresses issues related to data tracking and unauthorized data mining, ensuring that consumers are informed about how their data is used and allowing them to opt-out of data collection practices (Azmi, 2002). PDPA mandates that e-commerce platforms provide clear and concise privacy policies, detailing how consumer data is collected, stored, and used. Compliance with privacy regulations is crucial for electronic service providers, which must implement robust security measures to protect consumer data from breaches (Maharani & Prakoso, 2024). These measures include encryption, regular security audits, and immediate notification to consumers in the event of a data breach.

Additionally, current laws in Malaysia, such as the CPA, are deemed inadequate for the digital marketplace. Proposed reforms include the establishment of a Malaysian E-Consumer Law to enhance protections against fraud, misleading information, and unfair contract terms (Roslan et al., 2022; Nor et al., 2019). This new law would introduce stricter penalties for fraudulent activities and require e-commerce platforms to provide transparent information about products and services. Legislative measures are necessary to ensure that consumers are aware of their rights and that e-commerce platforms are held accountable for their practices (Jayabalan, 2012). Additionally, the establishment of a dedicated consumer protection agency for e-

commerce could provide a centralized platform for addressing consumer grievances and enforcing regulations.

On the other hand, the need for fair competition in e-commerce is commendable. Ensuring that all players adhere to consumer protection laws can foster a more equitable market environment. The Competition Act 2010 needs to be updated to address the unique challenges posed by digital markets, such as platform monopolies and algorithmic pricing. Stricter competition laws would help prevent anti-competitive practices and ensure that small and medium-sized enterprises (SMEs) can compete fairly in the e-commerce space. Despite these proposed reforms, there remains a concern that the existing legal framework may not keep pace with the evolving e-commerce landscape, necessitating continuous updates and adaptations to effectively protect consumers and ensure fair competition.

Overall, these proposed reforms aim to create a more secure and reliable online marketplace in Malaysia, fostering consumer trust and promoting fair business practices. Continuous dialogue between regulators, industry stakeholders, and consumers is essential to ensure that the legal framework remains relevant and effective in addressing the dynamic challenges of e-commerce.

Conclusion

In conclusion, technological advancements over time have contributed to the rise of e-commerce, demanding a strong legal framework to assure consumer protection, fair competition, and regulatory compliance. Malaysia, as one of the emerging countries, has a high percentage of internet use, making online transactions easy for consumers. The future of e-commerce appears to be quite bright. However, it can only remain so if consumers trust and believe in it. The current legal situation provides a framework through different rules and regulations, but concerns remain, including jurisdictional issues, cybersecurity threats, and enforcement difficulties. This report emphasizes the need for legal reforms to improve regulatory systems, which can increase consumer trust and align Malaysia's e-commerce laws with worldwide norms. Strengthening the legal framework will safeguard consumers while simultaneously promoting economic growth. These findings are critical for policymakers, legal experts, and entrepreneurs to guarantee that Malaysia's e-commerce sector remains secure, competitive, and in line with internationally accepted standards.

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CRITICAL THINKING ABILITIES AS MEDIATOR BETWEEN BIG FIVE PERSONALITIES AND JOB PERFORMANCE AMONG ASSISTANT MANAGERS IN SABAH OIL PALM PLANTATIONS COMPANIES: AN EMPIRICAL PAPER

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Abstract : Critical thinking is crucial in the workplace, particularly in today's fast-paced information era. It significantly influences knowledge transfer and problem-solving across various situations. Assistant Managers in Oil Palm Plantation Companies must possess a diversified skill set to meet future demands. Preliminary results show that while 9.5%-14% of Assistant Managers score low, a majority 83%-84.5% have average scores, and a mere 3%-6% achieve high scores for Task Performance and Contextual Performance respectively. In the context of the present study, Job Performance is considered to include the service quality of employees, reflecting both task performance and contextual performance, which contribute both directly and indirectly to the organization's technical core processes.Directly: It is shown through the specific results and products of their work, including how good and how much they produce. Indirectly: include communication, effort, discipline, working well with others, and helping to develop others. Research indicates that Interactive effects of Personalities is a key predictor of Job Performance, and previous studies link Critical Thinking Ability with Job Performance . However, there is limited research on how the Big Five personalities affect Job Performance through Critical Thinking Abilities among Assistant Managers in Sabah Oil Palm Plantations Companies. This study aims to investigate this relationship using a quantitative approach, surveying 150 Assistant Managers from Oil Palm Plantation Companies. Data was collected and analysed via SPSS to explore correlations and mediating effects. Key findings reveal that: 1) the Big Five Personalities enhance Job Performance, confirming their role as performance predictors when interactive effect between the OCEAN traits is positive ; 2) variations in Critical Thinking Abilities are positively influenced by these Personality traits that defines AMs' reasonable reflective thinking to determine beliefs and actions with assessment criteria includes Analysis, Inference, Evaluating and Reasoning ; 3) Critical Thinking Abilities influence Job Performance significantly and 4) Critical Thinking Abilities partially mediates the relationship between the Big Five Personalities and Job Performance which is the main purpose of the present research. This research contributes new insights into the link between the Big Five Personalities and Critical Thinking Ability, highlighting the need for targeted training to improve competencies in Critical Thinking Ability and the Big Five Personalities. Such insights will benefit various areas by enhancing the Job Performance of Assistant Managers from Generations X, Y, and Z not only in an OPPC but across the Oil Palm Industry as this research represents a pioneering effort in this Industry.

Keywords*: Critical Thinking Abilities, Big Five Personalities, Job Performance, Assistant Manager, Oil Palm Plantations Companies.*

Introduction

Critical thinking is crucial in the workplace and essential in today's fast-paced information era (Robert, 2006; Donald, 2013). With a 94.3% critical rating, it underpins logical reasoning, decision-making, and problem-solving, particularly in Sabah's oil palm plantations (Giorgos, 2019). Effective management requires expertise in various fields, including plant science, finance, and sustainability (Pushparajah). Job performance in management reflects individual contributions to organizational success (Linda, 2011). The writer's preliminary survey with the Assistant Managers' superiors identified improvement areas for Assistant Managers, where 9.5% to 14% received low scores, 83% to 84.5% scored average, and only 3% to 6% excelled in Task Performance and Contextual Performance respectively. Personality traits influence behavior, with critical thinkers responding differently than non-critical thinkers (Facione, 2000). Critical thinking impacts decision-making, while personality indirectly affects performance, influenced directly by mediating variables (Nikolaou, 2018). This research examines the relationship between the Big Five Personalities and Job Performance among Assistant Managers in Oil Palm Plantations Companies in Sabah, specifically focusing on the mediating role of Critical Thinking Abilities. It aims to unveil the often-overlooked impact of Critical Thinking Abilities as a mediator, addressing whether the Big Five can enhance Critical Thinking Abilities and, consequently, improve Job Performance for Assistant Managers.

Literature Review

Job Performance

Job Performance is a key dependent variable in human resource management (Linda, 2019). It encompasses behaviours that employees control and that advance organizational goals (Campbell & Wiernik, 2015). Task Performance (TP) includes activities directly or indirectly contributing to an organization's core operations, such as completing tasks, work quality, job knowledge, and effective communication (Nikolaou, 2018). TP indicators involve task completion, quantity, quality, planning, decision making, and resource management. Contextual Performance (CP) encompasses behaviours that influence the social and psychological context of task performance (Nikolaou, 2018). CP indicators include extra tasks, initiative, motivation, and cooperation. Ultimately, CP contributes to organizational goals by enhancing the work environment through behaviours like enthusiasm and collaboration (Linda, 2011; Linda, 2019). The theories of Hunter (1983), Campbell et al. (1993), and McCrae and Kiker (1996) explain how personality affects job performance, suggesting that these effects are mediated by other variables (Motowidlo, 1997) that should serve as motivation for the current study as well.

The Big Five Personalities

A personality trait is a consistent pattern of thoughts or behaviours that persists over time, including in Oil Palm Plantation Companies. The Big Five personality traits are Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, commonly known by the acronyms OCEAN, NEOAC, or CANOE (Irina, 2013).

Prior research indicates a increasing interest in the correlation between personality traits and behaviours associated with career development. However, the current study, which utilized an

initial survey to affirm the enhancement of Assistant Managers' Job Performance through the adoption of appropriate attitudes and critical thinking skills, emphasizes the necessity of comprehensively addressing the inconsistency in the interactive effects of the OCEAN personality dimensions. This is particularly relevant in the context of Assistant Managers as potential successors in Oil Palm Plantation Companies (Manisha, 2020).

Openness to Experience (O)

Openness indicates imagination and creativity. High scorers are individualistic and thrive in creative fields, whereas low scorers favour conventional, detail-oriented roles and experience emotions less intensely (Salgado,2004; Irina, 2013). Research shows that openness to experience positively correlates with success in consulting (Hamilton, 1998), training (Barrick & Mount, 1991; Vinchur et al., 1998), and adapting to change (Horton, 1992; Raudsepp, 1990) (Rothmann, 2003). Individuals with high openness are more creative and curious. This study suggests that Assistant Managers who are open to new experiences tend to perform better, with Critical Thinking Ability enhancing this improvement.

Conscientiousness (C)

Conscientious individuals are meticulous, self-disciplined, and competent. High scorers excel in structured roles and are responsible, while low scorers may appear careless and lack clear goals. Research indicates conscientiousness is a strong predictor of job performance through effective goal-setting (Singh, 2018). Numerous studies, including those by Barrick and Mount (1991) and Sackett and Wannek (1996), have found a strong correlation between Conscientiousness and Job Performance (Rothmann, 2003). This link may stem from the association between conscientiousness and integrity. Defined as a tendency towards self-discipline and high achievement, conscientious individuals tend to excel in self-regulation (Ahadi and Rothbart, 1994). However, other research by O'Neill et al. (2011) and LePine et al. (2004) indicated a negative relationship between conscientiousness and Job Performance (Intan, 2013). This study posits that Assistant Managers with high conscientiousness are more likely to enhance their Critical Thinking Ability and improve Job Performance.

Extraversion (E)

Extraversion, characterized by sociability, dominance, gregariousness, ambition, and positive affectivity (Salgado, 2004), is linked to management and event organization roles (Barrick & Mount, 199; Career Research, 2016). High extraversion individuals excel in motivating others, while those with lower extraversion tend to be more analytical and prefer behind-the-scenes responsibilities (Singh, 2018). Extraversion predicts job performance in roles requiring social interaction, such as sales and management (Rothmann, 2003). Highly extraverted individuals exhibit self-confidence, decisiveness, and a preference for engaging experiences, which helps them effectively navigate challenging social situations (Motowidlo, 1997). They are also less prone to anger (Jensen-Campbell et al., 2006; Intan, 2013). This study hypothesizes that Assistant Managers with high extraversion are more likely to excel in job performance, potentially influenced by their Critical Thinking Ability.

Agreeableness (A)

Agreeableness includes traits like cooperativeness, kindness, and a tendency to avoid conflict (Salgado, 2004). Individuals with high agreeableness often pursue careers in teaching, nursing, or social work (Ozer & Benet-Martinez, 2006). In contrast, those low in agreeableness may excel in independent or creative roles (Singh, 2018). Agreeable people are friendly, helpful, and trusting, often demonstrating empathy and a willingness to assist others, expecting similar support in return (Rothmann, 2003). Conversely, less agreeable individuals may appear unfriendly, sceptical, and more competitive (Irina, 2013).

Research shows that being agreeable is important for doing well in a job. Another study found that agreeable people are more likely to succeed in training. Their friendly and helpful attitude can lead to success in jobs that require teamwork and good customer service (Rothmann, 2003).

Neuroticism (N)

Neuroticism reflects a tendency to experience negative emotions like fear, sadness, and anger (Rothmann, 2003). Ackerman (2017) notes that highly neurotic individuals often feel intense melancholy and are more sensitive to their environment. Individuals with low neuroticism maintain emotional stability, enabling them to handle fast-paced and stressful situations effectively (Singh, 2018). They exhibit confidence and experience fewer negative emotions, even under stress (Irina, 2013). Research has shown that neuroticism significantly predicts job performance across various fields (Hormann & Maschke, 1996) and that emotional stability, the opposite of neuroticism, is the second most vital trait for employability (Dunn et al., 1995; Rothmann, 2003). An inverse relationship between neuroticism and job performance has also been identified (Judge et al., 1999), though some studies suggest that neuroticism may influence performance under certain conditions (Salgado, 1997; Rothmann, 2003). Hochwarter's 2000 research highlighted neuroticism as a key predictor of emotional exhaustion among nurses, leading to the assumption that Assistant Managers with high neuroticism will perform poorly, which this study will explore in relation to their Critical Thinking Ability.

Critical Thinking Abilities

The cognitive psychological perspective focuses on individual thought processes and associated behaviours under optimal conditions (Halpern, 1998; Sternberg, 1986; Willingham, 2007). It encompasses mental strategies for problem-solving, decision-making, and learning (Sternberg, 1986, p.3), emphasizes reflective thinking to evaluate beliefs and actions (Ennis, 2002), and employs cognitive skills to improve the chances of positive outcomes (Halpern, 1998, p.450). Research indicates that critical thinking skills are insufficient among students and employees, despite their increasing importance in both the workplace and society. Critical thinking serves as a foundation for essential competencies and is closely linked to employability, with studies showing it as a key factor in reducing unemployment (Rosyati, 2008). According to Facione et al. (2000), developing these skills is a core objective of undergraduate education. Surveys reveal that 95% of college leaders and 81% of employers prioritize critical thinking development in students (AAC&U, 2011).

Furthermore, 92.1% of employers consider critical thinking vital for college graduates' success (Katrina, 2014). All Assistant Managers must engage in critical thinking to maximize their

potential, especially in dynamic operations like OPPC (Charles, 2020). In today's information age, these skills are crucial not only for language learners but also for employee engagement and organizational competitiveness (Donald, 2013). Critical thinking should be integrated into job performance rather than treated as a separate subject (Mirman and Tishman, 1988). Overall, the significance of critical thinking in job performance is widely acknowledged by scholars.

Research Methodology

This study adopts a positivist paradigm and a quantitative approach to investigate 17 hypothesized relationships between the Big Five Personality traits, Critical Thinking Ability, and Assistant Managers' performance in Sabah's oil palm companies. Using purposive sampling, data is collected from Assistant Managers at OPPC via self-administered questionnaires covering demographics, job performance (27 items from IWPQ by Linda Koopman, 2013), Big Five Personality traits (120 items from NEO-PI-R by Costa and McCrae, 2010), and Critical Thinking Ability (30 items by Peter Honey, 2004). Analysis with SPSS Version 26 includes descriptive statistics, normality assessment, validity and reliability check via factor analysis, and correlation and regression analysis for hypothesis testing.

Data Analysis and Findings

Data analysis was conducted using SPSS version 26. The study targeted current Assistant Managers at OPPC in Sabah, focusing on Senior Assistant Managers and Assistant Managers. Data was collected from OPPC estates in Sandakan, Lahad Datu, Kinabatangan, Tawau, and Beluran, with 150 questionnaires distributed and fully returned. All responses were complete and usable, resulting in 150 valid questionnaires for the study. Of the 150 respondents, 95.3% (143) are male Assistant Managers, while 4.7% (7) are female. In terms of age, 36% (54) of respondents are 25-30 years old, 19.3% (29) are 31-35, 16.7% (25) are 36-40, 11.3% (17) are 41-45, and 16.7% (25) are over 45. Notably, 72% (108) belong to Generation Y, while 28% (42) are from Generation X. The ethnic composition shows 29.3% (44) are Malay, 23.3% (35) Dusun, 16% (24) Bugis, with smaller percentages from Bajau, Kadazan, and other ethnicities. Additionally, 75.3% (113) of respondents are married, while 24.7% (37) are single. Educationally, 54% (81) hold bachelor's degrees, 34% (51) have diplomas, and 12% (18) possess STPM/College qualifications. Regarding work experience, 38.7% (58) have over 10 years, while smaller groups fall into shorter experience brackets. In terms of current roles, 20% (30) are Senior Assistant Managers and 80% (120) are Assistant Managers; 62.7% (94) have agricultural educational backgrounds, while 37.3% (56) have other backgrounds.

Respondents show moderate behavioral functioning in thought, feeling, action, and decision-making, with standard deviations between 0.324 and 0.462. The mean scores for Critical Thinking Ability (3.63) and Job Performance (3.81) suggest reasonable and reflective thinking and a moderate contribution to OPPC success.

Table 4.5 displays skewness and kurtosis values indicating normal distribution for the Big Five Personalities and the other measures, all falling between -1.5 and +1.5. Cronbach's alpha values showing the internal consistency of the variables included in the study were estimated and presented in Table 4.8.

Table 4.8: Cronbach's alpha values

Variables	Number of Items	Cronbach's alpha values
O	24	.714
C	24	.894
E	24	.754
A	24	.758
N	24	.783
CTA	30	.888
JP	27	.898

Multiple Regression Analysis: Baron And Kenny's Four-Step Method

Since there are two independent variables in this analysis, it is more appropriate to interpret the Adjusted R-Squared value. The Adjusted R-Squared value of Model 2 is 0.368, which indicates that the variables in Model 2 (Education Background, Age, Ethnic, Gender, Current Position, Marital Status, Education Level, working Experience and OCEAN) **can explain 36.8% increase of Job Performance in Step 1**. Given the two independent variables, the Adjusted R-Squared value is more relevant, at 0.191 for Model 2. This indicates that the variables (Education Background, Age, Ethnic, Gender, Current Position, Marital Status, Education Level, Working Experience) **explain 19.1% increase in Critical Thinking Ability in step 2**.

The regression results are presented below:
Since there are two independent variables in this analysis, it is more appropriate to interpret the Adjusted R-Squared value. The Adjusted R-Squared value of Model 2 is 0.201, which indicates that the variables in Model 2 (Education Background, Age, Ethnic, Gender, Current Position, Marital Status, Education Level, working Experience) and **Critical Thinking Abilities can explain 20.1% increase in Job Performance in Step 3 & 4.**

Regression Analysis Results Step 1

Causal Steps **Step 1**	B	SE	B	Model Statistics
IV: O	-.395	.114	-.284***	R2: 0.368 F (-3.459) = 16.953 P<0.05
IV: C	.509	.094	.522***	R2:0.368 F (5.416) = 16.953 P<0.05
IV: E	.216	.117	.159	R2:0.368 F (1.839) = 16.953 P<0.05
IV: A	.021	.119	.017	R2:0.368 F (0.180) = 16.953 P<0.05
IV: N	.030	.114	.023	R2:0.368 F (0.262) = 16.953 p<0.05

DV: Job Performance

*p<.01, ** p<0.05, ***p<0.001

Table 4.46b: Regression Analysis Results Step 2

Causal Steps **Step 2**	B	SE	β	Model Statistics
IV: O	-0.265	0.125	-0.195**	R2: 0.191 F (-2.117) = 7.730 P<0.05
IV: C	0.296	0.103	0.310**	R2: 0.191 F (2.871) = 7.730 P<0.05
IV: E	0.297	0.128	0.223**	R2: 0.191 F (2.312) = 7.730 P<0.05
IV: A	0.050	0.130	0.041	R2: 0.191 F (0.389) = 7.730 P<0.05
IV: N	-0.064	0.125	-0.050	R2:0.191 F ('-0.509) = 7.730 P<0.05

DV: Critical Thinking Ability

*p<.01, ** p<0.05, ***p<0.001

Regression Analysis Results Step 3&4

Causal Steps **Step 3&4**	B	SE	B	Model Statistics
IV: O	-0.330	0.112	-0.238**	R2:0.201 F (-2.947) = 16.932 P<0.05
IV: C	0.437	0.094	0.448***	R2:0.201 F (4.677) = 16.932 P<0.05
IV: E	0.143	0.116	0.105	R2:0.201 F (1.241) = 16.932 P<0.05
IV: A	0.009	0.115	0.007	R2:0.201 F (0.079) = 16.932 P<0.05
IV: N	0.045	0.110	0.035	R2:0.201 F (0.411) = 16.932 P<0.05
IV2: Critical Thinking Ability	0.244	0.074	0.238***	R2: 0.201 F (3.311) = 16.932 P<0.05

DV: Job Performance

*p<.01, ** p<0.05, ***p<0.001

In the first stage of regression analysis, it was found that Openness (O) negatively affected Job Performance (β= -0.284, p<0.001), while Conscientiousness (C) positively affected it (β= 0.522, p<0.001). Extraversion (E), Agreeableness (A), and Neuroticism (N) had positive but non-significant effects (β= 0.159, β= 0.017, β= 0.023; p>0.001). In the second stage, O negatively affected Critical Thinking Ability (β= -0.195, p<0.05), while C had a positive effect (β= 0.310, p<0.05). E had a positive but non-significant effect (β= 0.223, p>0.05), A was also positive but non-significant (β= 0.041, p>0.05), and N had a negative but non-significant effect (β= -0.050, p>0.05). In the third stage, Critical Thinking Ability significantly enhanced Job Performance (β= 0.238, p<0.001). The fourth stage revealed that O had a significant negative indirect effect on Job Performance (β= -0.238, p<0.05), while C had a positive effect (β= 0.448, p<0.001). E, A, and N each showed positive but non-significant effects. Including Critical Thinking Ability reduced O's effect on Job Performance and increased the effects of C, E, A, and N. Critical Thinking Ability was found to partially mediate the effects of O, E, A, and N on Job Performance, while it nearly fully mediated C's effect.

The Total 17 Hypothesis Test Results Has Been Summarized as Per Table 4:

Hypotheses	Regression Weights	β	Std Error	t-Value	P – value	Hypotheses Supported
H1	O vs JP	-0.468	0,117	-3.983	0.000**	**Yes**
H2	C vs JP	0.533	0.097	5.517	0.000**	**Yes**
H3	E vs JP	0.163	0.122	1.339	0.183	**No**
H4	A vs JP	0.011	0.122	0.908	0.366	**No**
H5	N vs JP	0.115	0.121	0.951	0.343	**No**
H6	O vs CTA	-0.331	0.130	-2.541	0.012**	**Yes**
H7	C vs CTA	0.320	0.107	2.989	0.003**	**Yes**
H8	E vs CTA	0.240	0.135	1.782	0.077	**No**
H9	A vs CTA	0.090	0.135	0.663	0.509	**No**
H10	N vs CTA	0.019	0.134	0.143	0.887	**No**
H11	CTA vs JP	0.452	0.201	5.859	0.000***	**Yes**
H12	OCEAN vs JP vs CTA	0.238	0.074	3.311	0.001***	**Yes**
	O & DV vs CTA	-0.238	0.112	-2.947	0.004**	**Yes**
H13	O vs CTA	0.238			0.036**	**Yes**
	DV vs CTA	0.452			0.000***	**Yes**
	C & DV vs CTA	0.448	0.094	4.677	0.000***	**Yes**
H14	C vs CTA	0.456			0.005**	**Yes**
	DV vs CTA	0.007			0.000***	**Yes**
	E & DV vs CTA	0.105	0.116	1241	0.217	**No**
H15	E vs CTA	0.165			0.022**	**Yes**
	DV vs CTA	0.436			0.000***	**Yes**
	A & DV vs CTA	0.007	0.115	0.079	0.937	**No**
H16	A vs CTA	0.058			0.698	**No**
	DV vs CTA	0.461			0.000***	**Yes**
	N & DV vs CTA	0.035	0.110	0.441	0.682	**No**
H17	N vs CTA	0.134			0.611	**No**
	DV vs CTA	0.471			0.000***	**Yes**

*p<.01, ** p<0.05, ***p<0.001

Discussion And Conclusion

This study analyzes how the Big Five personality traits—Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (OCEAN)—affect the job performance of Assistant Managers at OPPC in Sabah. It also explores the mediating role of Critical Thinking Ability (CTA) in the relationship between these traits and job performance. Four research questions support this objective.

The research questions are:

a. Does Critical Thinking Ability mediate the Influence between Big Five Personality and Job Performance among the Assistant Manager in Oil Palm Plantations Companies, Sabah?
b. Does the Big Five Personality Influence Job Performance among the Assistant Manager in Oil Palm Plantations Companies, Sabah?
c. Does the Big Five Personality Influence Critical Thinking Ability among the Assistant Manager in Oil Palm Plantations Companies, Sabah?
d. Does Critical Thinking Ability Influence Job Performance among the Assistant Manager in Oil Palm Plantations Companies, Sabah?

The study examines the Big Five Personality traits (OCEAN) as independent variables, job performance as the dependent variable, and critical thinking ability (CTA) as a mediator. Hypotheses include: (H1) Openness significantly affects job performance; (H2) Conscientiousness significantly affects job performance; (H3) Extraversion has no effect; (H4) Agreeableness has no effect; (H5) Neuroticism has no effect. For CTA, (H6) Openness affects CTA; (H7) Conscientiousness affects CTA; (H8) Extraversion has no effect; (H9) Agreeableness has no effect; (H10) Neuroticism has no effect. Further, (H11) CTA significantly impacts job performance, while (H12) CTA mediates between OCEAN and job performance. Specifically, (H13) and (H14) demonstrate partial mediation for Openness and Conscientiousness; (H15) and (H16) show partial mediation for Extraversion and Agreeableness; (H17) shows no mediation for Neuroticism. Findings indicate acceptance of H1, H2, H6, H7, H11, H12, H13, and H14, while rejecting H3, H4, H5, H8, H9, H10, H15, H16, and H17.

The discussion addresses the effects of the Big Five on job performance, their impact on CTA, the effect of CTA on job performance, and CTA's mediating role between OCEAN and job performance.

The Effect of OCEAN On Job Performance and Critical Thinking Ability: Comparison of Hypotheses with Actual Results

The study examines the impact of the Big Five personality traits—Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism—on job performance (JP) and critical thinking ability (CTA) among Assistant Managers (AMs). Results show that only **Openness and Conscientiousness** significantly influence JP and CTA, contrary to expectations. Specifically, high Openness negatively affects performance with coefficients of β=-0.468 (JP) and β=-0.331 (CTA), suggesting that younger AMs may struggle in technical roles due to their developmental stage and limited analytical skills.

Conversely, Conscientiousness positively impacts JP (β=0.533) and CTA (β=0.320), indicating that AMs with higher conscientiousness perform better.

Extraversion shows insignificant effects on JP (β=0.163) and CTA (β=0.240), requiring further investigation on how demographic factors influence performance. **Agreeableness** also has minimal impact on JP (β=0.111) and CTA (β=0.090), suggesting that relationship-building does not significantly enhance performance. Lastly, **Neuroticism** has an insignificant effect on

both metrics (β=0.115 for JP, β=0.019 for CTA), indicating that while anxiety may not hinder performance, lower neuroticism is correlated with better outcomes.
The findings emphasize the need for targeted training in personality development, particularly for Conscientiousness, while also addressing the interplay of other personality traits. Structured guidance, emotional stability training, and fostering an adaptive organizational culture are crucial for equipping AMs for success in the oil palm industry.

The Effects of Critical Thinking Ability on Job Performance

This study examines the effect of Critical Thinking Ability (CTA) on job performance, finding a significant correlation for Assistant Managers (AMs). Regression analyses reveal a robust positive impact, with a 45.2% increase in performance linked to higher CTA (β=0.452, $p<0.05$). AMs with stronger CTA demonstrate greater job performance improvements compared to those with lower levels. While effective problem-solving and organizational skills enhance performance, no similar trends were observed in Oil Palm Plantation Companies (OPPC), highlighting CTA's critical role. O*Net Online (2005) affirms the importance of critical thinking in various occupations, particularly in management roles.

For AMs in the oil palm sector, knowledge in agricultural science, financial management, and sustainability is essential, especially amid increasing skill demands. The study shows 72% of respondents are from Generation Y, indicating a need for tailored training to boost their critical thinking and decision-making. Employers value these skills, and Generation Y AMs show notable progress.

To enhance job performance, OPCC should revise training strategies to focus on improving CTA in lower-scoring AMs, emphasizing mentorship and coaching for younger employees. Strong critical thinking is vital for AMs to thrive in the oil palm industry and adapt to a dynamic work environment.

The Mediating Effect of Critical Thinking Ability Between OCEAN And Job Performance.

The study investigates how Critical Thinking Ability (CTA) mediates the relationship between OCEAN personality traits and job performance (JP) among Assistant Managers (AMs). It finds that OCEAN indirectly affects JP through CTA, confirmed by significant relationships in a four-step process outlined by Baron and Kenny (1986). Notably, Openness to Experience decreased JP by 23.8% due to impaired critical thinking, though CTA improved performance by 16%.

Conscientiousness enhanced JP by 44.8%, with CTA partially mediating this effect as conscientious behaviors foster self-discipline and problem-solving. Extraversion slightly increased JP by 10.5% through improved critical thinking, while lower levels can hinder performance.

Higher agreeableness marginally improved critical thinking and performance, whereas neuroticism negatively impacted critical thinking; AMs with lower neuroticism benefitted from better decision-making. Overall, OCEAN traits explained 36.8% of the variance in job performance, with CTA contributing an additional 20.1%. Both OCEAN traits and CTA

enhance effectiveness, particularly in labor-intensive settings like oil palm operations, warranting further research on their interactions and implications for training.

Contribution Of Research

The contributions of this study are significant in terms of theoretical and managerial perspectives.

Theoretical Implications: The study provides evidence linking the Big Five Personality traits—Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism—with Critical Thinking Ability (CTA) and Job Performance among Assistant Managers in Sabah's Oil Palm Plantation Companies. It demonstrates that both positive and negative interactions of the OCEAN traits, alongside high CTA, correlate with enhanced job performance. The research expands CTA's definition to include cognitive processes such as Analysis, Inference, Evaluation, and Reasoning, supporting theories by Hunter, Campbell, and McCloy. It finds that CTA partially mediates the relationship between Openness, Conscientiousness, and Job Performance, while Extraversion, Agreeableness, and Neuroticism do not significantly influence job performance when mediated by CTA, confirming CTA's role as a crucial mediating factor.

Managerial Implications: The findings offer valuable insights for HR, Learning and Development, Senior Management, and Research and Development professionals in the oil palm industry, highlighting the importance of understanding OCEAN traits and CTA in Assistant Managers.

Enhancing these traits and CTA can improve job performance among Assistant Managers. The study also outlines key focus areas to foster strong personalities that enhance critical thinking and performance, with strategic implications detailed in table 5.1.

Table 5.1: Interactive Effects within the Big Five Personalities

Personalities & Strength	O	C	E	A	N
O		↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑
C	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑		↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑
E	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑		↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑
A	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑	↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑		↑ ↓ ↑ ↓ ↑ ↓ ↓ ↑

N				

Table 5.1 details significant interactive effects among the Big Five personality traits (OCEAN) and their correlation with CTA and Job Performance, irrespective of demographic differences. The upcoming section will address specific traits and their interactive effects, offering guidance for the Human Resource, Learning and Development, Senior Management, Academic, and Research and Development departments to encourage future research.

The writer advocates that AMs seek traits that collectively enhance Job Performance. Notably, Emotional Stability is crucial, especially for those experiencing negative emotions that can detract from focus and resources, as noted by Lord and Harvey (2002). Individuals with low Emotional Stability struggle to direct their energy towards work goals, highlighting the trait's influence on others (Lisa & Emily, 2011). The writer proposes first examining Emotional Stability's interactions with other traits to identify improvement areas, followed by recommending support measures to enhance Emotional Stability, positively impacting CTA and Job Performance.

Limitations of the Study

This study presents several limitations. The foremost concern is that the questionnaires were exclusively available in English, which may pose challenges for certain respondents. A bilingual version would enhance both comfort and accuracy, particularly for individuals from Generation Y and Generation Z who possess limited professional exposure. Furthermore, data were gathered solely from major Oil Palm Plantation Companies (OPPCs) in Sabah, thus rendering the findings applicable only to that specific region rather than to Malaysia as a whole or other Asian country with significant oil palm plantations. The interplay among the demographic variables should be examined individually as independent variables, focusing on work experience, the three specified age categories presented in the subsequent section, current position, and educational background, while considering CTA as mediating variables in assessing the Job Performance of the Assistant Managers (AMs) in OPPCs. Additionally, other factors influencing AM performance, such as motivation, recognition, promotions, salary increases, career development, training, and leadership style, were not investigated. Future research should address these limitations more comprehensively.

Recommendations For Future Research

The study looks at different demographic factors to see how important they are, using a cutoff point of 0.05. The main findings reveal that how much work experience someone has does not significantly affect their job performance or personality traits interestingly. On average, AMs reported having about 3.97 years of work experience, which leads to a closer look at three age groups of Assistant Managers (AMs) in the OPPC. The first group consists of those with 1-4 years of experience (29.3%), who need opportunities for learning and development to improve their performance at work. The second group has 5-8 years of experience (20.0%) and shows stability; they should be encouraged to follow clear career paths, as they typically perform well at their jobs. The third group includes individuals with more than 9 years of experience

(50.7%), who are stable but should focus on developing their leadership skills to help with career advancement and future planning connected to great job performance. These AMs need strong people management skills to achieve better results. There's a need for further exploration on how the Big Five Personalities and Critical Thinking Abilities of these three age groups help in their Job Performance improvisation, especially as they represent the younger generation of planters, managers, and leaders in the OPPC.

Furthermore, Critical Thinking Abilities (CTA) may function as an independent variable that influences Job Performance, suggesting that enhancements in critical thinking can substantially improve performance ($\beta = 0.452$, $p < 0.0010$). The Big Five personality traits could serve as moderators in this relationship. For instance, heightened critical thinking may facilitate more efficient problem-solving and foster better collaboration, resulting in improved job performance. In this context, the personalities of the team members are anticipated to play a moderating role through an "interaction effect," wherein the relationship between the independent and dependent variables varies according to the level of the moderator, specifically the personalities involved.

Consider a scenario where a AMs team is confronted with a challenging assignment under tight deadlines. A manager or team member possessing advanced critical thinking skills analyzes the problems, identifies potential obstacles, and proposes innovative solutions that optimize the coding process, ultimately enabling the project to be completed ahead of schedule. Conversely, another team member exhibiting low Openness, a trait within the Big Five personality dimensions, may struggle to accept and implement these novel ideas, thereby hindering overall progress. In this instance, while the critical thinking skills of the first member contributed positively to team performance, the interaction with the less open personality acted as a moderator, affecting the overall effectiveness of the team's efforts. Therefore, it would be worthwhile to further investigate the role of the Big Five Personality traits as a moderator between Critical Thinking Abilities (CTA) and Job Performance.

Future research should also examine the essential soft skills that the younger generation of Assistant Managers require for effectively managing oil palm plantations being Planters, Managers and Leaders. These skills include adaptability, emotional intelligence, effective communication, the ability to influence others, openness to continuous learning, teamwork, analysis to details and proficient time management.

Mastery of these skills can significantly impact their job performance, which covers both Critical Thinking Abilities and the Big Five Personalities of the Assistant Managers.

Conclusions

This pioneering research indicates a partial mediating effect of CTA on the relationship between OCEAN traits and Job Performance, highlighting the importance of developing critical thinking skills for Assistant Managers to thrive in a rapidly changing environment. Continuous training is crucial, especially for younger generations in the workforce, to ensure they develop these essential skills. Looking ahead, the oil palm industry must address numerous challenges while rebranding itself to sustain growth and efficiency. Human capital, encompassing knowledge, skills, and personality traits, is vital for competitive advantage and must be strategically managed. Addressing the current shortfall in skilled personnel and

enhancing performance through personality and cognitive development are immediate priorities for industry sustainability.

In conclusion, many experts agree that the application of critical thinking is essential for enhancing job performance. The author seeks to highlight the context of the current study, which commenced with the inquiry: "Is Critical Thinking Ability important for Assistant Managers who are being employed by Oil Palm Plantation Companies in Sabah?" The author at time of completion of this research firmly believes that this question has been thoroughly analysed and positively answered in the confirmatory; Critical Thinking Ability is indeed crucial for Assistant Managers working within Oil Palm Plantation Companies While emphasis is placed on the interactive effects of the personalities of the AMs, which subsequently enhance their Job Performance. We hope that this research will motivate additional studies into relationship between Critical Thinking Abilities and the Big Five Personalities.

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FROM 'MUTE ENGLISH' TO MEANINGFUL COMMUNICATION: CULTIVATING ESL LEARNERS' SKILLS IN A GLOBALIZED WORLD

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Abstract: *In the context of contemporary English language education in China, the phenomenon of "mute English" poses significant challenges for Chinese students who excel in exam settings but struggle with real-life communication. This paper explores the critical gap between test performance and practical language use, advocating for a shift from a test-centered approach to a practical application-centered model. Drawing upon key theoretical frameworks, including Piaget's cognitive development theory and Krashen's Input Hypothesis, we emphasize the importance of fostering authentic English language skills during the secondary school stage, where students are cognitively equipped to engage with complex linguistic structures. The integration of culturally relevant materials into English curricula emerges as a central strategy for enhancing students' communicative competence. By aligning instructional content with learners' cultural backgrounds, these materials not only boost engagement and confidence but also promote deeper understanding and retention of language concepts. However, the paper also addresses the challenges associated with an over-reliance on localized content, which can limit students' exposure to diverse cultural contexts and impede the development of essential intercultural communication skills. Furthermore, we highlight the necessity of incorporating structured opportunities for cultural comparison and critical thinking within English Language Acquisition (ELA) education. By fostering an environment where students can analyze and reflect on cultural dynamics, educators can equip them to navigate the complexities of a globalized world. Ultimately, this paper underscores the need for a transformative approach to English education in China, one that prioritizes the cultivation of meaningful communication skills and prepares students for the demands of an interconnected society.*

Keywords: *Culturally Relevant Materials, English Language Acquisition, Intercultural Competence, Chinese Educational Transformation, Mute English.*

Introduction

In contemporary Chinese English language education, the phenomenon of "mute English" presents a significant challenge. This term refers to students who achieve high scores on English exams yet struggle to express themselves fluently in real-life communication. This discrepancy has become increasingly apparent in the context of globalization (Huang, 2024).

Many international students from China face considerable obstacles in living and studying abroad due to the gap between their test performance and actual communicative competence (Xiuwen, & Razali, 2020). This issue highlights a prevalent tendency among Chinese students to prioritize test-taking skills over the practical application of English (Huang, 2024). Consequently, this problem has garnered significant attention in the fields of education and language studies, prompting investigations into effective teaching methods that enhance students' practical language abilities.

To address the pressing need for improved practical English proficiency among Chinese students, this paper argues for a fundamental shift in the English education model in China—from the traditional "test-centered" approach to a "practical application-centered" model. This shift is essential not only for enhancing language skills but also for preparing students for real-world communication challenges. (Huang, 2024)

According to Piaget's theory of cognitive development, which posits that children's cognitive abilities become more developed and stable after the age of 12, the secondary school stage is crucial for language acquisition. At this juncture, students are cognitively mature enough to grasp complex linguistic structures and enhance their abstract thinking, information processing, and critical reflection skills (Anil, M.A., & Bhat, J.S., 2020). Thus, prioritizing the development of authentic English language skills during this pivotal stage is essential.

Literature Review

A key theoretical framework guiding this study is Krashen's Input Hypothesis, particularly the i+1 model of language acquisition (Krashen, 1982). This model asserts that learners acquire language most effectively when exposed to comprehensible input that slightly exceeds their current proficiency level. In other words, language learners must be challenged with more complex structures and cultural messages to advance their proficiency. Given China's emphasis on grammar and vocabulary, understanding cultural nuances embedded in the target language is vital for improving language proficiency, as language and culture are intrinsically linked (Tran, 2020).

The integration of local cultural elements in English as a Second Language (ESL) teaching has garnered significant scholarly interest due to its potential to bridge sociocultural familiarity with the language learning process. Makhroji (2023) asserts that local culture-based materials are essential for enhancing the quality of English acquisition. By aligning instructional content with learners' cultural backgrounds, these materials enhance engagement, boost confidence, and promote a deeper understanding of language concepts.

Local-culturally relevant materials create a supportive learning environment by connecting with students' existing knowledge frameworks. As Tanveer (2007) notes, "The more uncertainty or unfamiliarity with the target language culture, the more it is likely to be anxiety-provoking." Familiar cultural content not only enhances comprehension but also minimizes the anxiety often associated with second-language learning. Research indicates that such materials can lower the affective filter—a psychological barrier that inhibits language acquisition—by fostering a sense of security and belonging (Lalbiakpuii, 2020). For instance, incorporating folk tales, proverbs, or locally significant narratives allows learners to

engage with the language without the added complexity of navigating unfamiliar cultural contexts.

Moreover, culturally relevant materials often resonate with students' lived experiences, enhancing their comprehension of complex linguistic structures and promoting practical application. For example, research by Syahfitri et al. (2025) confirms that learning materials featuring local cultural elements significantly enhance language comprehension and engagement. And Ariffin (2018) explored the integration of local cultural materials within Malaysia's learning environments and found that these approaches significantly improved students' language performance and critical thinking skills. Additionally, Radha (2020) indicates that using culturally relevant reading materials contributes to advancements in language skills, particularly in reading comprehension and vocabulary acquisition. This improvement can be attributed to learners' ability to leverage pre-existing cultural schemas to decode textual meaning more effectively. Familiarity with the cultural context not only enhances comprehension but also encourages nuanced engagement with the language, thus supporting long-term retention and holistic proficiency development. (Chung, D.T., & Long, N.T., 2024)

Discussion

Motivation is widely recognized as a cornerstone of successful language learning, and local-culturally relevant materials play a crucial role in this regard. When instructional content resonates with learners' lived experiences and cultural identities, lessons become more meaningful and relatable. It is supported by Tazhitova, et al (2022), who found that local materials in ESL learning process present a comprehensive study of the culture and traditions including developing spiritual values, ideals, and character. Students exposed to culturally aligned materials demonstrate significantly higher levels of classroom participation and intrinsic motivation. Radha Nambiar et al. (2020) found that using local culture-based materials can boost students' confidence and motivation, leading to greater classroom engagement. This motivational boost results in sustained interest and increased time investment in language learning, both of which are critical to achieving language proficiency.

While the integration of local culturally relevant materials offers numerous advantages, over-reliance on these resources can present significant challenges for learners. Primarily, such dependence may limit exposure to diverse cultural contexts and delay the development of essential English thinking patterns.

One major concern is that learners may become entrenched within a monocultural framework, which can undermine their ability to communicate effectively in global settings. The exclusive use of localized materials can narrow learners' intercultural horizons, which are crucial for navigating an increasingly globalized world (Shin et al., 2011). For instance, Nanduri (2024) found that learners who are not regularly exposed to diverse linguistic structures and cultural nuances struggle with comprehension when faced with unfamiliar idioms, humor, and pragmatics in international settings. This limitation poses a particular challenge for advanced learners who require intercultural competence for various academic, professional, and social contexts.

Additionally, Byram (1997) highlights that successful language learning extends beyond mere linguistic accuracy to encompass cultural adaptation and shifts in thinking patterns. Over-relying on local contexts can impede this adaptation process, particularly in writing and speaking, where learners are expected to employ English thinking patterns in their outputs. For instance, Guhao and Abdallah (2025) found that Filipino graduate students studying in Western universities often struggled with spontaneous spoken interactions due to their reliance on culturally familiar discourse styles. Without sufficient exposure to target-language conventions, learners may encounter difficulties transitioning to higher proficiency levels or meeting academic standards. This delay can hinder their overall language development and restrict their ability to engage fully in English-speaking communities.

A significant shortcoming in the integration of cultural content in English Language Acquisition (ELA) education in China is the absence of structured opportunities for cultural comparison, which is essential for fostering critical thinking and intercultural competence. Cultural comparison enables students to understand not only the unique characteristics of individual cultures but also their shared values, conflicts, and intersections. However, in the Chinese context, culturally relevant materials are often presented in isolation, lacking explicit connections to other cultures or frameworks that promote reflective thinking (Hu, 2002) Hanif and Ullah (2024) also claim that students often memorize cultural facts without engaging in critical discussions, leading to limited intercultural awareness in both English and Chinese learning as a second language.

For example, previous studies have found that textbooks used in mainland China include sections on both Chinese and Western holidays, yet they seldom encourage students to critically analyze the cultural significance or underlying values of these traditions (Lee & Li, 2019). Instead, cultural elements are typically presented as parallel entities, leading students to passively absorb information rather than actively engage in comparative analysis. This approach limits the potential for students to develop a deeper understanding of cultural dynamics and inhibits the cultivation of critical thinking skills.

The absence of critical thinking in the use of culturally relevant materials has broader implications for students' abilities to navigate cultural complexities in real-world contexts. Without exposure to cultural comparison or opportunities for critical analysis, students are less likely to develop the skills necessary to challenge stereotypes, address cultural biases, or engage in meaningful intercultural dialogue (Annenkova, A. V., & Domysheva, S. A., 2020). This lack of engagement not only hinders students' language development but also restricts their capacity to become informed, empathetic global citizens.

Culturally relevant materials in the target language can significantly aid students in understanding the language within its cultural context and improving their intercultural communication skills. However, excessive reliance on such materials may also present challenges for learners. This section analyses the advantages and disadvantages of incorporating target language cultural materials into English learning.

One of the primary advantages of target language culturally relevant materials is their ability to enhance language proficiency. These materials provide authentic input and cultural context, which include real-life expressions and idioms (Nambiar et al., 2020). Mastering the target

language necessitates an understanding of the cultural background of that language and its integration into the new cultural landscape of non-native speakers. According to Rashid, B. T., and Hasan, M. N. (2020), "Culture is a basis for literature; namely, it does not merely imply that literature deals with culture, but literature about the culture of any specific user of that language." As a key medium of cultural transmission, exposure to literature not only allows students to learn authentic and complex English expressions but also distils the essence of the humanities, thereby improving their humanistic qualities. Numerous studies highlight the effectiveness of literary texts in language learning. For instance, Kahraman and Şentürk (2020) discovered that including literary texts in curricula, course books, or lessons maximizes language learning outcomes, as demonstrated by a study testing the benefits of short stories in teaching English grammar. Literature not only aids in teaching linguistic structures but also immerses learners in cultural narratives, enhancing their understanding of the social and historical contexts of the target language. Research indicates that literature-based instruction significantly contributes to both cultural awareness and linguistic competence.

Furthermore, Bérešová (2014) emphasizes that literary texts provide second-language learners with authentic exposure to cultural discourses, fostering deeper engagement with the language. In addition to enhancing language proficiency, target language culturally relevant materials increase students' interest in language learning. Engaging cultural stories, historical backgrounds, and social customs can spark curiosity and motivation among learners. Research shows that interest is a key motivator in language acquisition. By interacting with cultural content such as music, movies, literature, and everyday life scenarios, students become more motivated to learn.

According to Uddin (2019), learning English through literature allows learners to gain awareness of English-speaking cultures and to understand how native speakers express their thoughts, feelings, and dreams. This exposure enables students to learn and use English in a manner similar to that of native speakers. Moreover, Akintayo et al. (2024) emphasizes that integrating diverse cultural content within instructional materials enhances student engagement by making the learning process more dynamic and enjoyable which aligns with Tomlinson (2011), who emphasizes that diverse learning materials and cultural content make the learning process more enjoyable, reducing fatigue and enhancing student participation and engagement.

In summary, while target language culturally relevant materials can profoundly impact language proficiency and motivation, it is essential to balance their use with a broader range of cultural contexts to ensure comprehensive language development and intercultural competence.

The connection between language and culture is fundamental, as noted by Kramsch (1993), who asserts that they are inseparable. Learning culture alongside language enables students to use language more accurately and appropriately across various contexts. Target language culturally relevant materials not only facilitate language acquisition but also encourage students to adopt different cultural perspectives, thereby enhancing their intercultural and critical thinking skills.

By engaging with diverse cultural norms, students learn to analyse issues from a multicultural viewpoint and develop an understanding of the behaviours and thought processes shaped by different cultural backgrounds. This exposure is crucial in fostering a more nuanced

comprehension of language use in various social contexts. Byram (1997) emphasizes that language learning should extend beyond linguistic proficiency to include intercultural competence. Further more, Elemam and Saide (2023) emphasise that teach diverse cultural norms helps students develop cultural sensitivity, a global mindset, and an understanding of multicultural perspectives. By incorporating culturally relevant materials into the curriculum, educators can help students appreciate cultural differences and improve their ability to communicate effectively in an increasingly globalized world.

However, excessive exposure to target language cultural materials can significantly impact students' cultural identity. When students focus too heavily on the target culture while neglecting their own cultural values, they may experience a cultural identity crisis. Phillipson (1992) cautions against "linguistic imperialism," a phenomenon where second language learners unconsciously adopt the cultural values associated with the target language, often at the expense of their own cultural heritage.

This issue is particularly pronounced in developing countries, where students may lose their cultural confidence during their English learning journey. For instance, the hegemonic representation of Western cultural values in Indonesian English textbooks has raised concerns about cultural colonization (Sudartini, 2024). While Asian countries increasingly export their cultures through mediums such as TV dramas, anime, and music (e.g., K-pop, J-pop), the influence of Western culture remains pervasive in the process of learning English. Consequently, while it is possible to promote our culture, it often does not counterbalance the dominant influence of Western culture.

In conclusion, while target language culturally relevant materials play a significant role in enhancing students' language proficiency, learning interest, and intercultural thinking skills, excessive use of such materials may lead to increased learning difficulties and negatively affect students' cultural identity. Therefore, it is essential for educators to select appropriate cultural materials that consider students' needs and to integrate both target and native cultures to achieve the best learning outcomes.

Conclusion

This paper has explored the role of local and target culturally relevant materials in English education, both globally and within the Chinese context. It is crucial to summarize the overall contributions and shortcomings of existing studies regarding their strengths and limitations.

Firstly, these studies have emphasized the significance of culturally relevant materials in enhancing English language learning, particularly in improving students' language proficiency and intercultural communication skills. Both local and target culturally relevant materials contribute to diversifying textbook content, thereby enhancing students' learning interest and practical language abilities.

Secondly, the research provides valuable insights into the practices of English language education in China. By analysing the use of target language culturally relevant materials, scholars have illuminated how cultural content can foster critical thinking and cross-cultural understanding among students, thereby offering theoretical support for improving educational

policies in the country. However, several limitations persist in the existing literature. Most notably, many studies lack practical suggestions on how to effectively balance the use of local and target culturally relevant materials in classroom settings to maximize English language acquisition.

Additionally, current research tends to focus heavily on theoretical discussions while offering limited exploration of practical teaching methods and assessment frameworks. Furthermore, the need for teacher training in cultural education is often overlooked. Without adequate resources and guidance, teachers may struggle to integrate cultural materials effectively into their lessons.

Therefore, future research should prioritize the development of practical application strategies for incorporating cultural content into English teaching, establish comprehensive assessment frameworks, and implement teacher training programs to ensure that culturally relevant materials are utilized effectively. By addressing these gaps, we can enhance the effectiveness of culturally relevant materials in English language learning and better prepare students for an interconnected world.

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UNDERSTANDING PUBLIC PERCEPTIONS OF AN IDEAL CITY IMAGE THROUGH DOUYIN: A GOVERNMENTAL REVIEW FRAMEWORK FOR XI'AN

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Abstract:
Background: As short video platforms increasingly shape public discourse, public perception has become a central force in constructing and redefining city image. Cities are no longer solely defined by official narratives, but also by how they are represented and interpreted through user-generated content. Douyin, one of China's most influential platforms, provides a valuable lens to examine how contemporary users conceptualize the characteristics of an ideal city image.
Objective: This study explores how the public perceives and communicates ideal city image features on Douyin, with a specific focus on Xi'an. From a governmental perspective, it synthesizes existing city image evaluation frameworks and proposes a review model that aligns with public sentiment and platform-driven engagement dynamics.
Participants and Setting: A systematic review was conducted on peer-reviewed articles published in English and Chinese between January 1, 2020, and January 1, 2025, retrieved from Scopus and CNKI databases. Inclusion criteria focused on studies related to city image evaluation, city branding, digital media's impact on urban perception, and short video-based communication strategies.
Methods: Adopting a systematic literature review approach, the study applied content analysis to categorize and evaluate existing assessment frameworks. Special attention was paid to models applicable to public-sector communication. Additionally, representative Douyin content and user interaction patterns were analyzed to reflect public perceptions of city image.
Results and conclusion: As platforms like Douyin reshape urban branding in the Web 3.0 era, governments face new opportunities and challenges in understanding and managing digital city images. This study proposes a government-oriented evaluative framework that integrates traditional image indicators with digital engagement metrics, offering strategic insights for policymakers and urban communication practitioners navigating the evolving digital media landscape.

Keywords: *City Image, Douyin, Xi'an, Government Perspective, Evaluation Framework*

Introduction

City Image Construction as a Strategic Imperative in the Digital Age

In contemporary urban governance, city image has become a strategic asset linked to cognitive capital, emotional engagement, and institutional legitimacy. It shapes tourism, investment, and cultural identity within global urban networks (Anholt, 2010; Jansson, 2005).

In the Web 3.0 era, decentralized, multimodal information flows empower digital natives—especially those born after 1995—to actively shape urban narratives through short videos and interactive content. Platforms like Douyin, Xiaohongshu, and Bilibili function as "visibility fields under platform capitalism" (Fuchs, 2021), where cities are continuously redefined as streamable, fragmented content shaped by algorithmic and user dynamics.

As urban imagery becomes more visualized and datafied, it evolves into a symbolic and participatory cultural form co-produced by multiple actors (Harvey, 1989; Lefebvre, 1991). Consequently, city image studies now span media, urban theory, geography, and visual culture. In this context, communication strategies and evaluation models must reflect the perceptual logic of platform-native users and support ongoing co-creation.

The Disruption of Traditional Urban Image Narratives by UGC On Social Media

In today's platform-driven media landscape, city image construction is shifting away from top-down narratives traditionally controlled by governments and mainstream media. With the rise of user-generated content (UGC) on social media, especially in the Web 3.0 era, city imagery is increasingly shaped through decentralized, participatory processes (Chadwick, 2013; Carpentier, 2011). In the legacy media model, urban branding was curated by "symbolic elites" via coordinated and authoritative messaging. Platforms like Douyin have disrupted this model, enabling individuals to co-create fragmented yet emotionally resonant narratives. UGC now actively participates in urban meaning-making, rather than merely reflecting it.

Douyin represents a "platformed visibility structure" (Bucher, 2018), where algorithmic distribution, real-time feedback, and visual formats redefine urban representation. Through content like check-ins and challenges, users continuously reshape city images, while algorithms selectively amplify or ignore certain symbols (Gillespie, 2014). This shift calls for governments to evolve from image controllers to collaborative mediators. To stay relevant, official narratives must engage with grassroots discourse shaped by public sentiment and platform dynamics. Using Xi'an as a case, this study examines how UGC on Douyin contributes to idealized city imagery and proposes a responsive, government-oriented evaluation model to support adaptive urban image governance in the digital age.

Xi'an As a Case of Douyin Platform-Driven Urban Representation: Opportunities and Gaps

Xi'an, known for its deep historical and cultural legacy, has traditionally relied on state-led narratives to shape its city image. However, with the rise of platforms like Douyin, its communication model has shifted toward user-driven, algorithm-amplified narratives. Viral phenomena such as "Datang Evernight City" and "Chang'an: Thirty Thousand Miles" have reactivated cultural symbols and repositioned Xi'an as a dynamic, multi-voiced urban brand.

Douyin has enhanced Xi’an’s visibility among younger users, blending visual, historical, and emotional appeal. Yet, the lack of standardized frameworks for evaluating city image on such platforms presents challenges for strategic governance.
This study uses Xi’an as a case to examine how governments can collaborate with platforms and users to co-create urban imagery. It proposes a responsive, perception-based evaluation model to inform adaptive communication strategies in the platform era.

Research Objectives

1. To synthesize existing scholarly literature on frameworks for evaluating city image.
2. To extract and analyze public expressions of Xi’an’s city image as represented on the Douyin platform.
3. To construct a government-oriented evaluation and communication framework for city image, grounded in public perception.

Research Questions

1. What theoretical frameworks and indicator dimensions are most employed in existing academic studies on city image evaluation?
2. What features of an “ideal city image” are reflected in the ways the public portrays Xi’an on the Douyin platform?
3. How can public perceptions be integrated with governmental communication goals to form a context-specific evaluation model applicable to Xi’an’s digital city branding strategy?

Research Methodology and Data Sources

Step	Method	Clarification
1	Systematic Literature Review (SLR)	Retrieving and organizing research related to city image, brand communication, public perception, and short video platforms
2	Integration Analysis	Cross-comparison of literature and platform data to summarize the dimensions and communication elements that should be included in the "ideal image of Xi'an".

This study adopts a systematic narrative review to examine how city images are shaped on short video platforms and to develop a government-oriented evaluation framework. Unlike quantitative reviews, this method allows for flexible integration of diverse sources and contextual interpretation. Through a transparent, replicable search process and narrative synthesis of models, methods, and findings, the study builds both conceptual and empirical foundations for a responsive, platform-based city image evaluation model.

Identification

The first phase of the systematic review involved identifying relevant literature aligned with the research questions. Using the keywords “City image” AND “TikTok” AND “Public perception,” search strings were developed based on prior studies and iterative refinement.

Searches were conducted in Scopus and CNKI, yielding 147 articles that preliminarily matched the review's scope.

Scopus	**TITLE-ABS-KEY ("City Image" AND "Tik-Tok" AND Governmental approach AND City Image Building) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (LANGUAGE , "English"))**
CNKI	"city image" AND "Tik-Tok" AND Governmental approach AND city image building

Source: (The results of the search through the two databases are tabulated in a self-contained table)

Screening

During the screening phase, 35 duplicate records from Scopus and CNKI were removed. Remaining articles were evaluated against strict inclusion criteria: only peer-reviewed studies with clear quantitative, qualitative, or mixed-methods designs were retained. Theoretical essays, editorials, and reports lacking methodological transparency were excluded.

To ensure comprehensiveness, both Chinese and English publications were included, covering the period from January 1, 2020, to January 1, 2024−a key phase in the rise of short video platforms. After two screening rounds, 58 articles were selected for in-depth analysis and framework development.

Criterion	Inclusion	Exclusion
Language	English & Chinese	Non-English & Chinese
Time line	2020 – 2024	< 2020
Literature type	Journal (Article)	Conference, Book, Review
Publication Stage	Final	In Press

Source: (Chart of statistics on the screening process for the second phase of the systematic evaluation)

Eligibility

Following initial screening and quality control, an eligibility assessment was conducted based on title, abstract, and research content. Each article was reviewed for theoretical relevance, methodological rigor, and alignment with this study's focus. As a result, 22 studies were excluded for lacking relevance to public perception of city image on social media; 6 were removed due to unrelated titles, and 17 were excluded based on abstracts misaligned with the research scope. Ultimately, 13 high-quality, relevant studies were selected for inclusion in the final review.

Data Abstraction and Analysis

This study conducted a systematic narrative review to explore city image construction, public perception, and short video communication on platforms like Douyin. Thirteen studies were included, covering city branding, evaluation models, platform strategies, and UGC impact. Each study was analyzed for its objectives, frameworks, methods, and findings. This was complemented by reviewing Douyin content about Xi' an to bridge theory with platform practices. The aim was to inform a government-oriented, perception-driven evaluation model. Figure 3 illustrates the review process for clarity and replicability.

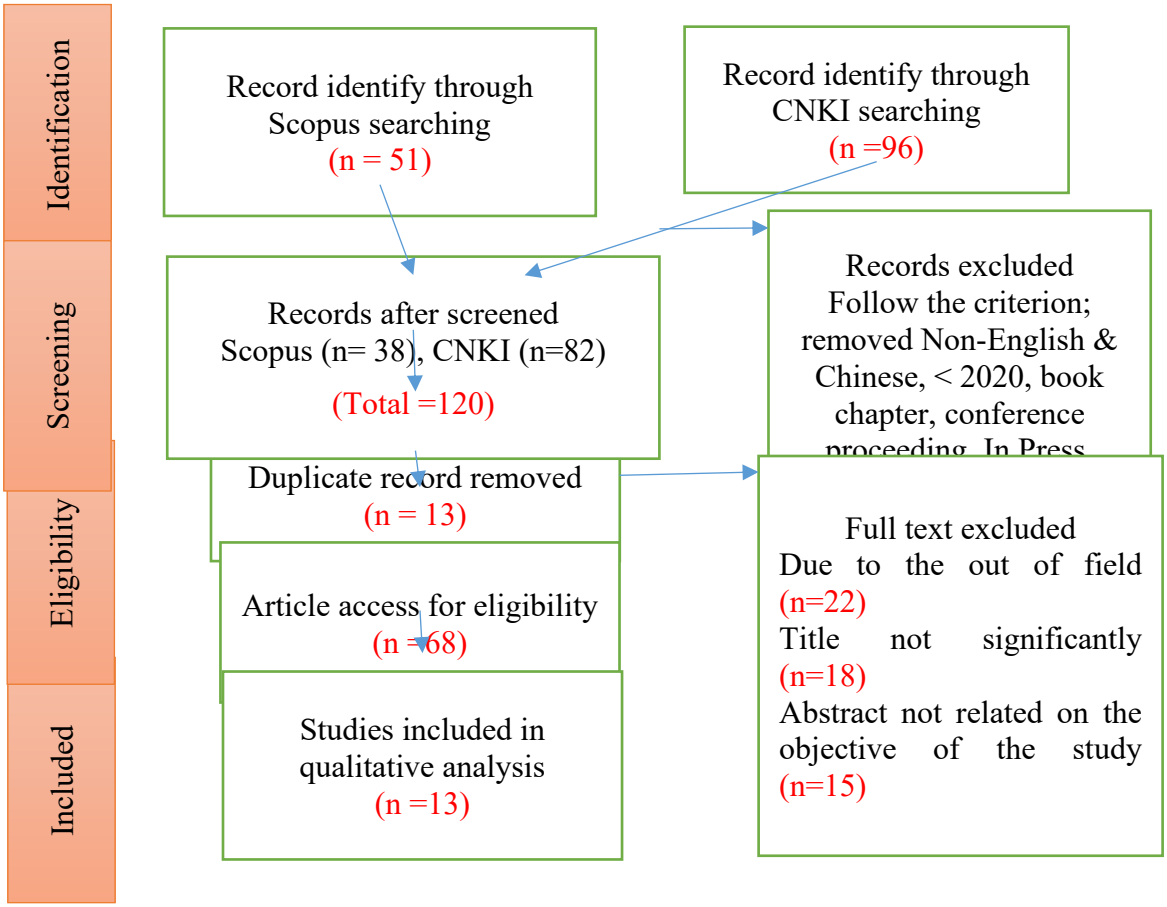


FIGURE . Flow diagram of the proposed searching study

Source: (Mustafa, W. A., Alias, N. A., Jamlos, M. A., Ismail, S., & Alquran, H. (2022))

Results

This review included 13 core studies, summarized in Table 3, which examine key aspects of city image construction and evaluation within social media contexts—particularly on Douyin. The studies collectively address three main themes: the representation of city image on Douyin (n = 7), theoretical frameworks and evaluation indicators for assessing city image (n = 7), and government strategies for image shaping via social media (n = 2). Two of the studies focus specifically on Xi'an.

Table : Summary of studies' characteristics and main findings (N = 13)

Author (Year , Database)	Research Title	Research Objective	Research Method	Main Findings	Comment
Liu & Su (2021, Scopus)	Government communication in the era of short video: A study of local governments' TikTok use in China	Explore how local governments in China utilize TikTok to communicate urban narratives.	Qualitative content analysis	Governments use TikTok to humanize their image, but lack consistent strategy and evaluation.	Provides strong support for framing a government-oriented evaluation model on Douyin.
Cheng & Jiang (2020, Scopus)	The evolution of social media engagement: What motivates users to engage on TikTok?	Identify motivational factors behind TikTok user engagement.	Survey-based quantitative study	Entertainment, social interaction and information sharing are key motivations.	Helps define 'public perception' dimensions relevant to city image engagement.
Zhang & Huang (2022, Scopus)	From viewers to virtual tourists: Short video platforms and city image perception in China	Analyze how TikTok videos shape virtual tourist perception of Chinese cities.	Case-based content analysis	Short videos reshape tourist imaginations and highlight city aesthetics.	Highlights the perceptual power of visuals, important for evaluating image resonance.
Chen & Xu (2021, Scopus)	Framing Chinese cities on TikTok: A study of visual storytelling and platform logic	Explore the role of TikTok's platform features in shaping city image.	Platform analysis + semiotic analysis	Algorithmic promotion and visual aesthetics drive dominant urban narratives.	Supports the integration of algorithmic visibility into city image evaluation.
Tian & Zhao (2020, Scopus)	Public engagement and smart city image in social media: Evidence from Chinese short video platforms	Assess how short videos affect public engagement with city image.	Mixed-method: content analysis + interview	UGC enhances emotional connection and city loyalty among viewers.	Emphasizes the emotional aspect of public perception relevant to ideal city image.

Yu & Wang (2023, Scopus)	City branding and Douyin communication: A study of digital placemaking in post-pandemic China	Investigate how Douyin is used in post-pandemic city branding strategies.	Case study of Douyin campaigns	Douyin fosters creative participation and collective imagination of city identity.	Directly informs government strategy in digitally mediated placemaking for Xi'an.
Li Jing (2020, CNKI)	Research on the Communication of Urban Brand Image and Audience Perception Evaluation—A Case Study of Dongguan	To explore the alignment between Dongguan's brand communication and public perception.	Questionnaire + Content Analysis	Perception is hierarchical; visual symbols and social identity have significant impact.	Provides a perception-based framework reference for evaluating brand communication.
Huan Jia & Chen Bohan (2022, CNKI)	Discourse Co-Production Framework of Urban Image Communication in the Era of Converged Media—A Case Study of Xi'an	To analyze cooperative mechanisms among government, media, and users in shaping city image.	Case Study + Discourse Analysis	A government media user co-construction model enhances Xi'an's communication power.	Inspires collaborative strategies especially relevant for short video platforms.
Lu Songnian (2021, CNKI)	In-depth Reflection on Shaping a Positive Urban Image of Shanghai	To reflect on Shanghai's city image construction issues and improvement paths.	Theoretical Analysis + Case Review	City culture should integrate with contemporary expression; avoid image generalization.	Provides insight into content and emotional layers of city image construction.
Gao Hua (2020, CNKI)	Audience Evaluation of City Tourism Slogan Marketing	To assess how city slogans influence audience brand identification.	Empirical Survey + Perception Analysis	Concise, emotional slogans resonate more with the public.	Slogan and language can be part of communication content evaluation.

Ren Dapeng (2021, CNKI)	City Brand Construction Based on Audience Perception	To investigate how public perception drives city brand formation.	Questionnaire + Factor Analysis	Perception shapes branding trajectory; interactive communication is key.	Reinforces the logic of perception-led evaluation framework.
Chen Qian (2022, CNKI)	Analysis on Destination Image Components Based on Audience Perception– A Case Study of Beijing	To identify core components of perceived city image in tourism.	Content Analysis + Interviews	Cultural depth, service experience, and visual aesthetics are key factors.	Useful for designing ‘perceptual dimensions’ in evaluation indicators.
Song Huanying & Zhang Xuyang (2021, CNKI)	Audience Perception Evaluation of Chinese Urban Brand Image– Empirical Study on 36 Cities	To construct a national evaluation model from a public perspective.	Multi-level Regression + Survey	Identified six core factors: communication, reputation, friendliness, etc.	Key reference for building empirical, audience-oriented evaluation systems.

The findings underscore the complexity of city image communication in platform environments and the urgent need for multi-dimensional evaluation models. Public perception emerges as a central factor in shaping city image, offering practical insights for government actors aiming to enhance communication strategies through participatory and responsive approaches.

Among the 13 core Chinese and English-language studies included in this review, a total of six were identified through systematic classification and content analysis as explicitly proposing evaluation frameworks or structural dimensions related to public perception of city image. These studies offer diverse analytical perspectives and reveal how the public, through engagement with new media platforms, participates in the construction, expression, and negotiation of their understanding and preferences regarding the "ideal city image." (See summary table for reference.)

Author	City / Scope	Primary Dimension	Secondary Dimension	Tertiary Indicators
Liu & Su (2021)	Local governments in China	Government Communication	Public Engagement Strategy, Content Orientation	Frequency of posts, Type of video content (e.g. policy, tourism), Use of interaction features (likes, comments, shares), Humanization techniques
Zhang & Huang (2022)	Tourism cities (e.g. Chengdu, Xi'an)	City Image Perception	Aesthetic Appeal, Tourist Intentions	Scenic visuals, Emotional tone, Local culture representation, Intention to visit
Chen & Xu (2021)	Chinese urban TikTok channels	Platform Logic & Storytelling	Visual Narrative, Algorithmic Amplification	Video format, Symbolic imagery, Hashtag use, Engagement volume (views, comments)
Song Huanying & Zhang Xuyang (2021)	36 major cities in China	Audience Perception Evaluation	Communication Power, Affinity, Recognition	Media exposure rate, Brand favorability, Urban reputation index, Public emotional connection
Ren Dapeng (2021)	Urban brand building (general)	Brand Perception	Symbol Recognition, Perceptual Consistency	City logo/image identification, Message clarity, Cultural-symbolic coherence
Chen Qian (2022)	Beijing	Tourist-Based Image Structure	Cultural Value, Service Quality, Visual Impression	Cultural heritage, Hospitality service ratings, Aesthetic of urban scenery, Tourist feedback

Detailed Evaluation Framework Summary (6 Studies)

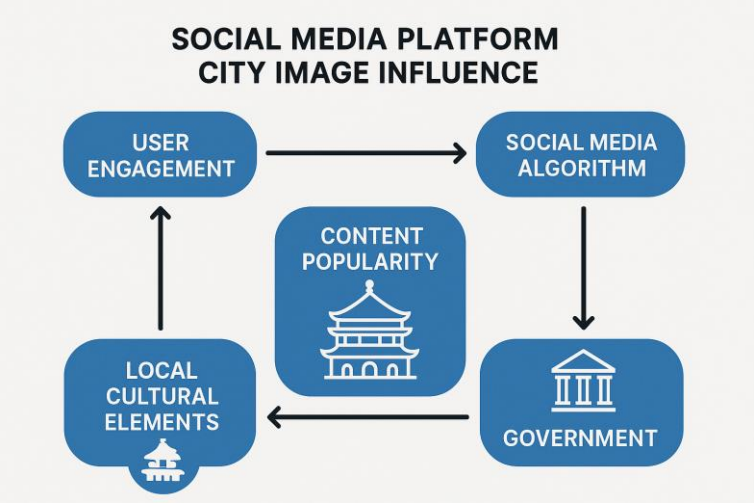
By comparing the primary, secondary, and tertiary indicators proposed across these studies, five key dimensions emerged as the core focus of current evaluative frameworks: (1) government communication and platform governance strategies, (2) visual storytelling and aesthetic representation of the city, (3) public emotional engagement and symbolic identification, (4) symbolic dissemination and cultural signification, and (5) user- or tourist-centered perceptual experiences and value resonance.

These dimensions reveal that public understanding of city image on short video platforms—such as Douyin—has shifted away from static, top-down narratives toward a dynamic co-construction process shaped by algorithmic recommendations, interactive feedback, and symbolic consumption. Accordingly, the analytical frameworks proposed in these six studies not only offer theoretical insight into how the public envisions an "ideal city image," but also provide a practical foundation for developing government-oriented models for evaluating city image influence in digital environments.

Discussion

This study uses Douyin as a research platform to examine how the public constructs an "ideal city image" through short video content and to propose an evaluation model that aligns public perception with governmental communication goals. A systematic narrative review of 13 empirical studies identified six with explicit frameworks for assessing city image from a public perspective, forming the theoretical basis for this analysis.

Douyin's algorithm-driven environment has transformed city communication from a linear model to a dynamic cycle of content, interaction, recommendation, and reproduction. As Chen & Xu (2021) note, city image formation now relies more on visual appeal, emotional resonance, and algorithmic fit than on the coherence of official narratives. This poses a key challenge for governments: translating strategic messages into content that resonates within platform logic. From the audience perspective, research by Cheng & Jiang (2020) and Zhang & Huang (2022) shows that urban perception is increasingly shaped by individualized visual experiences and emotional engagement, rather than functional or policy-oriented narratives. In Xi'an's case, although its image has long emphasized cultural heritage and national symbolism, Douyin users prefer localized, distinctive, and often entertaining content—highlighting the rising role of cultural identity and affective connection in digital-era city branding.Synthesizing the frameworks proposed across the six studies, this paper argues that constructing a government-oriented, public-perception-based model for evaluating city image influence is both necessary and feasible. Such a model should incorporate: (1) the city's strategic branding objectives; (2) the public's perceptual schema as expressed on digital platforms; (3) the interventionist logic of Douyin's algorithms and interaction design; and (4) the need for narrative consistency and symbolic coherence in long-term brand building. This framework not only supports governmental evaluation of platform-based communication efforts but also provides an empirical foundation for policy design—enabling a closed-loop evaluation system that integrates city image construction, platform strategies, and public feedback.



Source: (Chart of statistics on the screening process for the second phase of the systematic evaluation)

Conclusion

In platform-based urban communication, understanding how the public constructs an "ideal city image" through short video platforms has become central to local governance and branding strategies. This study employed a systematic narrative review to synthesize recent evaluation frameworks and identified key dimensions applicable to platforms like Douyin.
The proposed government-oriented model integrates traditional indicators—such as reputation, symbolism, and official narratives—with platform-native metrics like user engagement, visual aesthetics, and algorithmic visibility. This dual-layer framework bridges strategic intent with public sentiment.

For Xi'an, such a model can enhance the relevance and effectiveness of digital content, enabling more accurate assessment of communication outcomes. It also supports government efforts to align with public narratives, fostering stronger cultural resonance and adaptive communication in the era of social media.

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EFFECT OF FINANCIAL DISTRESS, CAPITAL STRUCTURE AND COMPANY VALUE ON RETURN OF SHARES IN TELECOMMUNICATIONS COMPANIES LISTED ON THE BEI

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Abstract: *This study aims to determine the effect of financial distress, capital structure, and firm value on stock returns in telecommunications companies listed on the Indonesia Stock Exchange (IDX). This research is a quantitative study. The sampling technique used is non-probability sampling with a purposive sampling method. The sample consists of five companies. The data analysis method employed is multiple linear regression. Partially, the variables of capital structure and firm value have a significant influence on stock returns, while the financial distress variable does not affect stock returns. The F-test results show that financial distress, capital structure, and firm value have an F significance value of 0.006 < 0.05, indicating that these three variables simultaneously have a significant effect on stock returns. The coefficient of determination (R^2) test results show a value of 36.2%. This study has limitations in terms of variable measurement, research time frame, and sector coverage. For future research, it is recommended to enrich the research variables, extend the observation period, and expand the sector coverage to obtain more comprehensive and accurate results.*

Keywords: financial distress, capital structure, firm value, stock returns

Introduction

Indonesia is ranked second highest after Vietnam in ASEAN stock exchange performance, especially in terms of return rates, with a recorded increase of 6.16%. Stock returns in Indonesia show positive prospects for 2024. Indonesia's GDP growth is estimated to reach 5% and people's purchasing power is stable. The condition of the Indonesian stock market in 2024 is predicted to improve compared to the previous year, with positive prospects for several sectors, including telecommunications (kontan.co.id, 2023). The telecommunications sector in Indonesia has experienced very rapid growth along with the increasingly widespread digital era. The increasing use of the internet, data services, and various digital applications has driven the demand for telecommunications services even higher. This condition has a direct impact on the stock performance of telecommunications companies on the Indonesia Stock Exchange (IDX).

Although the telecommunications sector has not always performed strongly, Telkom Indonesia (TLKM) is projected to remain positive thanks to increasing internet usage, digital infrastructure investment, 5G technology, and data service growth. However, as of October

25, 2024, TLKM's share price was under pressure, falling 1.36% in the last 24 hours and 16.91% in a year, with the last price of IDR2,900. ISAT shares showed more dynamic movement, almost tripling in 2021 due to restructuring and strategic acquisitions. The positive trend continued in 2022 and 2023 with returns of 25.0% and 30.7%. Until September 2024, ISAT rose 16.49% year-to-date (ytd) with stable liquidity and trading volume. As part of the analysis of the telecommunications sector in Indonesia, the following table contains stock return data from several telecommunications companies listed on the Indonesia Stock Exchange (IDX) during the period 2019 to 2023.

Table 1 Telecommunication Company Stock Returns 2019-2023

No	Company name	Code	2019	2020	2021	2022	2023	Average Return
1	PT Telkom Indonesia (Persero) Tbk	TLKM	1.79%	-12.8%	29.9%	-10.5%	2.59%	2.17%
2	PT Indosat Ooredoo Hutchison Tbk	ISAT	6.20%	120.52%	23.38%	7.86%	53.68%	42.32%
3	PT XL Axiata Tbk	EXCL	45.16%	-5.86%	43.18%	-35.54%	-13.04%	6.78%%
4	PT Smartfren Telecom Tbk	FRIEND	-6.12%	-37.86%	61.11%	-18.51%	-26.47%	-5.57%
5	PT.	JAST	131.70%	-83.79%	-17.91%	-52.27%	-52.27%	-12.19%

Source: Diolah dari IDX

Based on table 1.1, it can be seen that telecommunications companies show varying stock performance. Some experienced a significant increase, such as PT Indosat Ooredoo Hutchison Tbk (ISAT), but there were also those that experienced a fairly drastic decline, such as PT Smartfren Telecom Tbk (FREN) and PT Jasnita Telekomindo Tbk (JAST).

Some of the causes of the rise and fall of stock prices include fundamental macroeconomic conditions, fluctuations in the Rupiah exchange rate against foreign currencies, government policies, panic factors, and market manipulation factors (ojk.go.id, 2021). Not only that, the company's internal conditions can also affect stock prices, such as companies that have the potential for financial distress, high corporate debt as a capital structure, and the company's value can be influenced by market sentiment. The potential for a financial crisis (financial distress) is a condition of a company that has a level of vulnerability to financial difficulties that have a significant impact on stock returns, especially because it can reduce investor confidence in the company. When a company experiences financial difficulties, this often triggers a decline in stock prices, as investors try to stay away from assets that are considered high risk.

Research by Fachrudin & Ihsan, (2021) shows that the probability of financial crisis and liquidity are important factors affecting stock returns. This finding confirms that companies

must maintain strong financial health to maximize their market performance. In accordance with agency theory, where managers may tend to prioritize short-term survival strategies rather than creating long-term value when the company is in a financial crisis. When investors see such risks, they may lose confidence and sell their shares, which can worsen the company's situation and result in a further decline in stock returns. In a study conducted by Caparino (2020) it is explained that increased risk can lead to higher capital costs, which also have a negative impact on stock returns.

High debt as part of the capital structure can have a significant impact on stock returns. When a company relies on debt to finance its operations and growth, it can increase the risk of bankruptcy and financial uncertainty, which in turn can reduce investor confidence. Research by Islamiyanti & Sari (2023) shows that a capital structure dominated by debt can lead to increased risk, resulting in investors demanding higher returns. If a company is unable to generate sufficient cash flow to meet its debt obligations, its stock price will be depressed, reducing expected stock returns. The trade-off theory explains that companies must balance the tax benefits of debt with the risks posed by the debt. Although debt can provide tax benefits and increase potential returns for shareholders, too much debt can trigger financial distress, which has a negative impact on stock prices. Research by Marcellino & Fitri (2023) supports this finding, showing that there is a negative relationship between the debt ratio and a company's stock market performance. Therefore, companies need to manage debt carefully to maximize shareholder value.

Company value can be influenced by market sentiment towards stock returns through investor perceptions and the decisions they make based on available information and emotions. When market sentiment is positive, investors tend to have higher confidence in the company's growth potential, which can drive up stock prices and increase company value. Conversely, negative sentiment can cause stock prices to fall, which has a direct impact on market assessments of company value. Research by Rahmawati and Irawati (2021) shows that market sentiment has a significant influence on stock prices, which in turn affects the company's value in the market.

Investors are often influenced by emotions and market reactions that can cause stock price fluctuations that do not always reflect the fundamental value of the company. This signal theory explains that investor sentiment is one of the main factors driving stock price fluctuations. Overreaction or underreaction to new information can cause changes in stock prices, which in turn will impact the returns obtained by investors. Research byThe Pooh (2024)supports this finding, suggesting that stock prices are often more influenced by investors' psychological reactions than by the company's fundamental performance.

Highlights the importance of these three factors in determining stock market performance which leads to an increase or decrease in stock prices. Researchers are interested in taking the research title "The Influence of Financial Distress, Capital Structure, and Company Value on Stock Returns in Telecommunication Companies Listed on BEI"

Literature Review

Agency Theory

Agency theory is a concept in economics that explains the relationship between company owners (principals) and company managers (agents).(Wibowo, 2023). In this context, the owners are the shareholders who invest their funds in the company, while the managers are responsible for managing the company in accordance with the owners' goals, namely maximizing the value of the company and generating profits for shareholders.

Signal Theory

Signal theory was proposed by Michel Spence. Spence (1973) stated that the creation of signal theory can be used by two parties, namely the source of information and the recipient of information. Signal theory is information provided by company management to investors as a basis for making investment decisions. The information provided will create a positive or negative signal for investors before investing their funds.(Wibowo, 2023).

Stock Return

***Return*share**is the level of profit or loss obtained by an investor from the stock investment he made. This is a measure of the performance of stock investment in percentage form, which shows how much profit or loss is generated from the investment in a certain period. Stock returns are the main benchmark for the performance of a stock investment. Investors use stock returns to compare the performance of various stocks or investment portfolios.(Sasongko & Shaliza, 2019). In measuring stock returns, you can use methods adopted from research.(Dura & Vionitasari, 2020)as follows:

$$\text{Stock Return} = \frac{(\text{selling price} - \text{purchase price})}{\text{purchase price}} \times 100\%$$

Financial Distress

Financial distress is a condition that is potentially experienced by a company, which reflects the level of vulnerability of the company to financial difficulties (Sagita, 2022). This condition can indicate problems in the company's financial management that can disrupt operational continuity. Although financial distress can be an early indicator of serious financial problems, it does not always mean bankruptcy. Companies experiencing financial distress still have a chance to recover by taking the right corrective steps.

Altman's Z-Score method has long been recognized as one of the most effective methods in predicting the possibility of financial distress in a company. The main advantage of this method lies in the simplicity of calculation and fairly high prediction accuracy. Financial distress can be calculated with the following indicators:

$$Z = 0{,}717_{x1} + 0{,}847_{x2} + 3{,}107_{x3} + 0{,}420_{x4} + 0{,}998_{x5}$$

Information:
Z= Z-Score
X1= Working capital/total assets
X2= Retained earnings/total assets
X3 = Profit before tax/total assets

X4= Equity/liabilities
X5= Income/total assets
Saffrani (2021)stating the minimum Altman Z-Score score to indicate a healthy company or not, there is actually no absolute benchmark. However, in general, here are the interpretations that are often used:

a. ***Z-Score*> 2.99**: The company is considered financially healthy and has a low risk of bankruptcy.
b. **1.81 < Z-Score < 2.99**: The company is in a grey area. Its financial condition needs to be monitored more closely.
c. ***Z-Score*< 1.81:**The company is considered at high risk of bankruptcy.

Capital Structure

Capital structure is a comparison or proportion between long-term funding sources used by a company. Simply put, this is how a company finances its assets, whether by using debt or equity (Maryani, 2019). Capital structure is the composition of a company's funding consisting of debt and equity. The higher the proportion of equity compared to debt, the lower the company's financial risk.(Mudiyana & Damayanti, 2023). The DER ratio is a common measuring tool used to assess a company's capital structure. The advantage of the DER ratio is that it provides a direct comparison between the amount of debt used by the company and its own capital. Capital structure can be calculated using indicators

$$\text{DER} = \frac{\text{total debt}}{\text{total equity}}$$

Wibowo, (2023)In general, the following interpretations are often used to provide an overview of a company's financial condition.

a. DER below or equal to 100% or 1 indicates a healthy company financial condition.
b. A DER above 2 or 200% indicates that the company's financial condition is very vulnerable to various risks.
c. A DER above 1 or 100% may indicate that the company's financial condition needs to be watched out for.

Company Values

Rustendi & Jimmi (2018)states that the intrinsic value of a company can be defined as the price that investors are willing to pay in a transaction to buy or sell the company as a whole, reflecting market expectations of the company's future cash flows. The price to book value (PBV) ratio is often used as a proxy to estimate the intrinsic value of a company. This is because PBV provides a comparative picture between the stock market price and the book value per share, so that investors can assess whether a company's stock price reflects its fundamental value. Adopting from researchAnggreni & Efendi (2023)Company value can be calculated using the following indicators:

$$\text{PBV} = \frac{\text{Stock price}}{\text{Book value per share}}$$

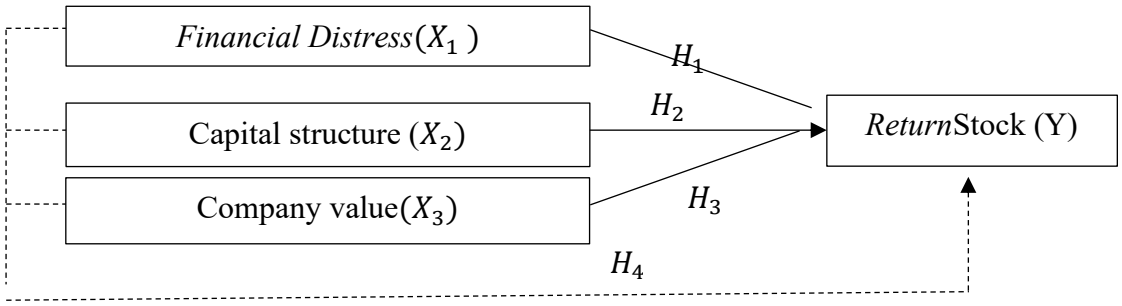
Anggreni & Efendi, (2023)states in general the PBV value used as a benchmark as follows:

- **PBV < 1:**This means that the market price of the stock is lower than the book value per share. This could indicate that the stock is undervalued by the market.

- **PBV > 1:**This means that the market price of the stock is higher than the book value per share. This could indicate that the stock is overvalued by the market.
- **PBV = 1:**This means that the market price of the stock is equal to the book value per share.

Framework Of Thinking

Based on previous explanations and research, it can be described regarding the influence*Financial distress*, Capital structure and Company value on stock returns in telecommunication companies listed on the IDX. The framework of thought used in this study is as follows:



Information :

= Partial Effect

= Simultaneous Effect

The Influence of Financial Distress on Stock Returns

Financial distressis a potential condition that a company can experience, this condition describes the level of vulnerability of the company to financial difficulties (Sagita, 2022). When a company experiences financial distress, the company's intrinsic value tends to decrease. Investors will see the company as a riskier investment, so the stock price will also fall. Financial distress not only has an impact on the company's financial performance, research conducted byFachrudin & Ihsan (2021)shows that the probability of financial crisis and liquidity are important factors affecting stock returns.

Signal theory provides negative information about the company's financial condition which will be interpreted as a danger signal, encouraging investors to sell. This further worsens the decline in stock prices and returns provided and extends the duration of the crisis. In line with the results of the studyWada & Wahyuni (2024)Financial distress has been proven to have a negative effect on stock returns, which shows that the higher the financial distress, the lower the rate of return or company stock returns. High uncertainty due to financial distress causes investors to be reluctant to invest or even conduct mass selling, thus drastically depressing stock prices and affecting stock returns. Based on previous explanations and research, the following hypothesis was obtained:
H1: Financial distress has an effect on stock returns in telecommunications companies listed on the IDX.

The Influence of Capital Structure on Stock Returns

Capital structure is a comparison or proportion between long-term funding sources used by a company. Simply put, this is how a company finances its assets, whether by using debt or equity (Maryani, 2019). Trade-off theory emphasizes the trade-off between the benefits and costs of using debt. On the one hand, debt can increase shareholder returns through the effect of financial leverage. However, on the other hand, increasing debt also increases financial costs and the risk of failure. Companies must balance these two factors to achieve an optimal capital structure. Empirical research shows that investors tend to avoid companies with high debt levels. This is due to the greater risk of default and the potential for decreased stock returns for shareholders. Based on the explanation and previous research, the following hypothesis was obtained:

H2: Capital Structure Affects Stock Returns in Telecommunication Companies Listed on the IDX.

The Influence of Company Value on Stock Returns

Rustendi & Jimmi, (2018)states that company value can be defined as the price that investors are willing to pay in a transaction to buy or sell a company, reflecting market expectations of the company's future cash flows. Company value, which is often measured by market capitalization or book value, reflects investor expectations of the company's future performance. The higher the company's value, the greater the investor's confidence in the company's ability to generate profits (returns). Information about company value can be considered a signal for investors. An increase in company value can be interpreted as a positive signal that the company is in good condition and has bright prospects. This statement is supported by research resultsMayasari & Syaipudin (2023)which states that PBV as an indicator of company value shows a positive influence on stock returns. The increase in company value indicates market confidence in the company's performance, thus encouraging stock demand and increasing stock prices to provide high returns as well. Based on previous explanations and research, the following hypothesis was obtained:

H3: Company Value Influences Stock Returns in Telecommunication Companies Listed on the IDX.

The Influence of Financial Distress, Capital Structure and Company Value

*Financial distress*or financial difficulties experienced by a company can trigger a series of events that have a negative impact on the capital structure and value of the company, and ultimately affect stock returns. When a company faces financial distress, investors will view the company as a high-risk investment. This will cause a decrease in the company's market value. To overcome financial difficulties, companies often increase the proportion of debt in their capital structure. However, increasing debt in financial distress conditions will worsen the situation. High interest rates will further depress the company's profitability, making it increasingly difficult for the company to get out of difficult conditions. Based on the explanation above, the last hypothesis is obtained:

H4: Financial distress, capital structure and company value influence stock returns in telecommunications companies listed on the IDX.

Research Methods

This study uses quantitative research data types and secondary data sources. Quantitative data is data in the form of numbers or figures that can be measured or calculated directly. This data is definite because it is symbolized by numbers or formulas. certain(Supriadi, 2021). Quantitative data used in this study is financial reports. According toJannah & Khoiruddin, (2017)secondary data is data that can be obtained from data collected by organizations or individuals or an organization. In this study, the secondary data used is the financial report of a telecommunications company listed on the IDX. The population that is the subject of the study is a telecommunications company that is publicly listed on the Indonesia Stock Exchange and is recorded as many as 22 companies. The sampling method used is purposive sampling. Based on the criteria, 5 companies were obtained as samples with a total of 25 data to be studied.

In this study, the data were analyzed through descriptive statistical analysis to provide an accurate picture of the variables being studied. In addition, multiple linear regression analysis was used to improve the accuracy of the conclusions drawn. Before applying regression analysis, it is necessary to test the classical assumptions to ensure that the regression coefficients are not affected by bias and remain stable so that they can provide accurate estimation results. The tests carried out include the normality test to assess whether the data follows a normal distribution. Continued with the next classical assumption test, namely the heteroscedasticity test to test the data studied is not affected by heteroscedasticity symptoms. The heteroscedasticity test is used as a determinant of the inequality of variance in regression (Wulan & Syahzuni, 2023). Then continued with a multicollinearity test to determine the data studied does not experience multicollinearity symptoms. Then continued with an autocorrelation test to test the data is not affected by autocorrelation symptoms. After these assumptions are met, the model fit is evaluated through the F test, t test and test to determine the significance of the results obtained. The statistical method used to study the relationship between two or more independent variables (X) with a dependent variable (Y). Multiple linear regression attempts to model a linear relationship between variables X and Y by using a linear function in the form:R^2

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3$$

Information:
Y = Company Value
α = Constant
β1 - = Regression Coefficientβ_5
X1 = Financial distress
X2 = Capital Structure
X3 = Company Value

Results and Discussion

Descriptive Statistical Test

Table 2 Descriptive Statistical Test

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
FINANCIAL DISTRESS	25	.21	6.32	1.3810	1.16840
CAPITAL STRUCTURE	25	.55	5.15	1.9135	1.14649
COMPANY VALUES	25	.00	16.54	3.0509	3.51411
*RETURN*SHARE	25	-83.79	131.71	6.7928	49.33007
Valid N (listwise)	25				

Source: processed with SPSS

The results of the statistical test in table 1 show that the financial distress variable has a minimum value of 0.21, while the maximum value is 6.32. The average value (mean) is 1.3810 and has a standard deviation of 1.16840. For the capital structure variable, it has a minimum value of 0.55, while the maximum value is 5.15. The average value (mean) is 1.9135 and has a standard deviation of 1.14649. The company value variable has a minimum value of 0, while the maximum value is 16.54. The average value (mean) is 3.0509 and has a standard deviation of 3.51411. And shows that stock returns have a minimum value of -83.79 while the maximum value is 131.71 The average value (mean) is 6.7289 and has a standard deviation of 49.33007.

Classical Assumption Test

Normality Test

This method will help us determine whether the dependent and independent variables in the regression model are normally distributed or not. The normality test method can be done using the statistical test method, namely the One Sample Kolmogorov-Smirnov test. The results of the Kolmogorov-Smirnov test are known to be Asymp. Sig. (2-tailed) of 0.172. This value is greater than its significance value of 0.05. From this it can be concluded that the data is normally distributed.

Heteroscedasticity Test

The heteroscedasticity test is a test in regression analysis that aims to determine whether there is inequality of variance (non-constant variance) of the residual (the difference between the actual value and the predicted value) in each observation (Wooldridge, 2012). The method used in the heteroscedasticity test in the study is the scatterplot method. The results of the heteroscedasticity test using the scatterplot graph can be seen as points spread on the graph, the points spread upwards from the number 0, to the left of the number 0, and to the right of the number 0. From these results, the researcher concluded that there was no heteroscedasticity in this regression model.

Multicollinearity Test

Multicollinearity test is a test to identify whether there is a strong or perfect correlation between independent variables. The method used for the multicollinearity test in this study is the

Variance Inflation Factor (VIF) or Tolerance test. Multicollinearity testing is carried out by looking at the Tolerance Value or by using the Variance Inflation Factor (VIF). Multicollinearity occurs when the VIF value ≥ 10 and the Tolerance Value ≤ 0.10 and vice versa multicollinearity does not occur if the VIF ≤ 10 and the Tolerance Value ≥ 0.10 (Ndruru, 2020).

X1 value (financial distress) VIF 1.007 <10, and tolerance value 0.993> 0.10. X2 value (capital structure) VIF 1.131 <10, and tolerance value 0.884> 0.10. X3 value (firm value) VIF 1.124 <10, and tolerance value 0.890> 0.10. From the table above, it can be seen that the VIF value for each variable is greater than 0.10 and the tolerance value for each variable is more than 10. The researcher concluded that the independent variables in this study did not experience multicollinearity.

Autocorrelation Test

This study aims to identify the existence of autocorrelation in the linear regression model, namely the correlation between residuals in consecutive time periods. The results of the Durbin-Watson test, obtained a statistical value of 2.801. By comparing this value with the critical value of the Durbin-Watson table for a sample of 25 and 3 independent variables at a significance level of 0.05. The DW table value dL = 1.0529 and dU = 1.6640, which in the results of the model summary table the DW value has a value of 2.801 which indicates that there is no autocorrelation problem.

Multiple Linear Regression

Multiple linear regression equations have been used to analyze the impact and significance of the influence of independent variables including financial distress, capital structure, and company value on stock returns in telecommunications companies listed on the IDX in the 2019-2023 period. The regression equation obtained can be explained as follows:

$$Y = -61{,}279 + -0{,}787\,X_1 + 22{,}222\,X_2 + 8{,}731\,X_3$$

Hypothesis Testing

F Test

The F test is used to explain whether all independent variables entered into the model together have an influence on the dependent variable, or in other words the model is fit or not. The regression results above can be seen that the calculated F value (5.534) > F table value 3.07, and the significant value is 0.006 < 0.05, so it can be concluded that the independent variables together have an influence on the dependent variable.

T-Test

The t-statistic test basically shows how far the influence of one explanatory variable individually in explaining the variation of the dependent variable. The results of the t-test are, the influence of Financial distress () on Stock Return with sig 0.910 > 0.05, meaning that Financial distress has no effect on Stock Return. For the Capital Structure variable () on Stock Return has a sig value of 0.007 < 0.05, which means that Capital Structure has an effect on

Stock Return. And the Company value variable () on Stock Return has a sig value of 0.002 < 0.05, which means that Company Value has an effect on Stock Return.$X_1 X_2 X_3$

Test R^2

The adjusted coefficient of determination test is a test that describes how the ability of the regression model to explain the independent variables affects the dependent variable. The Adjusted R-Squared value will show how much X will affect. The Adjusted value obtained is 0.362. This indicates that the stock returns on the IDX can be explained by the independent variables, namely financial distress, capital structure, and expected company value of 36.2%. And the remaining 63.8% is determined by other variables that are not in this study such as macroeconomic conditions, sectoral growth, company fair value, and stock price graphs.R^2

Discussion

The Effect of Financial Distress on Stock Returns.

The results indicate that the significant number (0.910) is above 0.05, indicating that there is no influence between financial distress as an independent variable on stock returns as a dependent variable. From these results, the researcher also concluded that financial distress has no effect on stock returns. The results of this study highlight the interaction between signal theory and agency theory in explaining the relationship between financial distress and stock returns. On the one hand, signal theory suggests that information about financial distress should be a negative signal that affects stock prices. On the other hand, agency theory suggests that managers' responses to these signals will be influenced by the incentive structure and corporate control mechanisms. The finding that there is no significant relationship between these two variables indicates that both market mechanisms and internal corporate mechanisms may have functioned quite well in responding to financial distress situations. This study is in line with research conducted by Mahroji & Nurhalimah (2024) which concluded that financial distress does not have a significant effect on stock returns

The Influence of Capital Structure on Stock Returns

The significance figure in this study is 0.007 which is below 0.05 indicating a significant influence between capital structure and stock returns. This finding indicates that changes in a company's capital structure can be a signal to investors in assessing the company's prospects and risks. Signaling theory states that companies can give signals to investors through their financial decisions, such as capital structure to reduce information asymmetry in the market. The capital structure chosen by the company, such as increasing debt or equity, can provide important information about the quality and prospects of the company in the future. When a company increases its proportion of debt, this can be interpreted as a positive signal that management is confident in the company's profitability and ability to meet its obligations. Islamiyanti & Sari, (2023) concluded that capital structure has a significant influence on stock returns.

The Influence of Company Value on Stock Returns

The results of the study indicate that the significant number (0.002) is below 0.05, indicating that there is an influence between company value and stock returns. This shows a significant

relationship between company value and stock returns. Signal theory assumes that the information contained in a company's financial statements, including company value, can function as a signal sent by management to investors. High company value is often interpreted as a positive signal by the market. This indicates that the company has good financial performance, bright growth prospects, and competent management. Companies with high company values tend to have high-quality assets, such as cutting-edge technology, strong brands, or large market share. These assets provide more stable and sustainable income potential. Investors tend to invest their funds in companies with high company values because they consider these companies to have lower risks and greater profit potential. Supported by research by Winata et al., (2021) and Anggreni & Efendi (2023), market assessments of stocks are useful in determining stock prices that are undervalued or overvalued so that investors can determine which stocks to buy.

Conclusion

The results of the analysis show that simultaneously, the three independent variables together have a significant effect on stock returns. However, when viewed partially, the results of the study show that financial distress does not have a significant effect on stock returns. This indicates that the difficult financial conditions of the telecommunications companies studied do not directly affect the company's stock performance. On the contrary, capital structure and firm value are proven to have a positive and significant effect on stock returns. This means that the better the capital structure and the higher the firm value, the higher the stock returns obtained. This finding is consistent with financial theory which states that investors tend to choose companies with a healthy capital structure and high firm value because they are considered to have better growth potential and lower risk.

Suggestion

This study has limitations in terms of variable measurement, research time span, and sector coverage. For further research, it is recommended to enrich the research variables, extend the observation period, and expand the sector coverage so that the research results are more comprehensive and accurate.

Award

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THE ROLE OF ENGLISH TRAVEL MATERIALS IN PROMOTING RESPONSIBLE TOURISM BEHAVIOR IN TRA QUE VEGETABLE VILLAGE

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Abstract: *Tourism is a crucial driver of Vietnam's economy, with sustainable tourism receiving increasing attention. Among Vietnam's ecotourism destinations, Tra Que Vegetable Village (TQVV) in Hoi An stands out for its cultural heritage and ecological significance. While sustainability initiatives are in place, challenges remain in effectively promoting responsible tourism behaviors. This study examines the role of English-language travel materials (ETMs), including guidebooks, brochures, and websites, in fostering sustainable tourism practices in TQVV. Adopting a mixed-methods approach, the research integrates document analysis, surveys with international tourists, and interviews with local stakeholders. Findings reveal that while ETMs help raise awareness of sustainability issues, they often lack persuasive messaging, interactive features, and engaging narratives. The study underscores the need for clearer sustainability-focused content, the integration of digital tools, and more visually compelling materials. Based on these insights, practical recommendations are proposed to enhance ETMs, including improved storytelling techniques, QR code integration, and culturally relevant sustainability messages. These findings provide valuable guidance for local tourism authorities and content creators in strengthening responsible tourism communication and supporting the sustainable development of TQVV.*

Keywords: *English, Travel Materials, Responsible Tourism Behaviours, TQVV*

Introduction

In recent decades, global tourism has experienced **significant expansion**, with a sharp rise in the number of travel companies and tourist destinations worldwide. This growth has generated **substantial economic benefits** for host countries and local communities, fostering global connectivity and offering people opportunities to explore diverse culture and landscapes. However, tourism also presents several challenges, including the displacement of residents, damage to historal and natural sites, and environmental degradation.

To balance economic growth, environmental protection, and cultural preservation, the concept of sustainable tourism has been introduced and well-applied globally. Sustainable tourism aims to minimize the negative impacts of tourism while maximizing benefits for local communities and ecosystems. At the core of this approach is the promotion of awareness and responsible tourism behaviors among stakeholders, including international tourists, local communities, businesses, and governing authorities. Communication materials, particularly English-

language travel materials (ETMs) such as guidebooks, brochures, and tourism websites, play a vital role in conveying these principles to both domestic and international visitors.

To address these concerns, **sustainable tourism** has emerged as a key strategy aimed at balancing economic development, environmental conservation, and cultural preservation. At the heart of this approach is the need to **foster awareness and encourage responsible tourism behaviors** among key stakeholders, including international visitors, local communities, businesses, and governing bodies. **Communication tools**, particularly ETMs such as guidebooks, brochures, and tourism websites, play a crucial role in conveying sustainability principles to diverse audiences. By providing essential information and shaping tourist behavior, ETMs can serve as **a bridge between cultural expectations and responsible tourism practices**.

Hoi An, home to the UNESCO-listed Hoi An ancient town, exemplifies a destination with **strong sustainable tourism potential**. Among its attractions, **Tra Que Vegetable Village (TQVV)** has emerged as a notable site promoting **eco-friendly tourism and organic farming practices**. In recent years, various sustainability initiatives have been implemented in TQVV, including **eco-tours, waste reduction programs, and community-based tourism projects**. Located just outside Hoi An's city center, the village serves as a model of sustainable agriculture, allowing visitors to engage in traditional farming activities such as planting, harvesting, and cooking with organic produce. However, despite these efforts, **challenges remain** - particularly in raising international awareness and fostering responsible tourist behaviors to mitigate environmental and cultural degradation.

Several factors influence the effectiveness of sustainable tourism in TQVV, including **communication strategies, local infrastructure, government policies, and stakeholder collaboration**. Among these, **the availability and quality of ETMs are particularly significant**, as they directly shape international tourists' understanding of sustainability and their engagement with responsible practices. Well-designed ETMs can not only **bridge cultural and linguistic gaps** but also **inspire environmentally and socially responsible behaviors** among visitors.

While previous studies have examined sustainable tourism in Hoi An, **there is limited research specifically addressing the role of ETMs in shaping visitor behavior in TQVV**. This study seeks to fill this gap by analyzing how ETMs influence tourists' perceptions and actions regarding sustainability. The findings will provide **practical recommendations** for enhancing ETMs to more effectively promote **responsible tourism behaviors in TQVV**, thereby contributing to broader discussions on sustainable tourism communication.

Literature Review

Sustainable Tourism

The UNWTO defines sustainable tourism as "tourism that takes full account of its current and future economic, social, and environmental impacts, addressing the needs of visitors, the industry, the environment, and host communities" (UNWTO, n.d.). While tourism contributes substantially to local economies and employment opportunities, it also exerts pressure on natural and cultural resources. Issues such as overuse of environmental resources, displacement

of wildlife, degradation of local heritage, and the tourism sector's contribution to greenhouse gas emissions highlight the urgency of adopting sustainable practices (Revfine, 2024).
As tourism is projected to continue growing, existing unsustainable tourism models risk causing irreparable harm to ecosystems, local cultures, and the earth's natural resources. Thus, there exists a need to integrate sustainable travel practices ensuring the long-term viability of the tourism industry (United Nations, n.d.).

Responsible Tourism

Responsible tourism is about creating better places for both residents and visitors. It is defined as "making better places for people to live in and better places for people to visit" (Responsible Tourism Partnership, 2025). This concept requires the involvement of various stakeholders, including tourism operators, hoteliers, governments, local communities, and tourists, to take responsibility and actively contribute to making tourism more sustainable (Responsible Tourism Partnership, 2025).

According to the Responsible Tourism Partnership (2025), the Cape Town Declaration defines Responsible Tourism as a multi-faceted approach to travel and tourism that prioritizes sustainability and ethical practices. It emphasizes minimizing adverse economic, environmental, and social consequences while maximizing benefits for local communities. Responsible Tourism seeks to enhance economic opportunities and well-being for local residents by fostering better working conditions and inclusive industry access. Additionally, it promotes active community participation in decision-making processes that influence their livelihoods.

Emerging in the 1980s, responsible tourism has been closely linked with sustainable tourism (Krippendorf, 1987). Recent research explores the ethical and moral dimensions of responsible tourism, emphasizing how different stakeholders, including tourists, industry managers, government officials, NGOs, and host communities, can influence sustainable development beyond their own interests.

According to Dimitrova (2018), although the terms sustainable tourism and responsible tourism are often used interchangeably, they have distinct meanings. Sustainable tourism primarily focuses on the long-term viability of the tourism industry, ensuring that current tourism activities do not compromise future generations' ability to meet their needs. Responsibility for sustainability is shared among political leaders, tourism enterprises, and other stakeholders. In contrast, responsible tourism emphasizes how individuals interact with destinations, with a particular focus on encouraging behavioral changes and ethical decision-making in tourism practices.

Sustainable tourism is more frequently referenced in ETMs, however, the contribution of various stakeholders including tourists to sustainability is best realized through the principles of responsible tourism. By adopting responsible tourism practices, individuals can actively support sustainability efforts, aligning their actions with broader environmental and social goals. When responsible tourism is effectively implemented, it manifests through responsible tourism behaviours, which are further discussed in the following section (Dimitrova, 2018).

Responsible Tourism Behavior

Responsible tourism behaviors refer to a set of ethical, culturally sensitive, and environmentally sustainable actions undertaken by tourists to minimize negative impacts and maximize positive contributions to the destinations they visit (Goodwin, 2011). The concept of responsible tourism has been widely explored in academic literature, with scholars and organizations emphasizing the need for travelers to be aware of their environmental footprint, economic influence, and cultural interactions while engaging with local communities (UNWTO, 2005). Early discussions on responsible tourism, such as those by Krippendorf (1987), characterized responsible travelers as those who consciously adopt behaviors that contribute to the well-being of host communities while respecting local traditions and protecting natural environments.

Building on these foundational perspectives, François-Lecompte and Prim-Allaz (2009) provide a more specific characterization of responsible tourists. They identify five key behaviors: willingness to sacrifice personal comfort for sustainability, preference for responsible tour operators, intention to safeguard local resources, acceptance of limiting travel distances to reduce environmental harm, and a strong desire to protect the cultural and natural heritage of visited areas. Based on these attributes, two distinct profiles of responsible tourists have emerged: "sustainable adventurers" and "neo-sustainables," both of whom prioritize ethical travel choices and seek to minimize their ecological footprint.

According to Fennell and Cooper (2020), sustainability in tourism is not solely the responsibility of industry stakeholders but also significantly depends on the behavior of individual travelers. The authors emphasize that tourists play a crucial role in minimizing negative impacts and maximizing positive contributions to destinations. By making conscious choices, travelers can support environmental conservation, respect local cultures, and contribute to the economic development of host communities. Therefore, responsible individual actions are a fundamental component in the realization of sustainable tourism principles.
In the context of TQVV, responsible tourism behaviors encompass specific actions aligned with sustainable tourism principles. These behaviors can be categorized into three key dimensions:

a) *Environmental Responsibility*

- Minimizing waste and pollution: Visitors are encouraged to reduce their plastic usage, dispose of waste responsibly, and avoid littering in farming areas.
- Conserving water and energy: Tourists should be mindful of water usage during farm visits, particularly in irrigation activities, and should minimize unnecessary consumption of electricity in homestays and local accommodations.
- Respecting biodiversity and ecosystems: Visitors should avoid trampling on crops, refrain from picking vegetables without permission, and adhere to eco-friendly agricultural practices promoted within the village.

b) Socio-Cultural Responsibility

- Respecting local traditions and customs: Tourists should familiarize themselves with local etiquette, dress modestly when interacting with villagers, and avoid intrusive behaviors such as taking photos of residents without consent.

- Engaging in meaningful cultural exchanges: Travelers are encouraged to participate in traditional farming activities, local cooking classes, and storytelling sessions to gain a deeper understanding of the cultural heritage of Tra Que vegetable village.
- Avoiding cultural commodification: Responsible tourism discourages the exploitation or misrepresentation of local traditions for commercial gain and instead fosters authentic interactions that respect the intrinsic value of cultural heritage (Smith & Robinson, 2006).

c) Economic Responsibility

- Supporting local businesses: Visitors should prioritize purchasing goods and services from community-run enterprises, such as organic vegetable farms, traditional handicraft shops, and family-operated homestays.
- Practicing fair trade and ethical consumerism: Tourists should pay fair prices for local products and services rather than engaging in aggressive bargaining that undermines local livelihoods.
- Encouraging skill development and capacity building: Responsible travelers can contribute to economic sustainability by participating in knowledge-sharing activities, such as language exchange programs or sustainable farming workshops.

Encouraging responsible tourism behaviors requires targeted strategies that promote awareness, facilitate behavioral change, and create incentives for responsible choices. Educational initiatives play a vital role in informing tourists about the environmental and cultural significance of their destinations. For example, tour guides can actively engage travelers in discussions about conservation issues and sustainable tourism practices, fostering a sense of responsibility among visitors (Jacobson & Robles, 1992). Additionally, behavioral nudges, such as well-designed informational messages in accommodations and tourism sites, can subtly encourage sustainable behaviors, such as reducing water usage or reusing towels in hotels (Dolnicar et al., 2020). Certification and accreditation programs, such as Green Globe and Biosphere Sustainable, also guide tourists toward selecting sustainable travel services, reinforcing responsible consumer choices (Condé Nast Traveler, 2024).

Research Methodology

The study employed a mixed-methods approach, integrating both qualitative and quantitative research methods. The qualitative approach was used to describe and analyse the linguistic and content features of ETMs related to TQVV. The quantitative approach, on the other hand, was used to examine the occurrence and frequency of the a fore mentioned aspects, as well as to gather survey data from tourists, local businesses, and tour guides.

Document analysis was conducted on a selection of ETMs, including two guidebooks, one information handbook, one brochure, three leaflets and one website related to TQVV. These materials were sourced from key tourist destinations, such as the Hoi An Office of Tourist Services, Hoi An Center for Culture, Sports, Radio and Television, Quang Nam Tourism Promotion Center, and the tourism company Hoi An Eco Travel.

To collect quantitative data for this study, both online (Google Forms) and paper-based surveys were utilized as primary instruments to be distributed to 50 tourists. The use of Google Forms offerred several advantages, including reduced administrative workload, streamlined data

collection, and increased efficiency and accuracy in processing responses (Hallur, 2016). The collected data was analyzed using IMB SPSS Statistic 29, which facilitated descriptive statistics analysis, including frequencies, means, and standard deviations to summarize tourist perceptions of TQVV's ETMs. Additionally, inferential statistics were applied to identify significant relationships between variables.

Semi-structured interviews were conducted with two represenatives from local businesses and two tour guides to gain deeper qualitative insights. The interview questions were adapted from Mihalic, T. (2016) in Sustainable-Responsible Tourism Discourse - Towards 'Responsustable' Tourism. The interviews were recorded, transcribed, and anylsed using thematic content analysis (Braun & Clarke, 2006). Responses were coded and categorized using Dedoose 9.0.46 to identify recurring themes. The findings from the thematic analysis were then compared with the quantitative results to provide a comprehensive understanding of the role of ETMs in promoting responsible tourism in TQVV. By triangulating data from document analysis, surveys, and interviews, this study aimed to ensure a robust and holistic examination of the research topic.

Research Findings

Survey data indicate that the majority of foreign visitors to TQVV are young adults, predominantly aged 26–35 (44%), followed by the 18–25 age group (24%). The tourists mainly come from Europe (38%), North America (28%), and Asia (18%).

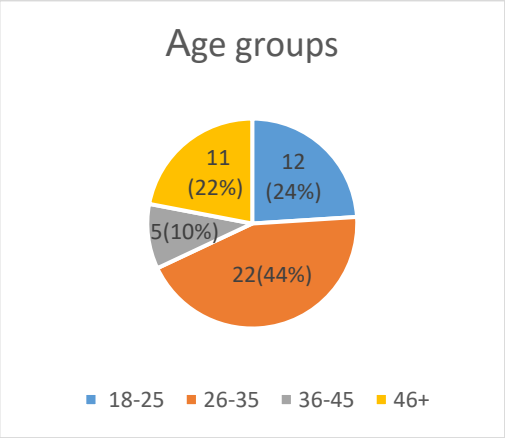


Figure 1. Age groups of TQVV's foreign tourists

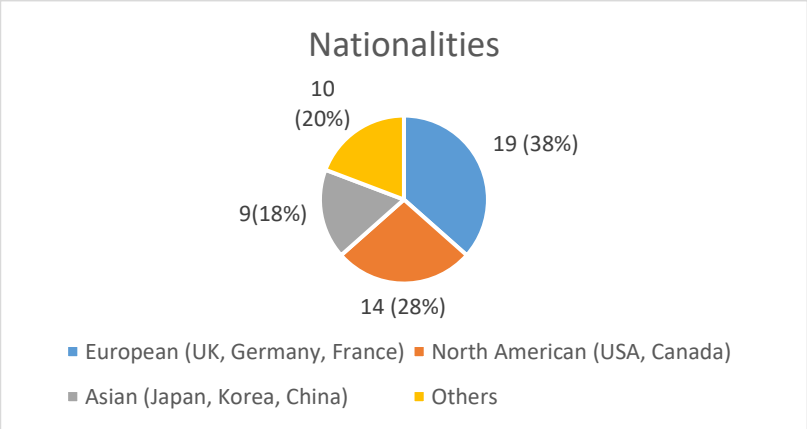


Figure 2. Nationalities of TQVV's foreign tourists

Regarding English proficiency, 50% of tourists possess an intermediate level, 34% are advanced, and 16% are at a basic level. These findings suggest that most visitors have sufficient English proficiency to engage with ETMs related to sustainable tourism as well as responsible tourism behaviours.

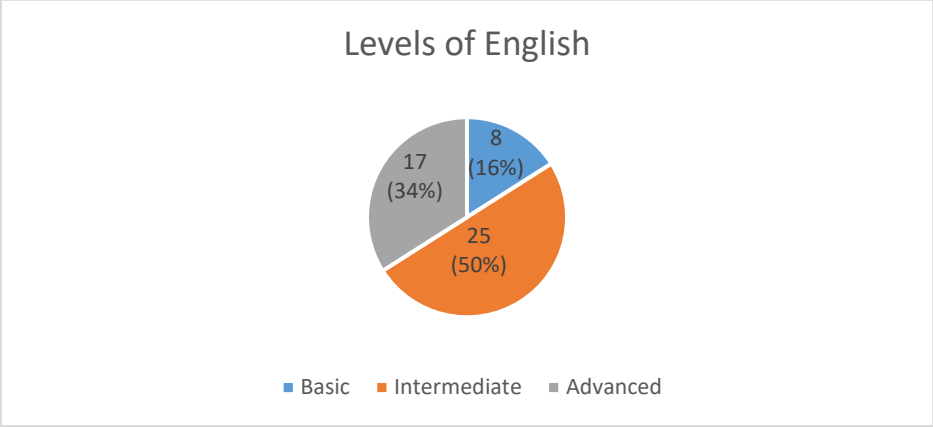


Figure 3. English levels of TQVV's foreign tourists

ETMs for TQVV primarily consist of printed resources such as brochures, guidebooks, information handbooks and leaflets distributed by tourism companies and at ticket points. Despite the increasing digitalization of travel information, no official digital resources, such as mobile applications or interactive websites, are available. While 90% of surveyed tourists access online sources (e.g., travel blogs and vlogs), this fragmented information flow may hinder comprehensive understanding of sustainable tourism practices and tourists' responsibility at TQVV.

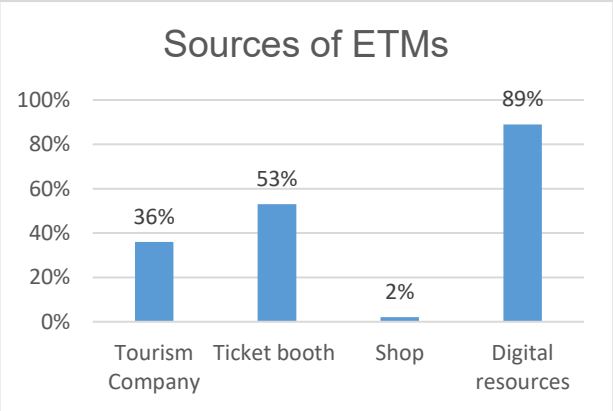


Figure 4. Sources of ETMs

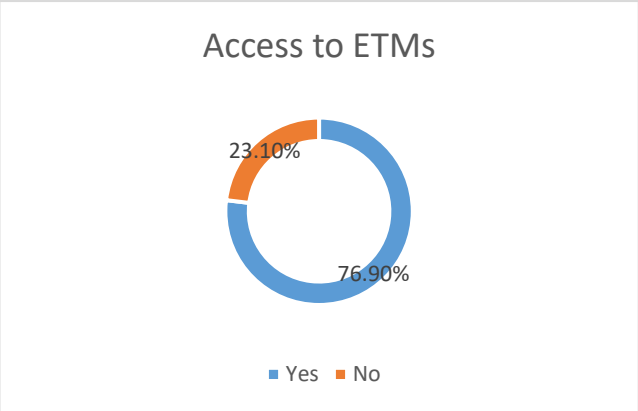


Figure 5. The number of foreign visitors accessing ETMs

The linguistic and content analysis of ETMs reveals a strategic use of action-oriented verbs (e.g., "experience," "immerse," "discover") to promote tourist engagement. The materials employ a descriptive tone when portraying TQVV's cultural and agricultural heritage, while an instructive tone is used for historical records and procedural guidance. However, the persuasive strength of ETMs remains moderate, suggesting that sustainability messages lack urgency and personal relevance. Additionally, the materials rarely use inclusive pronouns such as "we" and "our," which could foster a sense of collective responsibility among visitors.

Questionnaire and interview data highlight that tourists prioritize experience-based content over logistical or sustainability-related information. The most frequently consulted sections of ETMs include descriptions of activities and services ($M = 4.4$, $SD = 0.62$), scenic imagery ($M = 3.84$, $SD = 0.86$), and maps ($M = 3.38$, $SD = 0.71$). In contrast, sustainable tourism practices

(M = 2.1, SD = 1.01) and cultural insights (M = 2.6, SD = 1.02) receive less attention, reinforcing the well-documented attitude-behavior gap in sustainability engagement.

ETMs effectively promote interactive sustainability experiences, particularly eco-friendly farming (M = 4.66, SD = 0.53) and vegetable-oriented meals (M = 4.28, SD = 0.72). However, behaviors requiring restrictions are less emphasized and have lower tourist engagement, such as reducing plastic waste (M = 2.47, SD = 0.64) and avoiding gasoline vehicles (M = 2.19, SD = 0.92). A moderate correlation ($r = 0.401$, $p < 0.001$) exists between tourists' awareness of sustainability and their adoption of responsible tourism behaviors, suggesting that while ETMs influence behavior, external factors such as cultural background and personal values also play a role.

Regional differences in sustainability engagement are notable. European tourists show greater interest in sustainability topics, frequently inquiring about waste management and organic farming. In contrast, Asian tourists tend to prioritize wellness-related experiences, such as organic food consumption. These variations suggest that ETMs could be more effective by tailoring content to align with the distinct interest of diverse tourist demographics.

The combined insights from questionnaires, interviews, and linguistic analysis highlight key areas for improvement in English-language travel materials. Visual and digital innovations, such as high-quality images, QR codes, and social media integration, should be incorporated to enhance accessibility. The language used in ETMs should be clearer and more persuasive, simplifying complex sustainability jargon and using stronger directives to encourage behavioral change. In addition, inclusive and action-oriented messaging should be employed by increasing the use of "we" and "our" to promote shared responsibility and restructuring information to emphasize sustainability through problem-solution frameworks. Experiential learning should be prioritized, framing sustainability messages within engaging activities such as farming workshops and cooking classes, which align with tourist preferences. To cater to different audiences, content should be tailored to highlight environmental conservation for European tourists and wellness benefits for Asian visitors, ensuring greater relevance and engagement. By implementing these recommendations, ETMs can enhance their role in promoting responsible tourism practices in TQVV.

Discussion of Findings

The findings provide valuable insights into the role of ETMs in promoting responsible tourism behaviors in TQVV. It also highlights both the strengths and limitations of these materials in fostering sustainable tourism bahaviours among international visitors. The study demonstrates that ETMs serve as an essential medium for communicating sustainability principles to tourists. The linguistic and content features of these materials significantly shape tourist perceptions and engagement with responsible tourism behaviors. Specifically, the use of clear and concise language, a persuasive and instructive tone, and culturally sensitive messaging contributes to raising awareness of sustainability issues. Furthermore, ETMs frequently incorporate action-oriented phrasing and inclusive pronouns to encourage direct participation in eco-friendly practices.

Findings indicate that ETMs emphasizing experiential and culturally immersive activities successfully attract tourist engagement. As a result, tourists exposed to these ETMs show a

higher likelihood of adopting responsible tourism behaviors related to community engagement and sustainable consumption. Despite their strengths, ETMs in TQVV exhibit notable limitations in effectively promoting certain responsible tourism behaviors. While messages related to experiential tourism and cultural sustainability receive significant attention, other critical aspects are less emphasized. This finding aligns with previous research indicating that tourists often engage more with sustainability messages that are directly linked to their personal experiences and immediate benefits (Miller et al., 2010; Juvan & Dolnicar, 2014).

A further challenge is the moderate persuasive power of ETMs. Survey results indicate that while tourists acknowledge the presence of sustainability messages, they do not always perceive them as compelling or urgent enough to drive immediate action. This supports the elaboration likelihood theory (Petty & Cacioppo, 1986), which suggests that individuals are more likely to adopt behavioral changes when persuasive messages are personally relevant and strongly emphasized. The lack of explicit calls to action in ETMs may contribute to the observed gap between awareness and behaviour adoption. The study identifies notable variations in sustainable tourism engagement based on tourists' cultural backgrounds. This finding is consistent with previous research on cultural differences in sustainability perceptions and travel motivations (Kim et al., 2019).

	N	M	SD
Persuasive level	50	3.02	0.73

Table 1. Persuasive level of ETMs

To maximize the impact of ETMs in fostering responsible tourism behaviors, the study suggests several improvements. ETMs should incorporate clearer and more action-driven language, emphasizing specific behaviors tourists can adopt to support sustainability efforts. Digital innovations should be integrated to enhance accessibility and engagement. Moreover, ETMs should be tailored to different tourist segments, ensuring that sustainability messages align with diverse cultural values and travel motivations. Greater collaboration among tourism stakeholders is necessary to develop standardized sustainability guidelines for these materials. This coordinated approach can ensure consistency in sustainability messaging and improve the overall effectiveness of ETMs in promoting responsible tourism behaviors in TQVV.

Overall, this study highlights the essential role of ETMs in shaping sustainable tourism experiences in TQVV. While these materials effectively communicate key sustainability messages, their influence on actual behavior adoption remains limited due to gaps in messaging emphasis and persuasive strength. By enhancing linguistic clarity, incorporating digital tools, and refining content strategies, ETMs can become a more powerful mechanism for driving responsible tourism behaviors and supporting the long-term sustainability of TQVV.

Recommendations and Conclusions

This study provides several key recommendations for stakeholders in TQVV to enhance the role of ETMs in promoting responsible tourism behaviors.

For tourism authorities, the findings highlight the need for standardized guidelines in the design and implementation of ETMs to ensure consistency in sustainability messaging. These materials should be carefully structured to balance informational, persuasive, and instructional

content while maintaining accessibility for a diverse audience. Additionally, government agencies should adopt a more proactive role in monitoring and refining the sustainability narratives within ETMs used in TQVV, ensuring alignment with broader sustainable tourism policies.

For content creators and marketers, the research underscores the importance of using engaging, action-driven, and visually appealing materials to capture tourists' interest. Tourism brochures, guidebooks, and websites should incorporate high-quality visuals, storytelling techniques, and clear calls to action that encourage tourists to adopt responsible tourism behaviors. The integration of digital tools, such as QR codes linking to sustainability resources, can also enhance accessibility.

For local businesses and tour operators, the study suggests that stronger collaboration is needed in aligning marketing materials with sustainability principles. Local tourism businesses can work with content developers to ensure that ETMs accurately reflect sustainable tourism practices, highlight eco-friendly accommodations and activities, and promote local products and services that support the community's economic sustainability.

Despite its valuable contributions, this study has certain limitations that should be acknowledged. Firstly, the research primarily examined ETMs from a linguistic perspective, focusing on how language use, tone, and content features contribute to promoting responsible tourism behaviours. However, it did not offer insights into marketing strategies, visual design, or user experience, which are also crucial in shaping tourists' perceptions and behaviours. Factors such as color psychology, typography, and digital interactivity in ETMs may significantly influence their effectiveness in fostering responsible behaviours, yet these aspects remain unexplored in this study.

Secondly, the sample size was relatively small, with data collected from a limited number of international tourists within a specific timeframe. While the findings provide valuable insights, a larger and more diverse sample including tourists from various cultural backgrounds, travel preferences, and levels of prior sustainability awareness would yield a more comprehensive understanding of how ETMs influence responsible tourism behaviors. The study also did not extensively examine longitudinal behavioral changes, meaning it remains unclear whether tourists who read ETMs maintain responsible tourism behaviours beyond their visit to TQVV. Given these limitations, future research should adopt a multidisciplinary approach, integrating insights from marketing, tourism psychology, and design studies to better understand how

ETMs can effectively shape sustainable tourist behaviours. Additionally, expanding the sample size and duration of data collection by including pre- and post-visit assessments or analyzing tourists' digital engagement with ETMs could provide deeper insights into the long-term impact of these materials. By addressing these gaps, future studies can contribute to the development of more persuasive, visually appealing, and behaviorally impactful ETMs, ensuring their role in promoting responsible tourism behaviours is fully optimized.

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EFFECTIVE PRACTICE STRATEGIES FOR OVERCOMING BURNOUT AMONG MUSIC STUDENTS

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Abstract: *This research explores the factors contributing to burnout among music students and investigates effective practice strategies to mitigate its impact. Focusing on undergraduate students at the Conservatory of Music, Universiti Teknologi MARA (UiTM), Shah Alam, the study adopts a qualitative approach to examine the challenges and coping mechanisms employed by students. Semi-structured interviews were conducted with ten participants to gain in-depth insights into the causes of burnout, including time management struggles, performance pressure, and ineffective practice routines. The findings reveal that burnout manifests through emotional exhaustion, physical fatigue, and decreased motivation, significantly affecting students' academic and artistic performance. Moreover, through content analysis, the research highlights several strategies to prevent and manage burnout, such as adopting structured practice routines, integrating mindfulness techniques, and balancing schedules to include breaks and leisure activities. The role of support systems, including mentorship and institutional resources, is also emphasized in fostering a healthier and more sustainable learning environment. This study contributes to the growing body of research on burnout in music education by providing actionable recommendations for students, educators, and institutions. It underscores the importance of promoting mental well-being, effective practice strategies, and supportive environments to ensure the long-term success and resilience of music students.*

Keywords: *burnout, music education, mental health*

Introduction

Music education provides students with an avenue for creative expression, skill development, and personal fulfilment. However, alongside its rewards, it presents significant challenges that can lead to burnout. Burnout, as defined by Cardinell (1981), is a state of persistent physical and emotional exhaustion that affects mental and physical well-being. In music students, it often manifests through frustration, helplessness, and depression, as well as physical symptoms such as back pain, headaches, insomnia, and other discomforts. These symptoms not only hinder a student's ability to progress musically but also diminish their overall quality of life. Burnout in music education is driven by various factors, including the pressure to achieve perfection. Music students frequently juggle overwhelming workloads, academic responsibilities, and performance deadlines. These challenges are compounded by the need to excel in unrelated academic courses and the stress of meeting high expectations in their musical pursuits. As Ericsson (1996) highlighted, sudden increases in practice hours, often required to meet performance goals, can result in overuse injuries and exacerbate burnout. This pressure to improve rapidly often leads to ineffective practice methods that discourage students and impair their progress.

The culture of perfectionism, performance anxiety, and career concerns further contributes to the stressors faced by music students. According to Bernhard (2005) and Raeburn et al. (2004), music majors experience unique challenges, including an unrelenting pursuit of perfection and the pressure to excel in competitive environments. This constant drive to meet high standards often leads to a cycle of stress, demotivation, and a loss of passion for music. Such stressors are not limited to short-term effects; untreated burnout can have long-lasting implications, including midlife crises and other psychological challenges (Cardinell, 1981). Recognizing the detrimental effects of burnout is essential in fostering a supportive and sustainable learning environment for music students. Effective practice strategies have been identified as a critical tool to alleviate stress, enhance productivity, and maintain a positive relationship with music. By implementing creative and structured approaches, students can address their challenges while nurturing their passion for music. As educators and institutions seek to bridge the gap between the demands of music education and students' well-being, it becomes clear that understanding and addressing burnout are vital to promoting a healthy and enriching learning experience.

This study aims to explore the practices, perspectives, and experiences of music students to identify strategies that can mitigate burnout. By examining the learning environment and its impact on students' mental and physical health, this research seeks to provide actionable insights for educators, students, and institutions. Ultimately, the goal is to foster a nurturing and lasting educational environment that supports students' artistic development and overall well-being.

Problem Statement

Music students face a range of specific challenges that significantly affect their academic and personal well-being. One of the primary issues is time management. Trying to balance the demands of general education courses, specialized music classes, and personal responsibilities is a constant struggle for many students. According to Conway et al. (2010), music students often find themselves overwhelmed as they attempt to set aside sufficient time for practice, academic assignments, and other aspects of their lives. This imbalance leads to feelings of stress, frustration, and exhaustion, contributing to burnout.

Another major challenge is performance pressure. Students feel pressured to perform to extraordinarily high standards because of the competitive nature of the music industry. Anxiety surrounding performances and fear of failure can make the learning experience highly stressful. Dews and William (1989) explain that the pressure to succeed in a competitive industry can lead to mental health issues such as heightened anxiety and self-doubt.

A third issue lies in the use of ineffective practice methods. Many students apply low-level strategies during practice sessions, such as playing through entire pieces without addressing specific errors or difficult passages. As Hallam (1997) observes, this approach often leaves mistakes uncorrected and limits students' progress. Inefficient practice not only reducing musical development but also contributes to a sense of stagnation and frustration, which worsens burnout.

These challenges collectively impact the mental and physical well-being of music students, potentially leading to burnout. Burnout can have far-reaching consequences, affecting

academic performance, emotional stability, and long-term career prospects in the music field. Additionally, institutions often lack tailored resources and support systems to address the specific needs of music students. Students are left to handle things on their own without the help of efficient interventions, endangering both their general well-being and creative development. This study seeks to address these challenges by exploring the factors contributing to burnout and identifying effective strategies to prevent and manage it, ultimately fostering a healthier and more sustainable learning environment for music students.

Therefore, there are two main research questions that from these problems:

1. What are the factors that contribute to burnout among music students?
2. What strategies are effective in preventing burnout among music students?

With that, the two objectives of this research are as follows:

1. To identify the factors that contribute to burnout among music students.
2. To investigate strategies that are effective in preventing burnout.

Literature Review

This section reviews the literature related to burnout and practice strategies in music education, focusing on factors that contribute to burnout, time management challenges, and effective strategies for mitigating these issues.

Navigating Burnout in Music Education

Burnout is a common phenomenon among music students due to the rigorous demands and high expectations placed on them. Several factors contribute to burnout, including long hours of practice, performance anxiety, competition, and lack of support and resources (Jääskeläinen et al, 2022). Existing literature on the concept of burnout has primarily focused on burnout in the corporate and business world and its negative consequences on corporate life. However, recent studies have started to explore burnout specifically in the context of music education and its impact on music students. These studies have found that burnout among music students can manifest in various ways, including physical and mental exhaustion, reduced motivation and enjoyment, decreased academic performance, and increased risk of dropout (Jääskeläinen, 2022).

One study conducted by Zetterberg et al. examined the relationship between workload and burnout among music students (Jääskeläinen et al, 2022). They found that students who reported having a heavier workload were more likely to experience burnout symptoms, such as fatigue, stress, and decreased motivation. Another study conducted by Hilt et al. explored the role of perfectionism in music student burnout. They found that students who displayed high levels of perfectionism were mosre susceptible to burnout, as the constant striving for flawless performances and self-imposed pressure contributed to heightened stress and decreased enjoyment in their musical pursuits. To address and prevent burnout among music students, effective practice strategies have been identified in the literature. One practice strategy is the implementation of mindfulness techniques, such as meditation and deep breathing exercises, to help students alleviate stress and cultivate a more positive mindset (Girgin, 2020). Another strategy is the promotion of healthy work-life balance, where students are encouraged to take breaks, engage in non-musical activities, and prioritize self-care (Varona, 2018). Additionally,

providing students with mentoship and support systems can also help alleviate burnout by creating a sense of community and ensuring that students have someone to turn to for guidance and emotional support (Jääskeläinen et al, 2022).

Music teachers play a crucial role in motivating and encouraging music students to engage in their musical education (Girgin, 2020). They have the opportunity to create a supportive and nurturing learning environment that fosters a healthy relationship with music and helps prevent burnout (Jääskeläinen et al, 2022).

Time Management Challenges in Music Education

The issue of time challenges in music education and the strategies to overcome burnout have been a focus of research in recent years. Several studies have investigated the experiences of undergraduate music students and in-service teachers, highlighting the prevalence of stress, anxiety, and burnout in the music education profession and its relationship to burnout in the music education profession (Kuebel, 2022). One study conducted by Jacobs and Dodd (2003) explored the subjective experience of overload and its relationship to burnout in music students. Their findings revealed that a high workload, lack of time management skills, and the pressure to excel academically contributed to increased levels of burnout among music students.

Another study by Wennström (2020) examined the perceived workload of students in relation to their actual allocated study time (Jääskeläinen et al, 2022). The result showed that many music students experienced a discrepancy between their perceived workload and the time they allocated for their studies, leading to feelings of stress and burnout (Jääskeläinen, 2022). Another study conducted by Blix et al. (2018) investigated the time challenges faced by music teachers (Jääskeläinen et al, 2022). Their findings indicated that music teachers often struggle to find a balance between fulfilling their teaching responsibilities and engaging in personal creative pursuits, leading to feelings of overwhelm and exhaustion. In addition to these studies, research has also identified various strategies and practices that can effectively address time challenges and mitigate burnout in music education. For example, Lee and Stambaugh (2020) suggested that implementing effective time management techniques, such as prioritizing tasks, setting realistic goals, and maintaining a structured schedule, can help music students and teachers better manage their time and reduce the risk of burnout (Jääskeläinen et al., 2022).

The body of literature surrounding time management challenges in music education underscores the pervasive nature of stress, anxiety, and burnout within the field. The studies by Kuebel (2019) and Jacobs and Dodd (2003) shed light on the overwhelming workload, deficient time management skills, and academic pressures faced by music students, all of which contribute significantly to elevated levels of burnout. Wennström's (2020) exploration of the perceived workload versus actual study time allocation further reveals the dissonance experienced by music students, leading to stress and burnout. Additionally, Blix et al.'s (2018) investigation into the time challenges faced by music teachers highlights the delicate balance between professional responsibilities and personal pursuits. In response to these challenges, scholars such as Lee and Stambaugh (2020) propose practical strategies, emphasizing the importance of effective time management techniques, prioritization, realistic goal-setting, and maintaining structured schedules to mitigate the risk of burnout. As we delve into the intricacies of time-related issues in music education, it becomes evident that proactive and intentional measures can be implemented to foster a more sustainable and enriching learning environment

for both students and educators alike. This comprehensive understanding of time management challenges and the proposed strategies lays the groundwork for future research and interventions aimed at cultivating resilience and well-being within the realm of music education.

Existing Practice Strategies for Preventing Burnout

Burnout among music students is a significant issue, resulting from the high demands of practice, performance, and academic obligations. To address these challenges, various strategies have been identified in educational and psychological efficiency, and promote mental well-being while minimizing stress. Barry (2023) mentioned that practice is an important element in music studying as it contributes to the development of basic music skills and music expertise. However, students often face difficulties in maintaining the required practice hours to enhance their performance abilities, particularly due to the demanding and directive nature of modern school instruction (Creech and Gaunt, 2013).

A study by Luqian Zhao (2021) explores the challenges and strategies related to motivating music students to practice effectively. Behavioral, cognitive, and humanistic theories have been examined and applied to understand motivation across various fields (Madariaga, 1988). There were two primary theories are highlighted which are SelfDetermination Theory (SDT) and Interest Theory. Self-Determination Theory (SDT) explains motivation with consideration to the social circumstances and further elaborates the intrinsic or extrinsic motivation model. Extrinsic motivation is the pursuit of an activity for any reason other than the activity itself, whereas intrinsic motivation is the pursuit of an activity for its own sake and because it is enjoyable, claim Evans and Bonneville-Roussy (2016). SDT developed the intrinsic or extrinsic motivation model with four regulatory types, ranging from relatively external to the self to relatively internal with the sel, rather than merely classifying motivation as intrinsic or extrinsic (Ryan and Deci, 2000). While some regulations involve the conscious valuation of an activity or an object that are not intrinsically motivating but are nonetheless regarded as personally significant, external regulations are typified by external rewards and punishments (Renwick and McPherson, 2002).

However, Interest Theory examines the relationship between individual and situational interests in motivating students. It posits that students with a long-term commitment to music are more likely to practice effectively. While situational interest can be sparked by environmental factors. Both types of interest can coexist and significantly influence students' engagement and learning outcomes. Individual interest, according to Renwick and McPherson (2002), is a more consistent and long-lasting orientation towards an activity, like learning an instrument. Children who make a long-term commitment to learning have been shown to practise more and produce better learning outcomes (McPherson, 2001). The literature also indicates that students' beliefs about their abilities, the perceived value of tasks, and the level of challenges they encounter are closely linked to their motivation to practice. Research has shown that providing students with choices in learning materials can enhance intrinsic motivation and lead to improved learning results. Offering students a choice of musical instruments and repertoires and letting them select their favourites can, on the other hand, let them pursue their interests and, on the other, lessen the negative effects of a lack of excitement for practice while elevating proficiency. Encouraging positive attitudes towards music study

and practice can internally motivate students. Hidi's (2000) research has demonstrated the effectiveness of this approach in motivating students to practice.

This research supports previous findings that both external and internal motivations play a significant role in music practice, and that effective practice strategies are crucial for influencing students' learning outcomes. It is therefore essential for educators to identify suitable methods of to motivate their students to engage in practice. Strategies to enhance external motivation include assessment, performance opportunities, and other tasks that students find valuable. However, individual differences must be taken into account, as a single strategy may not be effective for all students. For example, in this study, performance opportunities had different impacts on participants. Unlike other fields, music education involves content that is more procedural and deeply tied to individual preferences, emotional expression, and personal experiences, making it a more complex area to study (Sanz and Orbea, 2014).

Methodology

The research process involves two methods: semi-structured interviews and literature analysis. These methods are designed to provide a comprehensive understanding of the factors contributing to burnout among music students and effective strategies for managing it.

The first data collection method will be semi-structured interviews, which allows for both structured guidance and the flexibility to explore participants' experiences in depth. An interview guide will be developed to include open-ended questions that address key themes such as the causes of burnout, time management challenges, and the strategies music students use to cope. These questions will encourage participants to share their thoughts and experiences freely, offering rich qualitative data. The interviews will take place in a comfortable and private setting to ensure participants feel at ease, fostering open and honest communication. The timing and location will be coordinated with participants to accommodate their schedules and minimize disruptions. With participants' consent, all interviews will be audio-recorded to ensure accuracy and completeness. Prior to each session, participants will be informed about the purpose of the recordings and the measures in place to maintain confidentiality. These recordings will then be transcribed verbatim, allowing for detailed analysis of participants' responses. The transcriptions will serve as the primary data source for thematic analysis, which will identify patterns and recurring themes relevant to the research objectives.

In addition, this research will incorporate a literature analysis to provide a theoretical foundation and contextualize the findings. Relevant studies and publications on burnout, practice strategies, time management, and music education will be analysed to identify existing themes, trends, and gaps. This analysis will explore prior research to understand the broader context of burnout in music education and evaluate strategies that have been proposed or implemented. By synthesizing this information, the literature analysis will offer valuable insights that align with the data collected from participants. It will also ensure that the findings from this study contribute to and build upon the existing body of knowledge in the field of music education. By combining semi-structured interviews with literature analysis, this research ensures a holistic approach to understanding the challenges faced by music students and the strategies that can support their well-being and success.

Analysis of Data

The analysis of the collected data will involve a systematic process to ensure accurate and meaningful insights are derived from the semi-structured interviews and literature analysis. The data collected through interviews with UiTM music students will first be transcribed verbatim to capture the full depth of participants' responses. The transcripts will then be carefully reviewed and organized into themes that align with the research questions. Themes such as time management challenges, performance pressure, ineffective practice strategies, and effective interventions will be identified based on the recurring patterns and ideas shared by participants.

Each participant will be assigned a unique code, such as 'E1', 'E2', & 'E3', 'C1', 'C2', & 'C3' until 'P1', 'P2', & 'P3' to maintain confidentiality during the analysis. The thematic analysis will involve coding the transcribed data and categorizing it into relevant themes, enabling a deeper understanding of the experiences and perspectives of music students. The findings from this analysis will be used to draw connections between the challenges faced by students and the strategies they use to overcome burnout. Ten students from Bachelor of Music programs, which is Bachelor of Music Education (Hons), Bachelor of Music Composition (Hons) and Bachelor of Music Performance (Hons) will be labelled into:

Table 1: Participant's Code

Bachelor of Music Program	Participant's Code	Gender
Bachelor of Music Education (Hons)	E1	Male
	E2	Female
	E3	Male
	E4	Male
Bachelor of Music Composition (Hons)	C1	Male
	C2	Male
	C3	Male
Bachelor of Music Performance (Hons)	P1	Male
	P2	Female
	P3	Male

During the interview, the ten participants will be asked questions. The interviewee will have the opportunity to elaborate on all of the questions and provide an explanation of themselves. The interview also will be audio recorded and transcribed. To ensure that they accurately represent the participants' viewpoints, the interview notes will be examined. In order to categorise and structure the data, it will be divided into multiple sections, which will subsequently be labelled and arranged according to relevant topics. To make data analysis easier to understand, a number of word codes will be combined.

For the literature analysis, relevant studies and publications on burnout, practice strategies, time management, and music education will be critically reviewed. The analysis will focus on identifying key themes, trends, and gaps in the existing research. By synthesizing this information, the literature analysis will provide a theoretical framework to contextualize the findings from the interviews.

This dual approach ensures that the data analysis is both grounded in participants' lived experiences and supported by existing research. The integration of interview data with insights from the literature will strengthen the validity of the findings and contribute to a comprehensive understanding of burnout and its management in music education.

Data Collection and Discussion

The data collected for this study produced five major themes: factors contributing to burnout, emotional and physical impact, practice strategies for managing burnout, the role of support systems, and improvements in practice environment. The participants' perspectives, experiences, and coping mechanisms regarding burnout are reflected in these themes. The focus of this study is to explore the challenges faced by music students, identify the factors contributing to burnout, and evaluate the effectiveness of practice strategies in mitigating its impact. The themes identified are directly aligned with the research questions, ensuring that the findings address the study's objectives.

Factors Contributing to Burnout

The analysis identified several key factors contributing to burnout among music students, with 'workload' emerging as the most frequently mentioned keyword among participants. Numerous students expressed challenges in balancing unrelated academic courses, with their practice schedules. The keyword 'pressure' was also frequently highlighted, especially in the context of performance expectations for recitals and assessments, where participants described experiencing feeling more stressed and anxious.

'Time management' was another often-mentioned keyword, as participants often talked about how difficult it was to allocate sufficient practice time while managing academic responsibilities. These keywords' frequent use highlights how complex burnout is in music education and it became abudantly obvious from analysing the experiences of the participants that academic workloads, performance pressures, and poor time management were the main causes of burnout among music students.

> *"The main cause of my burnout is the heavy workload from assignments that are not related to my major subject. I feel like I have wasted valuable time on those unrelated tasks instead of focusing on my major instrument." (P2)*

> *"Unnecessary subjects unrelated to our major add burden to us as students. Plus, the workload given by the lecturers from these unrelated courses is too demanding for us." (C2)*

These findings are consistent with previous research. According to Bernhard (2005), the demanding nature of music education, coupled with perfectionism and performance anxiety, creates an environment ripe for burnout. Similarly, Ericsson (1996) emphasized that abrupt increases in practice hours without proper planning often led to overuse injuries and stress. The pressure to excel academically and musically is a recurring theme in the literature, as highlighted by Jääskeläinen et al. (2022), who noted that students frequently struggle with prioritizing their time effectively.

To address this issue, institutions should think about changing their educational curriculum to lessen the focus on irrelevant or unrelated academic courses and give students more time to practise their principal instruments.

Emotional and Physical Impact

The analysis revealed that the keywords 'frustration,' 'demotivation,' and 'helplessness' were frequently mentioned by participants when describing the emotional toll of burnout. Due to these enduring negative emotions, many participants expressed a sense of losing passion for music and questioning their future career paths due to these persistent negative feelings.

'Fatigue' was a prominent keyword on the physical side, as students often reported feeling exhausted from prolonged practice sessions. The physical strain connected to intensive practice schedules and performance preparation was also highlighted by terms like 'back pain' and 'stress-related injuries', which were frequently mentioned.

The literature corroborates these findings. Cardinell (1981) defined burnout as persistent physical and emotional exhaustion, often accompanied by symptoms like irritability, depression, and physical discomfort. Maslach (1976) further emphasized that prolonged burnout can lead to chronic health issues, such as insomnia and musculoskeletal problems, which were evident in the participants' responses.

Counselling services and workshops on mental health should be established by universities especially for music students. These resources can offer expert guidance and methods for dealing with stress and burnout.

Practice Strategies for Managing Burnout

In order to manage burnout, participants used a variety of coping mechanisms, with a particular emphasis on developing disciplined practice schedules. Many stressed how crucial it is to take regular breaks in order to improve and maintain productivity. Instead of focusing on long sessions, some participants changed their practice schedules to emphasise more manageable, smaller goals. Deep breathing exercises and other mindfull practices were also found to be useful in assisting participants in regaining their concentration and clarity during practice. In order to reduce stress and maintained a balanced lifestyle, some participants also took part in non-musical activities.

Varona (2018) advocated for balanced schedules that include breaks and leisure activities to help students recharge and sustain focus. Similarly, Renwick and McPherson (2002) emphasized that mindful and goal-oriented practice significantly improves students' productivity and reduces stress. Teachers should encourage students to develop structured practice routines, incorporate regular breaks, and explore mindfulness techniques to reduce stress and improve productivity.

The Role of Support Systems

Support systems such as lecturers, friends, and family was essential in assisting participants in coping with burnout. Many students appreciated the encouragement and emotional support

they got from classmates who had gone through similar struggles. In addition, family members were crucial in offering moral support. The lecturers were acknowledged for offering helpful feedback and fostering an open communication environment. However, some participants noted the need for institutional resources, such as counseling services, to better support students facing burnout.

These findings resonate with the literature. Raeburn et al. (2004) emphasized the importance of nurturing relationships in reducing stress among music students. Additionally, Bernhard (2005) highlighted that supportive feedback from lecturers fosters a positive learning environment, helping students feel more confident and motivated. Institutions should encourage collaborative projects, ensembles sessions, and group practises to create a supportive atmosphere, lessen feelings of loneliness, and create peer networks.

Improvements in Practice Environment

In order to reduce burnout, participants recommended changes to the program's structure. It was generally advised to reduce academic workloads that had nothing to do with music and to concentrate more on music-related subjects. Additionally, emphasis was placed on personalised teaching strategies because they enable more individualised feedback that meets the needs of each individual student. In order to encourage creativity and enjoyment in learning, participants also recommended making the environment more collaborative and less stressful.

> *"The academic workload should focus more on our major, with fewer unrelated subjects. This would allow us to dedicate more time to practice." (C3)*

> *"If lecturers could create a more flexible curriculum and adapt their teaching to individual student needs, it would help us stay motivated and reduce stress." (P3)*

Jääskeläinen et al. (2022) highlighted the value of tailored teaching methods that address individual student needs, while Sanz and Orbea (2014) emphasized the importance of reducing external pressures to encourage creativity and enjoyment in learning. To accommodate the unique needs and abilities of every student, lecturers should use individualised teaching strategies. Future studies should examine the impact of burnout on the long-term careers of music students as well as efficacy of institutional interventions in mitigating burnout.

The results draw attention to the difficulties faced by music students, such as the strain of coursework, performance expectations, and the psychological and physical effects of burnout. Effective methods for handling these difficulties were found to include mindfulness exercises, organised practice schedules, and supportive networks. The suggestions made by participants to enhance the practice setting offer insightful information about how to design a supportive and well-rounded teaching strategy for music programs.

Conclusion

The purpose of this study was to investigate the factors of burnout among music students and explore strategies to lessen its effects. The findings successfully addressed the research objectives and answered the research questions. Participants offered insightful information about the causes of burnout, such as heavy workloads, pressure to perform, and ineffective time

management. The demands of irrelevant academic courses made these difficulties even worse, highlighting the need for educational reforms.

The study's objective of identifying effective strategies for managing burnout was also accomplished. Participants showed that structured practice routines, mindfulness techniques, and peer collaborations were beneficial in reducing stress. The importance of peer networks, family support, and lecturer guidance was highlighted in the results of the successful exploration of the role of support systems. However, the lack of institutional support services emerged as a significant limitation, indicating an area for improvement.

The question of how music students experience burnout and how to deal with it has been effectively addressed by the research. By providing practical recommendations for educators and institutions, this study contributes to the growing body of knowledge on burnout in music education. It emphasises the necessity of a well-rounded curriculum and extensive support networks that put students' welfare first. Future studies could examine burnout's long-term effects in greater details and assess how well institutional interventions work.

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REVOLUTIONISING ESL LEARNING: THE IMPACT OF CANVA ON L2 STUDENTS' MOTIVATION AND ENGAGEMENT

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Abstract: *This study investigates the integration of Canva, a graphic design platform, into Content-Based Language Teaching (CBLT) to enhance motivation and engagement among L2 students in ESL classrooms. Using a mixed-methods approach, the research involved questionnaire-based surveys with 30 secondary school students and open-ended interviews with six pre-service teachers in Selangor. The findings suggest that Canva-based lessons improve students' interest, engagement, and comprehension by incorporating visually appealing and interactive elements. Additionally, tasks such as infographic design and multimedia presentations enhance critical thinking and problem-solving skills. However, challenges such as limited internet access, restricted premium features, and difficulties in teacher adaptation were identified. Despite these limitations, the study highlights Canva's potential as a transformative tool for creating dynamic, inclusive, and engaging learning environments. To maximize its effectiveness, the research recommends providing training for educators, improving digital infrastructure, and increasing institutional support. These findings contribute to ongoing discussions on leveraging technology to enhance ESL teaching practices and student learning outcomes.*

Keywords: *Canva, ESL, CBLT, motivation, student engagement*

Introduction

Motivation is essential for educational success, as it drives students to engage with content, persist through challenges, and achieve better outcomes (Pratama & Hikmat, 2024). However, traditional teaching methods often struggle to sustain motivation, particularly in language learning, where content may feel abstract and disengaging (Pratama & Hikmat, 2024). This highlights the need for innovative approaches to make language learning more meaningful and relatable. Canva addresses this challenge by fostering creativity and engagement through visually appealing and interactive materials, transforming lessons into dynamic experiences (Fitria, 2022). Research shows that such tools enhance intrinsic motivation, leading to better academic performance and a more positive attitude toward learning (Pratama & Hikmat, 2024).

Literature Review

Technology has reshaped language education, shifting from teacher-centered to student-centered methods (Hutapea, Manullang & Hartati, 2024; Ali et al, 2024; Ali & Azamri, 2023;

Ali et al., 2023). Canva, a widely used graphic design platform, enables educators to create engaging learning materials that cater to different learning styles (Harsabawa, 2023; Fitria, 2022). Its customizable templates and multimedia tools support diverse learners, fostering an inclusive environment. This study explores Canva's impact on student motivation, engagement, and creativity in ESL classrooms, as well as its influence on student-teacher interaction. Research suggests that digital tools like Canva can transform traditional classrooms into collaborative and interactive learning spaces (Fitria, 2022). By examining these aspects, this study aims to provide insights into Canva's practical applications in language education and contribute to more effective teaching strategies that enhance motivation and engagement.

In an ideal educational setting, integrating technology like Canva into language teaching would seamlessly enhance students' motivation, engagement, and learning outcomes. Research highlights Canva's potential to transform traditional teaching by catering to diverse learning styles and fostering dynamic classrooms (Ngoc & Huyen, 2023). However, in low- to medium-resource ESL settings, educators often face barriers such as limited technological proficiency, time constraints, and inadequate institutional support, making Canva's implementation inconsistent (Hutapea, Manullang & Hartati, 2024; Friska & Pramuaniati, 2023). Additionally, issues like low internet connectivity and restrictions in the free version's templates further hinder its effectiveness, requiring teachers to seek alternative methods such as printed materials to maintain engagement (Hutapea, Manullang & Hartati, 2024).

Despite these challenges, Canva remains a promising tool for enhancing ESL instruction when implemented effectively. Studies suggest that with adequate teacher training, institutional support, and improved infrastructure, Canva can create vibrant, interactive learning environments (Fitria, 2022). Hence, this study aims to examine the effectiveness of Canva in enhancing L2 students' motivation in ESL classrooms, identify the specific features that contribute to this improvement, and explore ESL teachers' perceptions, experiences, and strategies in using Canva to support content-based language teaching and student engagement.

Methodology

This study employs a mixed-method research design, combining quantitative surveys and qualitative interviews to examine the integration of Content-Based Language Teaching (CBLT) and Canva in ESL classrooms. A purposive sampling method was used to select 30 L2 students from secondary schools in Selangor and six pre-service ESL teachers, ensuring participants had relevant experience with Canva in lesson planning. Data collection involved **two instruments**: (1) **questionnaires** with Likert-scale and open-ended questions to assess students' motivation and Canva's impact, (2) **open-ended interviews** to explore teachers'perceptions and strategies in using Canva. Questionnaires were administered via Google Forms, and interviews were conducted virtually or in person. Ethical considerations, including informed consent and data anonymization, were strictly maintained to uphold confidentiality and research integrity.

Findings

The Effectiveness of Canva in Enhancing L2 Students' Motivation in ESL Classrooms

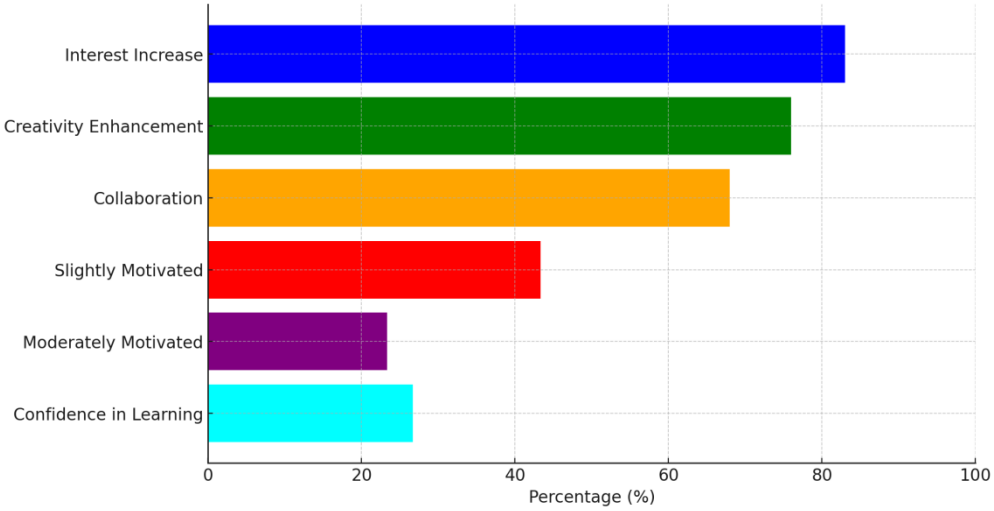


Figure 1: The Effects of Canva on Students' Engagement and Motivation

As shown in Figure 1, a substantial proportion of students reported that Canva significantly enhanced their creativity. This finding aligns with previous studies by Fitria (2022), which emphasize that Canva's diverse design tools enable students to personalize their learning materials, fostering creative expression. The ability to customize visual elements allows learners to engage in more meaningful interactions with the content, reinforcing their comprehension and retention of language concepts. Additionally, the integration of design-based learning activities promotes cognitive flexibility, an essential skill in second language acquisition, as learners experiment with various ways to present and structure information.

Furthermore, Canva's interactive features, such as group projects and shared design workspaces, have been found to facilitate collaborative learning. Research by Hutapea, Manullang and Hartati (2024) suggests that digital tools that allow real-time collaboration enhance teamwork, communication, and peer learning. This aspect of Canva aligns with the socio-constructivist theory, which posits that learning is most effective when it occurs within a social context where students can engage in discourse, negotiate meaning, and co-construct knowledge. By working together on design projects, students are not only improving their linguistic competencies but also developing essential 21st-century skills such as critical thinking and problem-solving.

Despite its positive impact on creativity and collaboration, the study indicates that Canva's role in increasing motivation presents more nuanced findings. The data reveal that 43.3% of students were only slightly motivated, while 23.3% reported moderate motivation levels. This suggests that while Canva can contribute to engagement, motivation in language learning is influenced by multiple factors, including instructional design, student autonomy, and external influences such as classroom environment and assessment methods (Fitria, 2022). Therefore, Canva's effectiveness in fostering motivation may be maximized when integrated with pedagogically sound strategies that provide clear learning objectives, scaffolded instruction, and intrinsic reinforcement.

The lowest percentage recorded in the study pertains to students' confidence in learning (26.7%). While Canva enhances engagement and creativity, this does not necessarily translate to increased self-efficacy in language acquisition. One possible explanation, as highlighted by

(Fitria, 2022) is the learning curve associated with mastering the platform. For some students, digital literacy and unfamiliarity with design tools may create initial challenges, leading to hesitation in actively participating in Canva-based tasks. Additionally, the need for explicit teacher guidance and structured learning support is crucial in ensuring that students not only engage with the tool but also develop confidence in their language skills through its use.

In conclusion, the findings underscore Canva's effectiveness in fostering creativity, collaboration, and engagement in ESL classrooms. However, its impact on motivation and confidence levels highlights areas for further pedagogical refinement. To optimize Canva's potential, educators should integrate it with structured lesson designs that provide clear instructional guidance, scaffolded support, and opportunities for self-directed learning. Additionally, targeted professional development for teachers on how to effectively implement Canva in language instruction could further enhance student outcomes, ensuring that the tool serves as a catalyst for both engagement and meaningful language acquisition.

The Most Preferred Specific Features of Canva

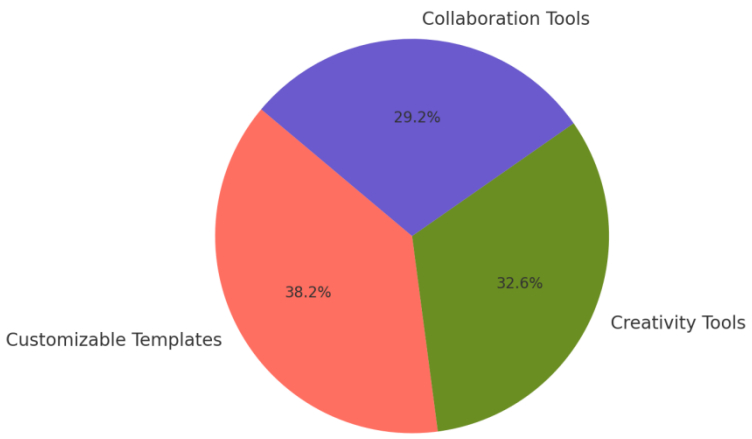


Figure 2: Three Most Preferred Specific Features Of Canva

Figure 2 shows that students most prefer Canva's **Customizable Templates (38.2%)**, followed by **Creativity Tools (32.6%)**, and **Collaboration Tools (29.2%)**. These features help simplify lesson design, boost creativity, and encourage teamwork—key elements for engaging ESL learners.

Customizable Templates minimize cognitive load by providing ready-made layouts, letting students focus on language skills rather than design (Pratama & Hikmat, 2024). They also support a scaffolded learning approach, especially for those with limited design experience. **Creativity Tools** (drag-and-drop elements, font choices, and multimedia integration) help students personalize content, fostering intrinsic motivation and creative thinking (Hutapea, Manullang & Hartati, 2024). This multimedia aspect supports multimodal learning and accommodates different learning preferences (Ngoc & Huyen, 2023). **Collaboration Tools** (shared editing and group projects) enable real-time teamwork, improving communication, problem-solving, and peer learning (Ngoc & Huyen, 2023). Though slightly less preferred than the other two features, collaboration remains crucial for constructivist, student-centered learning.

Overall, students appreciate Canva's ability to simplify design, encourage creativity, and promote collaboration. Future research should explore how these features affect long-term language proficiency, the role of teacher guidance, and potential digital literacy or access issues. Comparing Canva to other digital tools may also clarify which strategies best enhance ESL teaching and learning.

ESL Teachers' Perceptions, Experiences, and Strategies in Utilizing Canva to Support Content-Based Language Teaching and Student Engagement.

Teacher 1 (Experienced ESL Teacher, 10+ years)

> *"Canva has been a game-changer in my classroom. I use it to design interactive worksheets, infographics, and flashcards that align with my content-based lessons. My students find the visuals engaging, and it helps simplify complex concepts. However, I do see a challenge when students are unfamiliar with digital tools, so I usually provide a short tutorial before incorporating Canva into lessons."*

This teacher perceives Canva as a transformative tool in the ESL classroom, particularly for enhancing content-based learning through visual materials. Their experience highlights that interactive worksheets, infographics, and flashcards are effective in simplifying complex concepts, making learning more accessible. The teacher's strategy of providing a tutorial addresses the digital literacy gap among students, ensuring they can effectively engage with Canva-based materials. This insight aligns with research suggesting that teacher guidance in digital tool usage enhances learning outcomes (Fitria, 2022)

Teacher 2 (Early-Career ESL Teacher, 2 years)

> *"I started using Canva to create content-rich presentations and digital storybooks. The platform's templates save me a lot of time and allow me to focus on delivering quality content. One strategy that works well for me is allowing students to create their own visual summaries after a lesson, reinforcing both content and language skills."*

With a limited teaching background, this teacher appreciates Canva for its ability to streamline content creation, allowing for a focus on lesson delivery rather than material preparation. The preference for Canva's templates underscores its time-saving benefits, which is crucial for early-career educators. This response highlights how Canva empowers students to take ownership of their learning while integrating digital literacy skills (Friska & Pramuaniati, 2023).

Teacher 3 (ESL Teacher,6 years)

> *"In my school, internet access is limited, so I have to download Canva materials in advance. Despite this, I find that using Canva to create worksheets and posters keeps my students more engaged. They respond better to lessons when visuals are incorporated, especially for subjects like science and social studies."*

This response presents a realistic challenge faced by many educators in regions with limited internet connectivity. Despite this, the teacher proactively downloads Canva materials in advance, demonstrating an adaptive approach to technological limitations. The preference for worksheets and posters suggests that even in low-resource settings, Canva remains an effective tool for content visualization, particularly in subjects like science and social studies, where complex ideas benefit from visual representation. Research by Friska and Pramuaniati

(2023) supports the claim that visually enhanced materials improve student engagement and comprehension.

Teacher 4 (ESL Teacher, 15+ years)

> *"I use Canva for storytelling activities, where students co-create digital storybooks. The drag-and-drop features make it easy for them to personalize their stories with visuals. This approach not only strengthens their writing skills but also enhances their creativity and confidence in using English."*

This teacher's extensive experience is reflected in the creative integration of Canva into storytelling activities. Their strategy of co-creating digital storybooks aligns with constructivist learning theories, which suggest that students learn best when they actively engage in content creation (Friska & Pramuaniati, 2023). The use of Canva's drag-and-drop features enhances personalization, allowing students to express their ideas creatively. Furthermore, this approach supports literacy development, critical thinking, and language fluency, making it an effective CBLT strategy.

Teacher 5 (ESL Teacher with a Focus on Technology)

> *"I integrate Canva with project-based learning, where students collaborate to design educational posters and infographics. This method encourages teamwork while reinforcing both language and subject content. One challenge I notice is that some students rely too much on pre-made templates, so I encourage them to explore design elements more actively."*

This teacher emphasizes the collaborative potential of Canva in project-based learning (PBL). Their strategy involves students working together to design infographics and educational posters, reinforcing both language skills and subject-specific content. The concern that students rely too much on pre-made templates highlights a pedagogical challenge—students may prioritize visual appeal over content depth. To counter this, the teacher encourages more active exploration of design elements, fostering higher-order thinking skills (Dani, Agustin & Deani, 2023). This aligns with research on active learning strategies, which suggest that students engage more deeply when they interact meaningfully with content rather than passively consuming it.

Teacher 6 (ESL Teacher with a Focus on Technology)

> *"One effective strategy I emphasize is using Canva for formative assessments—students create concept maps or infographics to demonstrate their understanding of a topic. This approach not only makes assessments more engaging but also provides insights into their learning progress."*

This teacher integrates Canva into assessment practices, using it for formative assessments such as concept maps and infographics. This approach shifts assessments from traditional tests to interactive, student-created materials, which not only make learning more engaging but also provide teachers with visual insights into students' understanding. Research suggests that alternative assessments (such as infographics) promote deeper learning by requiring students to synthesize information creatively (Dani, Agustin & Deani, 2023). This teacher's strategy reinforces the idea that Canva can be leveraged beyond content delivery to enhance evaluation and student feedback mechanisms.

The findings from the six teachers' responses highlight the diverse and transformative role of Canva in ESL classrooms, particularly within the framework of Content-Based Language Teaching (CBLT). Canva serves as a powerful visual learning tool that enhances student engagement and facilitates comprehension by reducing cognitive load through structured visuals (Dani, Agustin & Deani, 2023). The platform allows teachers to create interactive and visually appealing materials, making abstract or complex subject matter more accessible to ESL learners. Moreover, Canva's integration into classroom activities promotes student-centered learning, as evidenced by its use in self-directed projects, digital storytelling, and formative assessments. Beyond its benefits in enhancing content delivery, Canva also proves adaptable to diverse teaching contexts, including low-resource environments. Teachers working in schools with limited internet access have demonstrated strategic modifications, such as pre-downloading materials to ensure continued accessibility. Furthermore, Canva's ability to support project-based learning (PBL) and collaborative tasks fosters essential 21st-century skills, including teamwork, problem-solving, and digital literacy. However, some challenges emerge, including students' over-reliance on pre-made templates, which may limit creativity and higher-order thinking skills. To mitigate this, teachers actively encourage students to explore design elements independently, thus fostering deeper engagement and content mastery. Additionally, Canva's application in alternative assessment methods signifies a shift from traditional testing approaches toward more interactive and meaningful assessments. The use of concept maps, infographics, and visual summaries as formative assessments allows educators to gain insights into students' learning progress while promoting knowledge synthesis and retention. These strategies highlight Canva's potential not only as a tool for delivering content but also as a platform for measuring and enhancing student learning outcomes in a more engaging and effective manner. While Canva's integration into ESL instruction demonstrates numerous advantages, including increased engagement, creativity, and collaborative learning, challenges such as digital literacy gaps, dependency on internet access, and over-reliance on templates indicate the need for teacher training and pedagogical support. Future research should explore the long-term impact of Canva on ESL learning outcomes, particularly in different educational settings and age groups. Additionally, investigating how Canva can be effectively blended with other digital learning tools may provide a more comprehensive framework for technology-enhanced language learning. Ultimately, Canva has the potential to redefine ESL teaching practices by offering a dynamic, interactive, and student-centered learning experience that aligns with modern educational demands and digital literacy advancements.

Conclusion

In conclusion, these findings underscore Canva's effectiveness in simplifying design, fostering creativity, and facilitating collaboration in ESL classrooms, aligning with established theories on cognitive load, multimodal learning, and sociocultural interaction. By offering ready-made templates, diverse creativity tools, and shared editing features, Canva helps minimize extraneous cognitive demands, encourages intrinsic motivation, and supports peer collaboration—all crucial elements in language acquisition. However, the data also highlight areas needing further exploration, such as the long-term impact of Canva-based learning on student language proficiency and the importance of teacher guidance to address digital literacy and ensure equitable access. Comparative studies examining Canva alongside other digital platforms could deepen our understanding of optimal technology-driven strategies in ESL instruction, ultimately contributing to more inclusive, engaging, and effective learning environments.

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BRIDGING CLASSROOM PRACTICE AND SYSTEMIC CHANGE: A DUAL-AXIS QUADRANT MODEL FOR PROFESSIONAL LEARNING COMMUNITIES

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Abstract: *This conceptual study introduces a dual-axis quadrant model for teacher professional development that integrates both instructional and systemic interventions with reflective and collaborative approaches. Grounded in a literature review on Professional Learning Communities and collaborative practices, the model was developed through stakeholder consultations and an iterative conceptual mapping process. The dual axes, (i) Focus of Effort and (ii) Approach, differentiate interventions that directly enhance classroom practices from those that drive system-wide reform, and reflective practices from collaborative, action-oriented strategies. Thirteen professional development activities, including Lesson Study, Peer Coaching, Learning Walks, Video Critique, Teacher Sharing Sessions, Teacher Study Groups, Book Clubs, Critical Friends Groups, Curriculum Mapping, Common Assessments, Data Analysis, Problem Solving Groups, and Horizontal and Vertical Teams, were strategically categorized into four clusters corresponding to the quadrant's four regions. Findings indicate that teachers value immediate, reflective interventions that improve instructional practices, while experts stress the necessity of systemic, collaborative strategies for sustainable educational change. The model not only synthesizes theoretical constructs from self-efficacy, reflective practice, and communities of practice, but also offers a pragmatic diagnostic tool for designing balanced and contextually responsive professional development programs. By uniting reflective inquiry with collaborative action, the quadrant model addresses the persistent fragmentation in teacher professional development, ensuring that interventions meet both individual and systemic needs. In conclusion, this comprehensive framework has the potential to enhance teacher efficacy, foster continuous professional growth, and drive long-term educational reform, leading to improved student outcomes and a more resilient educational system.*

Keywords: *Teacher Professional Development, Dual-Axis Quadrant Model, Professional Learning Communities*

Introduction

Over the past several decades, the landscape of teacher professional development has undergone a significant transformation, shifting from traditional, top-down models to dynamic, teacher-driven approaches that emphasize collaborative inquiry and reflective practice (Rarasati & Pramana, 2023). Despite the proliferation of professional learning communities

(PLCs) and similar initiatives, many schools struggle with fragmented interventions that address classroom-level practices or systemic reform, but rarely both. This disjointed approach impedes sustained instructional improvement and limits the potential for transformative educational change. The problem, therefore, lies in the absence of a comprehensive framework that integrates targeted, reflective interventions with broader, collaborative, and systemic strategies to support teacher growth and school reform. This study aims to formulate conceptually a dual-axis quadrant model that draws on past research and perspectives from experts. Formulating this conceptual model not only addresses the challenges of instructional practice and teacher efficacy but also aligns with broader organizational and systemic reforms necessary for sustainable educational improvement.

Literature Review

Evolution Of Professional Learning Communities (PLCS) And Collaborative Practices

The evolution of Professional Learning Communities (PLCs) and collaborative practices over the past few decades has fundamentally reshaped how educators engage in professional development, teacher learning, and school reform. Early models emphasized top-down professional development; however, the shift toward collaborative inquiry and shared leadership has redefined PLCs as dynamic, teacher-driven communities of practice (Carpenter, 2018). In these communities, educators are not mere recipients of externally imposed expertise; rather, they are active agents whose self-directed learning and reflective collaboration foster both instructional innovation and transformative professional growth (Avgitidou et al., 2024). A key element in this evolution is the redefinition of the learning space from a sole physical environment to one that values both intellectual and virtual collaboration. Purposely designed physical settings that encourage interaction and shared inquiry are essential (Carpenter, 2018). Simultaneously, digital and virtual platforms have emerged as vital components, enabling educators to overcome geographic and temporal constraints and thus broadening participation and collaboration (Bedford, 2019). Such platforms facilitate reflective dialogue and the de-privatization of teaching practices, which are central to the formation of effective PLCs (Carpenter & Munshower, 2019).

Beyond the configuration of spaces, shared leadership and collegial trust have become recognized as cornerstones for successful PLCs. Research indicates that when leadership is distributed and teachers collaboratively set goals and share responsibilities, there is a marked improvement in both teacher efficacy and student outcomes (Benoliel & Schechter, 2017; Jones & Thessin, 2017). Open, reflective conversations—identified by Sims and Penny (2014) as essential for effective Professional Learning Communities (PLCs) help create a culture where professional inquiry becomes a catalyst for continuous improvement. Additionally, effective PLCs provide a “critical friend” environment where educators challenge assumptions and refine their practices through rigorous feedback and collective analysis (Avgitidou et al., 2024; Woodland & Mazur, 2018). However, the evolution of PLCs has not been without its challenges. Research has highlighted impediments to the development of robust PLCs, including structural issues, lack of time, and insufficient systemic support for teacher collaboration (Zhang et al., 2016). In response, innovative models have sought to integrate tailored professional development approaches with strategies for overcoming logistical obstacles. In contrast, some PLC models emphasize integrating project-based learning to explicitly link teacher collaboration with classroom innovation and student engagement.

Moreover, variations in satisfaction with PLC initiatives across different contexts, such as those observed in higher education and specialized disciplines, underscore the need for adaptive models that cater to specific institutional cultures and teacher needs (Alrahaili, 2023). In summary, the evolution of PLCs and collaborative practices is characterized by a shift from traditional, hierarchical professional development models toward more participatory, reflective, and inquiry-based frameworks. This shift has been facilitated by innovations in both physical and digital learning environments, the embrace of distributed leadership, and a robust culture of reflective practice and mutual accountability among educators. As ongoing research continues to refine these models, the potential for PLCs to serve as powerful engines for professional growth and educational reform remains significant.

Key Theoretical Perspectives on Teacher Professional Development

Aligning with the evolution, the key theoretical perspectives on teacher professional development (PD) have evolved from earlier behavioral and top-down models to more dynamic, constructivist, and collaborative approaches that position teachers as active agents in their learning. Current theories emphasize a multiplicity of interrelated components such as self-efficacy, reflective practice, communities of practice, and contextual responsiveness. One influential theoretical perspective is rooted in self-efficacy theory. Research highlights that teachers' beliefs about their capabilities are critical to the design of effective PD programs. Self-efficacy theory, originally grounded in social cognitive theory, posits that enhancing teachers' confidence through opportunities for mastery, modeling, and feedback can lead to improved instructional practices and student outcomes. In integrated STEM education, for example, increases in teacher self-efficacy have been linked to higher motivation and a greater willingness to experiment with innovative pedagogical strategies (Marlina et al., 2024; Kelley et al., 2020).

Another significant perspective is that of reflective practice and transformational learning. The use of video observation and reflective dialogue in PD provides a mechanism for teachers to view classroom practices from new perspectives and rethink their approaches without substituting the experience of teaching. Transformational learning theory further supports this, emphasizing that critical reflection leads to shifts in underlying assumptions and the formation of a more inclusive, dialogic, and sustainable professional practice. Peer discussions and reflective inquiry are essential for probing one's actions and beliefs, which fosters professional growth and innovation (Gaudin & Chaliès, 2015; Borko et al., 2010). Communities of practice (CoP) have also provided an important framework for understanding teacher professional development. The CoP perspective suggests that learning occurs through active participation and social interaction among educators who share common goals and values. This theory highlights the importance of collaborative inquiry and shared responsibility, wherein teachers pool their knowledge, engage in dialogue, and co-construct meaning from their experiences. In this context, Professional Learning Communities (PLCs) emerge as a prominent model that supports ongoing teacher development by cultivating networks of support, trust, and shared learning. Such communities empower teachers to become reflective practitioners who continuously challenge and extend their instructional practices through collective effort (Quadros & Carreira, 2024; Li, 2019).

Furthermore, theory-informed PD approaches increasingly draw on action research and participatory methodologies. By involving teachers in systematic inquiry into their practices, PD programs help them understand the contextual factors that influence their work and generate solutions that are relevant to their specific environments. Action research frameworks encourage an iterative process where planning, acting, observing, and reflecting are integrated into the fabric of daily teaching, thereby promoting adaptive expertise and professional agency. These participatory approaches foster empowerment among educators, making them stakeholders in educational reform and curricular innovation (Hajisoteriou et al., 2018; Dhungana et al., 2021). The role of mentoring and collaborative partnerships is another key theoretical lens in teacher PD. Scholars have observed that the integration of mentoring relationships into PD frameworks aids in constructing professional knowledge by bridging the gap between theory and practice. Mentoring, when embedded within structured collaborative contexts, can enhance teacher learning by providing opportunities for feedback, shared inquiry, and the deconstruction of tacit knowledge. Collaborative mentoring is thus not only a supportive mechanism but also a transformative process that facilitates sustained professional growth (Aderibigbe, 2013; Perry & Boylan, 2017).

Lastly, teacher PD is increasingly being examined through the lens of curriculum design and contextual adaptation. Research into collaborative curriculum design emphasizes that teacher learning is inherently social and distributed. Such frameworks argue that PD should not only be responsive to the institutional and cultural contexts of the teachers but also be designed to promote iterative feedback loops between classroom practice and curriculum innovation. The interplay between curricular demands and professional growth necessitates a systemic approach that integrates local contexts, collaborative learning, and reflective practice within a unified framework (Voogt et al., 2018). In summary, key theoretical perspectives on teacher professional development converge on several major themes: the enhancement of teacher self-efficacy, the critical role of reflective practice and transformational learning, the benefits of collaborative communities of practice, the empowerment derived from participatory and action research methodologies, the significant impact of mentoring relationships, and the importance of contextualized, collaborative curriculum design. Together, these theoretical perspectives provide a comprehensive view that informs the design and implementation of effective teacher PD programs aimed at fostering sustained instructional improvement and professional development.

Prior Research on Instructional Versus Systemic Interventions

Prior research on teacher professional development distinguishes between interventions that focus directly on classroom instructional practices (instructional interventions) and those that target broader systemic change (systemic interventions). Both approaches have been examined extensively in the literature. However, they function at different levels and through distinct mechanisms to effect change in educational settings. Instructional interventions typically target specific teaching practices by providing direct support through coaching, mentoring, curriculum resources, and focused professional development sessions. For example, Kraft et al. (2018) conducted a meta-analysis that demonstrated teacher coaching interventions generate large positive effects on classroom instruction and moderate gains in student achievement.

Similarly, Lee et al. (2016) reported that a standards-based, inquiry-oriented science intervention enhanced elementary teachers' science knowledge and instructional practices,

particularly benefiting English language learners. Virtual mentoring and coaching initiatives, as documented by Singer et al. (2023), further illustrate that targeted interventions can successfully improve pedagogical practices in response to specific challenges such as those imposed by the COVID-19 pandemic. In addition, studies focused on subject-specific improvements in teacher practice, such as the Integrated Literacy Study Group PD program outlined by Benner et al. (2022) and the use of data-driven practices to improve mathematics teaching noted by Christman et al. (2016), reinforce the notion that instructional interventions yield tangible changes in classroom behavior by offering teachers structured models, ongoing feedback, and opportunities for iterative practice.

In contrast, systemic interventions encompass a broader range of activities aimed at transforming the educational environment and institutional conditions under which teachers work. These interventions often include reforms in leadership practices, collaborative decision-making processes, and the creation of professional learning communities (PLCs) that support sustained improvement across schools. Harris and Jones (2010) argue that PLCs represent a potent strategy for systemic improvement by fostering a culture of collaboration and continuous learning, which in turn leads to systemic change. Further, studies by Kilag and Sasan (2023) and Polatcan et al. (2023) highlight the critical role of instructional leadership in shaping system-wide professional development, thereby advancing both teacher effectiveness and overall school performance. Lee et al. (2011) similarly show that teacher empowerment through curriculum reform efforts can lead to improved educational outcomes, even when these interventions expose tensions related to decision-making autonomy. Moreover, research by Lesh et al. (2021) on multitiered systems of support underscores the need for systemic interventions that cultivate team building, collaboration, and shared responsibility among school staff to become a necessary precondition for meaningful instructional change.

Importantly, prior research suggests that instructional and systemic interventions are not mutually exclusive but interdependent. Networked professional learning communities, for example, serve as a bridge between the two levels by creating platforms in which targeted instructional support is embedded within a broader, collaborative culture that promotes systemic change (Pan & Chen, 2023). Hutchison and Woodward (2013) further explain this point by discussing how a planning cycle for integrating digital technology into literacy instruction must address both the immediate instructional needs and the larger systemic barriers, such as the lack of meaningful professional development opportunities, that inhibit effective technology integration. In summary, prior research delineates a dual-axis approach: instructional interventions directly support classroom practices through coaching, curriculum innovation, and data-informed strategies, whereas systemic interventions focus on establishing favourable leadership conditions, collaborative structures, and school-wide reforms. Effective teacher professional development, therefore, may benefit most from a synergistic design that integrates targeted instructional strategies within a supportive systemic framework, enabling both immediate classroom improvements and longer-term educational reform.

Reflective Versus Action-Oriented Approaches in Professional Development

Reflective and action-oriented approaches represent two interrelated yet distinct paradigms in teacher professional development that together strive to enhance both the internalization of pedagogical beliefs and the practical enactment of instructional strategies. Reflective approaches emphasize metacognitive analysis, critical introspection, and a teacher's capacity

to derive meaning from their classroom experiences. These approaches encourage educators to engage in self-directed inquiry through journaling, debriefing sessions, and guided discussion. Uştuk and Costa (2020) illustrate how lesson study can foster "meta-action" by promoting reflective practice that empowers teachers to make decisions about their development. Agustin (2019) supports this, showing that reflective journals serve as effective self-directed tools, enabling pre-service teachers to translate reflection into actionable insights that enhance teaching practices. Aldahmash et al. (2017) also suggest that reflective practices not only facilitate a deep understanding of one's instructional methods but also foster a sustained commitment to continuous improvement by creating a reflective habit that informs everyday classroom decisions. In contrast, action-oriented approaches in professional development are characterized by active experimentation, systematic inquiry, and collaborative cycles of planning, acting, observing, and refining practice. These approaches are operationalized through methodologies such as collaborative action research and lesson study, wherein teachers engage directly with the process of implementing and testing new instructional strategies. Rumiantsev et al. (2023) detail how action research cultivates an inquiry stance among educators, leading to transformative changes in their pedagogical knowledge and the development of new perspectives on teaching and learning. Similarly, Messiou (2018) and Kijkuakul (2019) demonstrate that collaborative action research promotes reflective dialogue while propelling teachers into active partnerships that emphasize practical experimentation and iterative enhancement of instructional methods.

Despite these differences, reflective and action-oriented approaches are not mutually exclusive; they are often integrated into cohesive professional development models. For instance, lesson study, as examined by Uştuk and Costa (2020) and Chow (2016), inherently combines reflective dialogue with actively testing pedagogical innovations. This integrated model underlines the notion that while reflective processes enable teachers to deconstruct and understand their practices, the subsequent application of this reflection through action-oriented strategies solidifies pedagogical change. In summary, reflective approaches in teacher professional development provide the theoretical and introspective foundation for teachers to critically assess and understand their instructional contexts, enhancing their agency and metacognitive skills (Uştuk & Costa, 2020). Conversely, action-oriented approaches prioritize the cyclical, collaborative, and iterative application of new strategies to achieve tangible changes in classroom practice (Rumiantsev et al., 2023). The convergence of these approaches, as evidenced by models that integrate reflective discussion with action research (Uştuk & Costa, 2020), constitutes a comprehensive professional development framework that leverages the strengths of both paradigms to drive sustained educational improvement.

Methodology

In this conceptual study, we employed a multi-phase methodology combining a literature review, expert validation, and iterative conceptual mapping to develop the quadrant model. Initially, we reviewed past studies on professional learning communities and collaborative professional development to identify key dimensions influencing teacher development and systemic change. This review revealed two principal continua: (i) Focus of Effort, ranging from direct, classroom-level instructional interventions to broader, system-wide initiatives, and (ii) Approach, spanning reflective practices to collaborative, action-oriented processes. Guided by these dimensions, we operationalized each continuum through definitions: the Instructional end was characterized by activities such as lesson study and peer coaching that focus on immediate

classroom practice, whereas the Systemic/Organizational end encompassed processes like curriculum mapping and data analysis that influence school-wide or district-level change. Similarly, reflective practices were defined as activities centered on introspection and self-assessment, while collaborative action was aligned with group-based, solution-oriented planning. Through a series of interviews with educators and administrators, we iteratively mapped various professional development clusters onto this two-axis framework, using qualitative feedback and pilot data to refine the positioning of each cluster. The resulting quadrant model not only synthesizes theoretical insights but also provides a pragmatic tool for aligning professional learning communities with strategic educational outcomes.

Findings

The iterative process revealed that the two dimensions, (i) Focus of Effort and (ii) Approach, are fundamental in categorizing professional development interventions. Through a comprehensive literature review and extensive stakeholder consultations, we confirmed that activities designed to enhance classroom practice, such as lesson study and peer coaching, consistently align with an instructional focus. In contrast, initiatives aimed at systemic improvement, like curriculum mapping and data analysis, emerged as distinct from classroom-level practices. Similarly, the analysis highlighted a clear demarcation between reflective approaches, which prioritize individual or small-group introspection, and collaborative, action-oriented strategies that foster collective problem solving. Through this mapping process, we categorized thirteen professional learning community (PLC) activities into four distinct clusters, offering a structured lens to analyze their focus, collaborative depth, and systemic orientation: (i) Observation and Reflective Practices, (ii) Collaborative Discussion and Professional Learning, (iii) Curriculum, Assessment, and Data Analysis, and (iv) Team Collaboration and Problem Solving.

a. **Cluster 1: Observation and Reflective Practices** encompasses activities such as Lesson Study (LS), Peer Coaching (PC), Learning Walks (LW), and Video Critique (VC). These initiatives emphasize the importance of classroom observation and structured reflection to enhance pedagogical strategies and deepen instructional awareness.

b. **Cluster 2: Collaborative Discussion and Professional Learning** includes Teacher Sharing Sessions (TSS), Teacher Study Groups (TSG), Book Clubs (BC), and Critical Friends Groups (CFG). These activities foster dialogic engagement and collegial learning, allowing teachers to co-construct knowledge, exchange resources, and engage in reflective discourse grounded in practice.

c. **Cluster 3: Curriculum, Assessment, and Data Analysis** comprises Curriculum Mapping (CM), Common Assessments (CA), and Data Analysis (DA). This cluster prioritizes coherence in instructional planning and the strategic use of assessment data to inform and differentiate teaching.

d. **Cluster 4: Team Collaboration and Problem Solving,** which includes Problem Solving Groups (PSV) and Horizontal and Vertical Teams (HVT), highlights the value of collective inquiry and strategic teamwork in addressing instructional and systemic challenges.

Participants in this conceptual study noted that the quadrant model provided a framework to evaluate existing professional development practices and to strategically design interventions that address both immediate instructional needs and broader systemic goals. The findings of this study not only validate the dual-axis framework (see Figure 1) but also highlight its potential as a diagnostic and planning tool for targeted professional learning initiatives through PLCs.

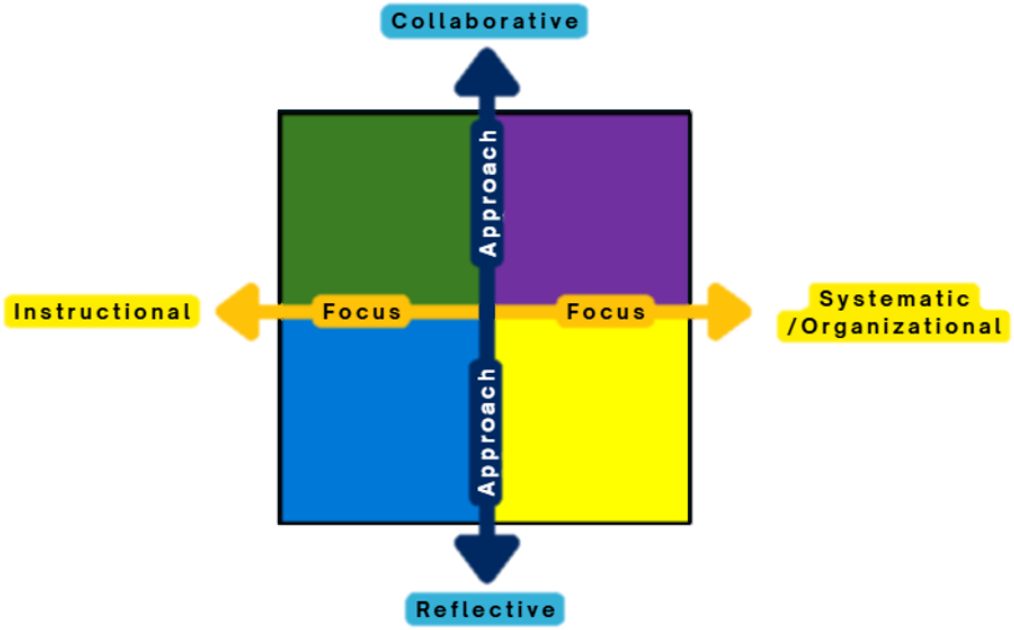


Figure 1: The Dual-Axis Framework of the Quadrant Model

Figure 1 visually positions 13 PLC activities recognized by the Ministry of Education within the four quadrants: Instructional-Reflective, Instructional-Collaborative, Systemic-Reflective, and Systemic-Collaborative. Each quadrant is represented by a colour for clarity and thematic emphasis. For the quadrant, Instructional–Reflective (Blue), the activities focused on individual teacher introspection and classroom practice enhancement. For quadrant Instructional–Collaborative (Green), the activities promote co-construction of knowledge and shared pedagogical development. For the quadrant Systemic–Reflective (Yellow), the activities encourage strategic reflection on broader school-wide processes and alignment. For the quadrant Systemic–Collaborative (Purple), the activities emphasize collective leadership, cross-team coordination, and institutional transformation. This mapping is further detailed in Table 1, which outlines each activity's dominant orientation, expected teacher agency, and potential for systemic scalability.

Table 1: Findings of Expert Validation and the Outcomes of the Iterative Conceptual Mapping Process

Dimension /Category	Expert Validation Findings	Iterative Mapping Outcome
Focus of Effort – Instructional	Teachers emphasized that activities directly linked to classroom practice (e.g., lesson	Clusters focused on Observation & Reflective Practices and Collaborative Discussion &

	study, peer coaching, and learning walks) have an immediate impact on teaching.	Professional Learning were positioned on the instructional end of the continuum.
Focus of Effort – Systemic	Administrators and curriculum specialists stressed the need for school-wide strategies, such as curriculum mapping, common assessments, and data analysis, to drive systemic change.	Clusters encompassing Curriculum, Assessment & Data Analysis, and Team Collaboration & Problem Solving were mapped toward the systemic end, highlighting their broader impact on educational systems.
Approach – Reflective	Participants reported that reflective practices (like video critiques, self-assessments, and data reflections) were essential for individual professional growth.	Components emphasizing reflection were mapped into the reflective quadrant, particularly within the Observation & Reflective Practices cluster and aspects of data analysis in the systemic cluster.
Approach – Collaborative	Stakeholders valued collaborative, action-oriented strategies, such as professional learning communities, teacher sharing sessions, and joint problem-solving, for collective impact.	Clusters involving Collaborative Discussion & Professional Learning and Team Collaboration & Problem Solving were positioned in the collaborative quadrant, underscoring their group-based focus.

Discussion

The dual-axis quadrant model demonstrates that a multidimensional approach to professional development is both theoretically sound and practically essential. Stakeholders consistently highlight the need for balanced interventions that simultaneously target immediate classroom practices and broader systemic change. This is supported in the literature, where early top-down PD models have given way to dynamic, teacher-driven communities of practice that emphasize both reflective inquiry and collaborative action (Carpenter, 2018; Avgitidou et al., 2024). The mapping process revealed that PLC activities such as Lesson Study, Peer Coaching, Learning Walks, and Video Critique, when positioned in the Instructional/Reflective quadrant, directly impact classroom practice by encouraging deep individual reflection. In contrast, interventions like Curriculum Mapping, Common Assessments, and Data Analysis are critical for driving systemic or organizational reform, situating them within the Systemic/Reflective quadrant. Meanwhile, teacher sharing sessions, study groups, and critical friend groups exemplify the Instructional/Collaborative quadrant by harnessing collective dialogue to refine instructional strategies, and the Problem-Solving Groups, along with Horizontal & Vertical Teams, fall in the Systemic/Collaborative quadrant, where coordinated team efforts address school-wide challenges.

The dual-axis framework, therefore, not only aligns with the theoretical perspectives of self-efficacy, reflective practice, and communities of practice (Gaudin & Chaliès, 2015; Sims & Penny, 2014) but also offers a pragmatic diagnostic tool that helps educational leaders in identifying gaps and tailoring interventions to meet diverse teacher needs. By bridging reflective and collaborative action-oriented strategies, the quadrant model supports a comprehensive approach to teacher professional development, one that acknowledges the

interplay between micro-level instructional adjustments and macro-level systemic change. This alignment facilitates data-driven improvement cycles, enhances teacher efficacy through collaborative feedback, and ultimately fosters an environment of continuous improvement and innovation. As the experts and iterative mapping have confirmed, integrating the thirteen PLC activities into this continuum enables schools to strategically design, implement, and scale professional development initiatives that are both contextually responsive and aligned with long-term educational reform goals.

Limitations And Scope

While the dual-axis quadrant model offers a valuable lens for categorizing and analyzing PLC activities, several limitations must be acknowledged. Firstly, the study primarily relies on document analysis and expert validation, without empirical implementation in real-world school settings. This limits the model's practical validation, as its effectiveness in influencing actual teacher practices or systemic change has not yet been observed or measured. Secondly, the alignment of PLC activities within the quadrant model involved subjective interpretation based on available descriptions and theoretical alignment. These classifications, while guided by literature and expert input, may not fully capture contextual nuances across different schools, districts, or national education systems. The model's generalizability may therefore vary depending on cultural, structural, or policy contexts.

Future Suggestions

Future studies require empirical investigations operationalising the dual-axis quadrant model in various educational environments to address the limitations. Particularly, case studies in different school environments, including urban, rural, and high-performance against under-resourced, as well as pilot studies, would provide vital information on the usability, contextual fit, and influence on practice of the model. In-depth interviews with educators and school administrators, as well as classroom observations and feedback loops, should complement this applied research to provide complex viewpoints that might either dispute or support the quadrant placements. Such practitioner-informed data would help the model to be iteratively refined, hence improving its conceptual strength and field applicability. Furthermore, the creation of structured rubrics or alignment indicators would help to classify PLC activities more consistently, therefore lowering interpretive subjectivity and increasing dependability in many scenarios. Lastly, especially in terms of their capacity to encourage continuous changes in professional development culture, improve teacher agency, and support systemic coherence, longitudinal study designs are crucial to evaluate the influence over time of the model. These future suggestions not only solve methodological limitations but also enhance the possibility of the model to be a scalable and flexible framework for PLC development in many educational environments.

Conclusion

In conclusion, this conceptual study presents a dual-axis quadrant model as a transformative framework for rethinking teacher professional development by integrating two critical dimensions: (i) Focus of Effort and (ii) Approach. This conceptual study indicates that aligning interventions along these continua enables educators to address both immediate instructional needs and broader systemic challenges. The experts and iterative mapping process validated

those activities such as lesson study, peer coaching, and learning walks effectively enhance classroom practices through reflective inquiry, while initiatives like curriculum mapping, common assessments, and collaborative problem-solving drive systemic reform. Moreover, by embedding both reflective and collaborative dimensions into professional learning communities, this model not only reinforces established theories of self-efficacy and communities of practice but also provides a practical diagnostic tool for designing and scaling PD initiatives. In this study, the model offers practical utility for teachers, administrators, and policymakers seeking to design balanced PD ecosystems. It also holds potential for adaptation across diverse educational contexts, subject areas, and international settings where localized PLC structures exist. This framework also contributes to the discourse on professional development by offering a tool that integrates systemic reform with teacher-level agency. Future studies should explore its empirical application and iterative refinement through field-based validation. Thus, the quadrant model offers a comprehensive approach that empowers teachers to continuously improve their practices and fosters an educational culture of sustained innovation and reform.

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STUDENTS' EVALUATION OF AN EDUCATIONAL CARD GAME AS A SUPPLEMENTARY TOOL FOR DEVELOPING GROUP DISCUSSION SKILLS

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Abstract: *Educational card games have emerged as effective tools for engaging students and enhancing learning outcomes across various disciplines. This study investigates students' perceptions of an educational card game designed to improve group discussion performance. Semester 1 Malaysia polytechnic students are required to complete a Communicative English 1 course which includes the skill of group discussion. The card game was used as a supplementary tool to enhance students' readiness for the group discussion assessment which carries a weight of 20%. Using a mixed-methods approach, feedback was collected from 76 semester 1 polytechnic students from the Accountancy program who participated in four 30-minute sessions involving the card game. A 25-item survey and group interview were used to assess their satisfaction with the game's design, goals, playability, and its impact on collaboration and communication skills and student readiness/ confidence in carrying out discussion. Results were analyzed using SPSS V29 and NVivo which revealed that students rated the card game highly in terms of promoting interaction and recall of the use of language phrases related to group discussion. Participants appreciated the game's ability to help them conduct a group discussion in an organized manner and promote critical thinking and the element of evaluation in their discussion. Additionally, suggestions for improving game rules were noted. The findings underscore the potential of educational card games as supplementary tools in active learning environments, with implications for broader applications in higher education.*

Introduction

Educational games have emerged as powerful tools in modern pedagogy, offering innovative ways to engage students and enhance learning experiences. As education shifts toward more learner-centered approaches, the integration of game-based learning strategies has gained significant attention for their ability to foster active participation, critical thinking, and collaborative skills. Unlike traditional instructional methods, educational games create dynamic and interactive environments where learners are encouraged to explore and apply knowledge in meaningful contexts.

One particular advantage of educational games lies in their potential to cultivate soft skills—communication, cooperation, and problem-solving—that are essential in both academic and professional settings. Among these, group discussion skills stand out as particularly valuable, enabling students to articulate ideas, listen actively, build on others' contributions, and reach consensus through respectful dialogue. However, despite their importance, many students struggle to develop these competencies through conventional classroom activities alone. This challenge is especially evident among Malaysian Polytechnic students enrolled in the Communicative English 1 course, as many possess only low to intermediate levels of English

proficiency, compounded by factors such as a lack of structured opportunities to practice, fear of judgment, and underdeveloped communication strategies—all of which hinder their confidence and ability to engage effectively in group discussions.

To address this gap, educators are increasingly turning to game-based interventions that simulate real-world interactions and provide structured yet enjoyable practice. This study explores students' evaluation of an innovative educational card game called "BeanChunk" specifically designed to enhance group discussion skills. By examining the perceived effectiveness, satisfaction and learning outcomes associated with the game, this research aims to contribute to the body of knowledge on how educational games can be leveraged as supplementary tools to support classroom learning, in particular, group discussion skills.

Group discussion skills are fundamental to successful communication, collaborative learning, and critical thinking. These are essential skills in both academic contexts and the modern workplace. In the Communicative English 1 syllabus, students are trained to express their thoughts clearly, listen to others actively, and negotiate solutions through consensus-building and respectful arguments. These abilities not only enhance their English language and communicative abilities, but also prepare them for real-world situations that require teamwork, adaptability, and effective interpersonal communication.

From a theoretical perspective, the development of group discussion skills aligns closely with Lev Vygotsky's Social Development Theory, which emphasizes that learning is inherently social, occurring most effectively within the Zone of Proximal Development (ZPD), where learners construct knowledge through interactions with more capable peers. Communicating through group discussions provide a natural context for this type of learning, as students construct meaning together, receive peer feedback, and refine their ideas through dialogic exchange.

Educational card games have the potential to be a promising medium for enhancing group discussion skills among learners, especially those from the low to intermediate proficiency group. Designed to be interactive, engaging, and socially oriented, such games can reduce the pressure of traditional speaking tasks while providing structured opportunities for meaningful dialogue. This study aims to explore students' evaluation of an educational card game as a supplementary tool for developing group discussion skills. Specifically, the objectives of this study are to examine students' satisfaction with the game's design, goals, and playability as well as to assess its impact on students' collaboration, discussion skills and readiness/ confidence in carrying out discussion. To guide this inquiry, the study addresses the following research questions: 1. How do students evaluate the educational card game in terms of its design, goals, and playability? 2. How do students evaluate the game's contribution to their collaboration, communication skills, and confidence in participating in group discussions?

Literature Review

Importance and Benefits of Group Discussion Skills

The importance of group discussion skills have been highlighted in many studies. In the context of classroom learning, group discussion creates a collaborative learning environment that provides ample opportunities for students to interact, share ideas and give feedback to each

other (Asgawanti, Situmeang, & Priyatna, 2025). The same study also noted that group discussion encourages active participation and builds confidence.

Group discussion is also important in helping to acquire and retain learning material. According to Agrawal, Mehra, and Mehta (2025), incorporating group discussion helps students to be more interested in a topic, have longer retention, helps them to easily apply concepts, enhances their communication skills as well as increases their attention span and knowledge recall.

A crucial element in group discussion is collaboration, which offers many benefits such as better outcome in problem solving and critical thinking compared to working individually (Slavin, 1995). This study revealed that structured group interactions were able to foster deeper understanding among participants and improved their academic outcomes. Furthermore, Bransford, Brown, and Cocking (2000) pointed out that group discussion can enhance analytical capabilities because when students work together, they challenge each other's thinking and thus, develop more refined analytical skills.

Group discussion is a valuable skill to have for job hunting purposes. According to Nagarathinam and Lakshmanan (2016), group discussion is used as a method to test fluency, content knowledge, communication skills, group behavior and leadership skills in the job hiring process. This points to the need for students to be equipped with group discussion skills so that they can compete well in the job hunting journey.

Challenges in Teaching and Learning Group Discussion Skills

Group discussion integrates multiple key competencies, including collaboration, critical thinking, language proficiency, communication, and interpersonal skills. As a result, teaching and learning group discussion skills can be particularly challenging, especially for learners with low to intermediate proficiency in the target language. Sab and Naidu (2025) emphasized several factors that hinder students' effective participation in group discussions. These include large classroom sizes, exam-oriented instruction, and students' reluctance to use English. The real-time nature of group discussions poses additional challenges for low-proficiency learners, who often struggle with limited fluency, pronunciation, and vocabulary. These linguistic limitations are further compounded by psychological factors such as low self-confidence, poor motivation, and high levels of anxiety (Kulsum et al., 2025).

In Malaysian classrooms, one of the most significant barriers to group discussion is students' negative attitudes toward speaking in English. Among these, anxiety is a predominant issue, as highlighted in several studies (Lian & Budin, 2014; Tati, Paul, & Golingi, 2016; Nadesan & Md. Shah, 2020; Nijat et al., 2019; Hamid & Idrus, 2021). Other emotional barriers that affect students' willingness to speak include shyness and apprehension (Abu Bakar, Latiff & Hamat, 2017) as well as hesitation, embarrassment, and heightened self-consciousness (Nor et al., 2019).

Additional Malaysian-based studies further emphasize the challenges faced in group discussions. Tom et al., 2013 reported that many pre-university students disliked participating in group discussions and felt uncomfortable speaking in English. Similarly, Badrasawi,

Solihu & Ahmad (2020) identified insufficient linguistic competence and a lack of content knowledge as key barriers to effective speaking performance. Meanwhile, Omar et al., 2020 emphasized the roles of learner motivation and the classroom environment in influencing students' ability to speak English confidently and competently.

Educational Card Games as an Effective Pedagogical Tool

Card games, as a subset of educational games, offer unique advantages in pedagogical settings. They are cost-effective, easy to implement, and promote active learning through peer interaction. In the context of English language teaching and learning, positive outcomes were observed from the use of educational card games to teach vocabulary, sentence structure and grammar. A study by Utama, Hamid & Sodik (2025) showed that aside from creating a fun and interactive learning environment for kindergarten-level students, the use of card games was effective in helping them to acquire vocabulary. Many benefits of using this card game were observed such as high engagement and greater enthusiasm from the students, increasing opportunities for peer learning and social interaction as well as reducing student anxiety. In terms of the intended learning outcomes, students improved their vocabulary retention and attained better pronunciation accuracy.

A study conducted by Benidict (2024) utilized an educational card game called SPASS Game to improve students' ability to construct simple sentences. The use of this game contributed over 40% improvement in students' English Language Performance levels. There was increased competency in constructing grammatically correct, coherent and clear sentences by the students.

Zakaria et al., (2022) utilized the Jester card game to help university students learn adjectives. Students perceived the game to be effective in helping them learn adjectives and improve their vocabulary. The game also provided them the opportunity to learn from peers as they listen to sentences made by other students. This study proved that educational card games are well-received by students from university level, as they also enjoyed learning by playing.

The studies related to teaching and learning English have demonstrated that educational card games can be effective tools for facilitating language acquisition, particularly in areas such as vocabulary, grammar, and sentence structure. However, there is a lack of research on the use of educational card games to develop speaking skills, especially in the context of group discussions. This study seeks to contribute to the literature by exploring the potential of educational card games as a versatile tool for enhancing students' speaking abilities, particularly group discussion skills.

In learning contexts outside of English language teaching and learning, many studies have explored the use of educational card games to help students acquire learning materials. Gutierrez (2014) looked into the use of card games in reinforcing biology concepts among university students where the post-test revealed that there was a significant improvement in students' results. Educational card games were also used to teach Mathematics, as can be seen in the study by Wahyuni & Witanto (2025) which found that the game significantly improved students' understanding of the concept of volume in Mathematics. Additionally, student perceptions were also positive as they found the game to be engaging, enjoyable and effective.

Rajashekar & Bellad (2016) also adds to the literature on the effectiveness of educational card games in helping university students to acquire a learning topic. In this particular study, medical students taking Physiology use a card game to learn the topic of nerve muscle. The effectiveness of the game was measured by comparing students' performance before and after using the game which showed a significant improvement in scores. The study also gained insight into students' acceptance of the card game through a survey. Students found the game to be valuable in promoting the learning of nerve muscle and able to get them engaged in discussing the topic.

Interestingly, while these studies explored how card games stimulate student discussion as a means of acquiring learning content, none have focused on using card games for the purpose of teaching group discussion skills. This study aims to address that gap by exploring how educational card games can be utilized specifically to support the teaching and learning of group discussion skills."

Theoretical Frameworks

This study is grounded in several educational theories that support the use of game-based learning to develop group discussion skills. Aside from the a fore mentioned **V**ygotsky's Social Development Theory, the Constructivist Theory and Kolb's Experiential Learning Theory also provide a rich theoretical backdrop to this study.

Constructivist Theory particularly proposed by scholars like Piaget (1972) and Bruner (1966)— believe that learners actively build their own understanding through experience and reflection. Group discussions support this process by encouraging learners to articulate their reasoning, challenge their assumptions, and adapt their thinking in response to new information. When embedded in authentic and meaningful tasks, such interactions deepen comprehension and promote cognitive flexibility. Educational card games may provide authentic contexts for learners to explore concepts, engage in problem-solving, and construct meaning collaboratively.

Other than that, Kolb's Experiential Learning Theory (1984) provides a practical framework for understanding how learning activities that incorporate discussions contribute to skill development. According to Kolb, effective learning involves a four-stage cycle: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Group discussions offer students the opportunity to move through this cycle as they share experiences, reflect on differing viewpoints and synthesize ideas. Furthermore, utilizing educational card games aligns with this model as a game-based approach offers hands-on experiences that encourage reflection and application of knowledge in new situations.

Methodology

Research Design

This study employed a mixed-methods design to investigate students' perceptions of an educational card game and its effectiveness in enhancing their group discussion skills. A combination of an adapted survey and small group interviews was used to gain a

comprehensive understanding of students' satisfaction with the game and its perceived effectiveness.
The quantitative component involved the administration of a 25-item survey designed to measure student satisfaction across five dimensions: goals and objectives, card design, components and organization, playability and engagement, and usefulness. Items were rated on a Likert scale to measure the participants' overall satisfaction levels.

The qualitative component consisted of semi-structured group interviews, which provided deeper insights into students' experiences and perspectives as well as strengthen and validate the findings obtained from the survey. These interviews explored students' reflections on how the game influenced their motivation, confidence, and preparedness to participate in group discussions, as well as their perceived development of communication and teamwork skills.

Participants

The participants of this study comprised 76 Semester 1 Diploma in Accountancy students from a Malaysian polytechnic. They were aged between 18 and 19 years old. The majority of the participants demonstrated low to intermediate levels of English proficiency, based on their achievement in Sijil Pelajaran Malaysia (SPM) English subject. The participants were selected through purposive sampling as they were most relevant to the research objectives; students with low to intermediate English proficiency that practiced group discussion skills using educational card games.

Setting

The study was conducted in a Malaysian polytechnic classroom, involving students enrolled in the Communicative English 1 course. As part of the course syllabus, students were taught the topic of group discussion over a period of four weeks, totaling approximately 12 instructional hours. The lessons were delivered in a typical classroom environment using a combination of guided instructions and practice sessions using a set of educational card games called BeanChunk designed to help students carry out group discussion effectively.

Instruments

This study employed two main instruments for data collection: a 25-item survey questionnaire and a set of semi-structured interview questions.

The survey was adapted from Gutierrez (2014) and designed to gather quantitative data on students' evaluation of the BeanChunk card game in terms of their satisfaction with the game and its effectiveness. The questionnaire consisted of 25 items organized into five dimensions which are goals and objectives, card design, components and organization, playability and engagement, and usefulness. Items were rated using a five-point Likert scale ranging from (1) Strongly Disagree to (5) Strongly Agree.

To ensure content validity, the survey items were reviewed by two English lecturers with experience in language teaching and training. Their feedback helped refine the structure and relevance of the items to better match the study's objectives and participant context. In

addition, a pilot study was conducted with a small group of students who are not involved in the study to test the clarity, appropriateness, and internal consistency of the instrument.
To complement and validate the survey data, semi-structured group interviews were also conducted. The interview questions were developed based on the same thematic areas as the survey and were also peer-reviewed to ensure relevance and clarity.

Data Collection Procedures

The data collection process was carried out over a period of four weeks and involved several structured phases to ensure participants were adequately prepared and exposed to the intervention before data was gathered.

Introductory Lessons

The process began with lectures on group discussion skills, where students were taught the key elements of effective group discussions, including structure, turn-taking, idea elaboration and appropriate language use.

Initial Practice and Reflection

Following the lectures, students participated in their first practice session where they applied what they had learned in a group discussion task. After this session, they were asked to reflect on their experience, focusing on their feelings, confidence, language use and overall ability to carry out the task. This reflection served as a baseline for comparison with subsequent sessions using the educational card game.

Introduction to the Educational Card Game

Students were then introduced to the BeanChunk card game designed to enhance their group discussion skills through structured, interactive gameplay. The rules and objectives of the game were explained, and students were familiarized with the content and format of the cards.

Game-Based Practice Sessions

Over the next three weeks, students engaged in four practice sessions using the card game. These sessions were conducted in small groups of 3 to 4 members. Each session was observed informally to monitor engagement and participation.

Survey Administration

After completing the final practice session, students were asked to complete a 25-item survey adapted from Gutierrez (2014).

Group Interviews

Finally, semi-structured group interviews were conducted following the students' formal group discussion assessment. These interviews allowed participants to elaborate on their survey responses, share detailed feedback on their experiences with the game and reflect on its effectiveness in preparing them for the graded group discussion assessment.

Data Analysis

A mixed-methods approach was used to analyze both quantitative and qualitative data. Quantitative data from the 25-item survey were analyzed using descriptive statistics in IBM SPSS Statistics V29. Mean scores and standard deviations were calculated for each item to assess students' satisfaction with the game's goals and objectives, card design, components and organization, playability and engagement, and usefulness.

Qualitative data from group interview transcripts were analyzed using thematic analysis, following the six-phase framework by Braun and Clarke (2006). The phases included familiarization with the data through repeated reading of transcripts, generating initial codes that reflected key features relevant to the research objectives, searching for patterns and grouping codes into potential themes, reviewing themes for internal consistency and distinctiveness, defining and naming themes to clearly capture their meaning, and producing a narrative report with illustrative quotes. Coding was conducted using NVivo software. The qualitative findings were used to triangulate and enrich the quantitative survey results, providing a deeper understanding of students' evaluation of the card game, particularly their satisfaction, experiences, and the game's effectiveness.

Results

Table 1: Descriptive Evaluation of the BeanChunk Card Game

		Frequency							
	Items	5	4	3	2	1	Mean	Standard Deviation	Verbal Interpretation
Goals and Objectives 1	The purpose and rationale for the game are fully explained	43	24	5	4		4.39	0.83	Strongly Agree
2	The goals and objectives of the game are clearly defined	47	18	6	5		4.41	0.9	Strongly Agree
3	The game encouraged me to interact with other group members	43	25	8			4.46	0.68	Strongly Agree
4	The card game helps me to understand how to carry out a group discussion	46	25	4	1		4.53	0.66	Strongly Agree
5	The card game helps me to carry out group discussion effectively	42	31	2	1		4.5	0.62	Strongly Agree
6	The card game helps me to practice turn-taking in a group discussion	49	25	1	1		4.61	0.59	Strongly Agree
	AVERAGE MEAN:						**4.48**		Strongly Agree
Card Design 7	The card size is appropriate	49	27				4.64	0.48	Strongly Agree
8	The information on the cards is relevant	42	26	8			4.45	0.68	Strongly Agree
9	The material used for the cards is durable	49	16	9	2		4.47	0.81	Strongly Agree
10	The deck of cards is compact and can be easily carried around	51	25				4.67	0.47	Strongly Agree
	AVERAGE MEAN:						**4.56**		Strongly Agree
Components and Organization 11	The game rules were clear, concise, and easily understood	38	22	12	4		4.24	0.91	Strongly Agree
12	The game emphasized key elements of group discussion	41	28	7			4.45	0.66	Strongly Agree
13	The game emphasized useful language phrases for group discussion	44	29	3			4.54	0.58	Strongly Agree
14	The number of cards was appropriate	50	19	7			4.57	0.66	Strongly Agree

15	The length of time required to play the game is reasonable	43	23	8	2	4.41	0.79	Strongly Agree
	AVERAGE MEAN:					**4.44**		Strongly Agree
Playability 16	The game provides opportunities for cooperation among group members	52	21	3		4.64	0.56	Strongly Agree
17	The rules of the game provide players with equal conditions for a fair play	32	34	9	1	4.28	0.72	Strongly Agree
18	The rules of the game provide a set of options for flexibility in making decisions when playing the game	27	31	14	4	4.07	0.87	Agree
19	The game was enjoyable to play	44	23	9		4.46	0.7	Strongly Agree
	AVERAGE MEAN:					**4.36**		Strongly Agree
Usefulness 20	The game was effective in helping my group to carry out a successful group discussion	40	24	11	1	4.36	0.78	Strongly Agree
21	The game encouraged me to share ideas with my group members	41	28	7		4.45	0.66	Strongly Agree
22	The game encouraged me to evaluate other group members' ideas	39	29	8		4.41	0.68	Strongly Agree
23	Playing the game helped me to remember useful phrases to use in a group discussion	49	23	4		4.59	0.59	Strongly Agree
24	The game helped my group discussion to be well-organized	50	24	2		4.63	0.54	Strongly Agree
25	I would recommend the game to my peers	50	22	4		4.61	0.59	Strongly Agree
	AVERAGE MEAN:					**4.51**		Strongly Agree

The analysis of the survey responses, which were based on a 5-point Likert scale, revealed generally high levels of agreement among the 76 participants across all five domains: Goals and Objectives, Card Design, Components and Organization, Playability, and Usefulness. The overall mean scores for these categories ranged from 4.36 to 4.56, indicating strong student approval of the card game's design and its utility in promoting group discussion skills.

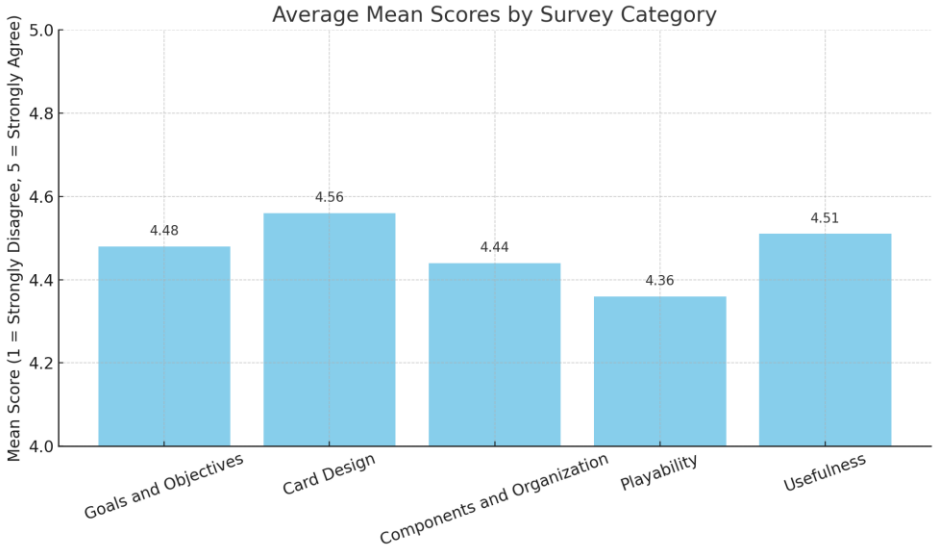


Figure 1: Average Mean Scores by Category

In relation to Research Question 1: How do students evaluate the educational card game in terms of its design, goals, and playability?, the findings indicate positive evaluations across all relevant dimensions. The Goals and Objectives category achieved a mean of 4.48, with students affirming that the game had a clear purpose and successfully promoted interaction and turn-taking in discussions (M = 4.61, SD = 0.59). The Card Design received the highest average mean (M = 4.56), with respondents highlighting satisfaction with its size, portability, and durability, as well as the relevance of the content. Low standard deviations (SD = 0.47–0.48) on several items in this domain suggest strong consensus.

In terms of Components and Organization, the average mean was 4.44. Respondents generally agreed that the game included relevant elements for group discussion and useful language phrases. However, Item 11, which addressed the clarity of the game rules, received the lowest mean in this category (M = 4.24) and the highest standard deviation (SD = 0.91), suggesting that while most found the rules understandable, a notable portion of students found them less clear. This indicates a potential area for refinement in future iterations of the game. Based on the small group interviews conducted, several students noted that it was challenging to remember the game rules, particularly because they were required to switch roles (Group Leader, Member 2, Member 3, and Member 4) in each practice session. Each role came with a unique set of five cards, arranged differently to guide their turn-taking during the discussion. This variation, while designed to encourage flexibility and familiarity with different discussion roles, may have contributed to the students' confusion. These insights suggest that providing clearer instructions or visual aids for each role could enhance players' understanding and ease of participation.

The Playability category yielded a mean of 4.36. Respondents agreed that the game encouraged cooperation and fair play. However, the item regarding flexibility in gameplay (Item 18: "The rules of the game provide a set of options for flexibility...") had the lowest mean score across the entire survey (M = 4.07, SD = 0.87), highlighting a possible limitation in how adaptable the game feels to players. Despite this, the majority still perceived the overall gameplay as enjoyable and inclusive.

In addressing Research Question 2: How do students evaluate the game's contribution to their collaboration, communication skills, and confidence in participating in group discussions?, the results were similarly encouraging. The Usefulness category was rated very positively (M = 4.51), with students agreeing that the game helped them conduct well-organized discussions, encouraged idea sharing, and reinforced appropriate language use. Items focusing on discussion organization and game recommendation (Items 24 and 25) received some of the highest mean scores (M = 4.63 and 4.61, respectively), illustrating the game's perceived value in enhancing collaborative communication. The relatively low standard deviations in this category (< 0.70 for most items) suggest consistent perceptions across participants.

Interview findings further support and enrich these quantitative results. When asked to elaborate on Item 21: The game encouraged me to share ideas with my group members and Item 22: The game encouraged me to evaluate other group members' ideas, students repeatedly expressed feeling excited, positive, calm, and confident during discussions. These emotions point to a greater readiness and willingness to engage actively in group communication. Several students indicated that the game environment helped them feel more at ease when expressing opinions or responding to peers' ideas. Notably, one respondent shared, *"Having the disagree card challenges me to think of a possible downside of my group member's idea, which gets us talking more."* This highlights how the game not only facilitated participation but also encouraged deeper critical thinking among group members. Such responses reflect the game's effectiveness in fostering communication confidence and collaborative engagement.

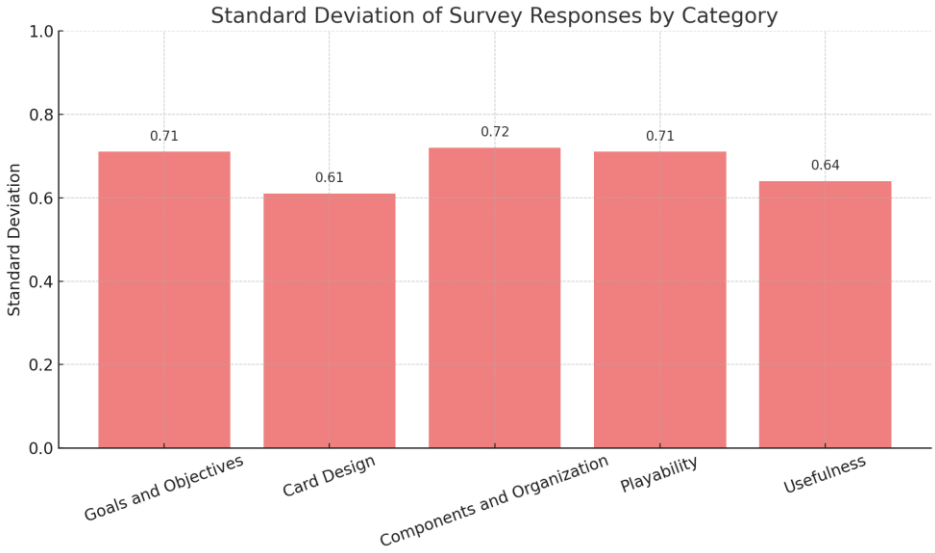


Figure 2: Standard Deviation of Survey Responses by Category

Together, the quantitative and qualitative findings demonstrate that students view the educational card game as well-designed, goal-oriented, and effective in supporting key discussion skills. While a few areas—such as rule clarity and flexibility—warrant refinement, the overall feedback underscores BeanChunk card game's promise as a tool for enhancing collaboration, communication, and discussion confidence in group settings.

Conclusion

The survey results indicate an overall positive perception of the BeanChunk card game in enhancing group discussion skills. Among the five categories evaluated, Card Design received the highest average mean score (M = 4.56, SD = 0.61), suggesting strong student approval regarding the cards' size, content relevance, durability, and usability. In contrast, Playability received the lowest mean score (M = 4.36, SD = 0.71), though it is still within the "agree" range. This suggests that while students found the game enjoyable, aspects such as rule clarity and gameplay flexibility could be improved. Overall, the game was seen as effective in promoting discussion, reinforcing useful language, and encouraging collaborative learning—echoing principles from Slavin's (1995) cooperative learning theory and Bransford et al.'s (2000) emphasis on active and social engagement in learning.

Future research could include investigating the effectiveness of the game by comparing students' performance before and after implementation to assess measurable improvements in communication and discussion skills. Additionally, it would be interesting to explore how varying levels of language proficiency impact students' understanding and interaction with the game mechanics. These findings can further contribute to the growing body of evidence supporting game-based learning as a practical and motivating pedagogical approach in language education.

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A CONCEPTUAL PAPER ON THE NEXUS BETWEEN PATERNALISTIC LEADERSHIP AND PRO ENVIRONMENTAL BEHAVIOUR VIA GREEN HUMAN RESOURCE MANAGEMENT

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Abstract : *This conceptual study is based on literature reviews related to paternalistic leadership (PL) which consisted of three elements (authoritarianism, benelovence and moral leadership), pro-environmental behaviour (PEB) and green human resource management (GHRM). Recently, the business community has been increasingly aware of the green lifestyle and adopted various environmental management strategies. In this sense, organisations need to incorporate environmental and social elements alongside financial and economic concerns. Thus, organisations require strong leadership and concrete process. To date, fewer studies have investigated the psychological mechanisms underlying the relationship between paternalistic leadership (PL) and employee behaviour. The present study aimed to investigate for future research on the moderating effects of GHRM to the relationship between the PL and PEB at the workplace from the perspective of the Leadership-Member-Exchange (LMX) Theory. The study continued to explore the concepts, issues, and objectives through several works of literature in numerous areas. This conceptual paper signifies supplementing works of literature as a future reference for academics. The outcome of this study also adds to the literature on the determinants of PEB and makes recommendations that can improve the PEB at workplace.*

Keywords: *Paternalistic leadership, pro-environmental behaviour, workplace, GHRM, LMX*

Introduction

The 21st century is evidence of the strong involvement of many stakeholders in environmental problems across the globe. The current situation has indicated organisations to be more innovative and constructive in seeking ways and strategies for coping with ecological footprint reduction and coping with the economic issues. Researchers say that companies must fit into the social, environmental, economic and financial dimensions in order to achieve success within the corporate community and promote the shareholders' benefit gain (Daily, Bishop & Steiner, 2007; Govindarajulu & Daily, 2004). Besides that, an organisation's performance has also connected to its central asset, employee behaviour (Reza et al., 2014). HRM is therefore an important management function which deals with an organisation's most valuable asset which is human resources. In the light of the overall sustainability, the entire HRM context is currently being considered. As a very significant aspect of sustainability, this explicitly applies to the term green human resource management (GHRM).

Thus, this paper aims to identify past research that discuss the effects of organisational factors that are leadership and GHRM on PEB.

Based on past research, many have suggested that role models will give impact to pro-social behaviour (Brown et al., 2005). Additionally, Paillé and Boiral (2013) supported that environmental leadership and green policies effectively promote PEB among employees, while Graves et al. (2013) suggested that managers with highly transformational leadership can increase employees' motivation to engage in PEB and vice versa. However, the association between GHRM and PL is not well-established in the past literature. Hence, the authors decided to investigate the role of GHRM as a moderator in the relationship between PL and employee environmental performance in the PEB context, via GHRM.

Problem Statement

Malaysia, is said to have poor environmental performance according to the Global Environmental Performance Index (EPI), where it is ranked as the 25th in 2012, 51st in 2014 and recently 68th in 2020 (Wendling et al., 2020). EPI is measured according to its categories of environmental health and ecosystem vitality, which the 100% score is the best. In Malaysia, the lowest score was contributed by ecosystem vitality which one of the components is pollution emission,41% (Environmental Performance Index, 2020). This percentage brings the individual component to the rank of 134 over 180 countries.

The source of pollution emission may come from improper waste disposal (Abdel-Shafey & Mansour, 2018). For example, Sungai Kim Kim in Johor, Malaysia, was polluted with toxic waste in 2019 (The Star, 2019). The incident occurred due to irresponsible companies who dumped their waste unethically. Such incidents can be prevented if going green awareness is practised. The GHRM practices allow employees to be trained appropriately on toxic waste management in an environmental-friendly way without harming other creatures (Mandip, 2012). This give the reason why it is important to study about PEB's importance and green practices at the workplace, especially when past researches have suggested that environmental behaviour among Malaysians is still low, specifically in air pollution and waste management (Neo et al., 2016).

Jia et al (2018) found that leadership style has impact on the pro-environmental behaviour among employee. Recently, when there is an emerging of green awareness in corporate culture, transformational leadership (TL) has been widely studied in relation with PEB as compared to other leadership styles (Saleem et al., 2019; Mukoza and Swartz, 2019; Hadi and Rasool, 2018; Wang et al., 2018; Priyankara et al., 2018; Robertson and Barling, 2013; Graves et al., 2013). The general wellbeing of organisations and a nation is greatly contributed by leadership factor (Odumeru and Ifeanyi, 2013). A few decades ago, studies about different leadership styles have already existed in the literature such as charismatic, authentic, transformational, and transactional. Popli and Rizvi (2015) proposed that great leaders will maximise their influences by switching between the styles accordingly. Organisational culture can be transferred to employees through examples shown by their leaders (Schein, 1995). This means that role models impact the pro-social behaviour (Brown et al., 2005). In pro-environmental behaviour (PEB), as it is in the context of voluntary behaviour, there is no obligation for employee to engage in these behaviours but the managers can encourage the employees to engage in PEB. This is supported by Paille and Boilar (2013) who stated that environmental leadership and

green policies are effective ways to promote PEB among employees. Graves et al. (2013) also suggested that managers in high transformational leadership will increase motivation among employees in engaging PEB, vice versa. PL is known as 'father-son' leadership which found has positive However, the association between PL and employees' PEB is not well-established in the past literature, so the author decided to investigate the role of GHRM as moderator in the relationship between PL and employee environmental performance in the context of PEB.

Research Questions and Research Objectives

The purpose of the conceptual study is to reveal the relationships between PL, PEB, and the GHRM at the workplace in Malaysia. Therefore, the following research questions will be addressed:

i) Is there a relationship between PL and employees' PEB at the workplace?
ii)Does GHRM moderate the relationship between PL and employees' PEB at the workplace?

Significance of the Study

Since the PEB contributes to the green goal of an organization, it is important to study the factor affecting the behaviour. Leadership is known to have influence in shaping employee behaviour. This study therefore explores the impact of PL on PEB with the existence of GHRM at workplace. Results of this study can be used as a reference by the management of an organization to achieve their goal. In line with the above explanation, this study is significant for new knowledge for the academia and industries and improving implementation of current practices.

The Ability-Motivation-Opportunity (AMO) Theory

The theory of AMO, as suggested by Applebaum et al., (2000), focuses on helping to select an HRM activity that improves organisational success. According to Gerhart (2005), a good choice of HRM practise is important for the conscious development of employee skills (selection, recruiting and training), motivation (performance-related pay) and opportunities to act (emphasis of teamwork and suggestions). Katou and Buddhwar (2010) divided HRM activities into three classes, i.e. HRM mechanisms that affect the desire to perform, the motivation to perform, and the ability to perform. Finally, in this vein, Rauch and Hatak (2016) have systematised and specifically described and differentiated HRM activities into three distinct classes, i.e. skills, motivation and empowerment. Abilities enhancing HRM activities (Subramony, 2009) are aimed at increasing the level of expertise, skills and skills within the business, thereby allowing employees to do their job properly. This community consists of two subgroups i) HRM practises that concentrate on expertise and that are mainly task selection, and (ii) HRM practises that concentrate on information and skills development. These can be influenced by interventions, in particular on training and coaching (Schmitt, 2014).Motivation-enhancing activities are, in essence, designed to steer employee actions towards the goals of the company through the use of an acceptable set of rewards. These include, but are not limited to, performance management, compensation, motivation and reward activities (Jiang et al., 2012). It should be noted that motivation-enhancing activities vary from organisational behaviour literature (Deci and Ryan, 1985), which focuses primarily on extrinsic motivation by concentrating on rewards and benefits. Finally, empowerment-enhancing activities focus on

the growth of employee autonomy, engagement in the decision-making process, as well as the employee accountability and input mechanisms (Mathieu, Gilson, & Rudy, 2006; Wood & Wall, 2007).

Literature Review and Hypothesis Development

Pro Environmental Behaviour at Workplace

Pro-environmental behaviour (PEB) is considered as one of the approaches that can be taken by organizations in order to reduce their adverse ecological impact. This is because PEB which also known as personal actions by the individuals and with the supports from their organisations can help to improve the environment (Blankenberg & Alhusen, 2018). Employees are considered agents of implementing organisational change regarding green initiatives and policies in many aspects (Dumont et al., 2017) because improving environmental sustainability and its success are dependent on employees' PEB (Saeed et al., 2019).

Prior studies have empirically suggested that the ability to perform work in environmentally conscious behaviour is important, thus it is becoming crucial for organizations to develop such behaviour among their employees (Afsar et al., 2018; Chaudhary, 2019; Cheema et al., 2019; Fawehinmi et al., 2020). Further, other literatures have pointed that some of the benefits for organization which practice PEB, (Fatoki, 2019) their employees will (i) promote and enhance natural environment which will help a long-term survival of the world. (ii) give positive impact to financial implications in terms of reducing costs and improve financial, environmental and social performance. However, the evidence on how, why and when employees adopt these behaviours is still undiscovered or remains inconclusive (Dumont et al., 2017; Saeed et al., 2019; Fawehinmi et al., 2020).

Paternalistic Leadership and Its Effect on Pro Environmental Behaviour

Based on past studies, PL can be understood as comprising authoritarianism, benevolence and morality (Aycan, 2006; Farh & Cheng, 2000; Farh et al., 2006).

Authoritarian leadership (AL) is distinguished by the actions of a leader to claim absolute power and influence over subordinates, and to seek unquestioned loyalty, conformity and appreciation from subordinates (Niu et al., 2009). Benevolent leadership (BL) is defined by the presentation by a chief of individualized, proactive consideration for the work and personal well-being of subordinates (Niu et al., 2009). It is seen as the duty of a chief to look after subordinates. Moral leadership (ML) is defined by a leader's actions which demonstrates superior moral character and dignity by selfless acts and leading by example (Niu et al., 2009). They show *shuh-der* habits to direct subordinates, such as improving honesty and dignity and guiding through example (Cheng et al., 2004; Erben and Guneser, 2008; Farh and Cheng, 2000).

The authors have interest to investigate further on paternalistic leadership as it has proven to have impact on organizational behaviour and organizational commitment (Unler & Kilic, 2019; Dedahanov, 2019; Nazir et al, 2020). Although research on paternalistic leadership has increasingly become popular within the past two decades (Pellegrini & Scandura, 2008), there are limited knowledge on its effect to pro environmental behaviour at workplace. Literature

suggested paternalistic leadership as "a style that combines strong discipline and authority with fatherly benevolence" (Farh & Cheng, 2000). This has been argued by Max Weber (1947) about the limitation of this paternalistic system, which it is focused to obedience to the leader by virtue of his or her status, and closed to elementary types of traditional domination. However, studies from the Asia opposed Weber's purely authoritarian view and argued that paternalistic managers provide support, protection, and care to their subordinates (Redding et al.,1994). Thus, the following hypothesis has been posited.
H1a: There is a negative influence of AL on employees' PEB at the workplace.
H1b: There is a positive influence of BL on employees' PEB at the workplace.
H1c: There is a positive influence of ML on employees' PEB at the workplace.

GHRM As Moderating Effect

Organizations can utilize human resource management to effectively deliver and implement environment friendly policies because it has the ability to measure and influence employee environment-related behavior, attitudes, knowledge, and motivation (Guziana & Dobers, 2013; Jabbour et al., 2013). In fact, past literatures have also given their concerns on the effects of environmental management activities from GHRM practices which can enhance its alignment with environmental management (Jabbour et al., 2013). O'Donohue and Torugsa (2015) revealed that GHRM positively moderates the association between proactive environmental management and financial performance.Globally, the respect for the atmosphere drives businesses to adopt GHRM activities, namely climate management dimensions of HRM, to encourage sustainable occupational actions among workers (Renwick et al., 2013). However, there is no published research, in either the large or small firm context, that tests the moderating effect of Green HRM specifically on the association between paternalistic leadership (AL,BL,ML) and employee pro-environmental behaviour at workplace. Accordingly, in order to address this research gap, and in line with the above discussion, we propose the following hypothesis for testing:

H2a: The relationship between AL and employees' PEB is positively moderated by GHRM.
H2b: The relationship between BL and employees' PEB is positively moderated by GHRM.
H2c: The relationship between AL and employees' PEB is positively moderated by GHRM.

Research Methodology

This article used an archival method based on literature reviews from journal articles, proceedings, theses and books to understand the existing studies of PL and PEB at the workplace to propose a conceptual framework. The keywords searched in the search engines such as Scopus, WoS and Google Scholar were "paternalistic leadership" "green human resource management", "pro-environmental behavior", "green behavior"and "ability-motivation-opportunity theory".

Conceptual Model Development

This conceptual study attempts to determine the relationship between PL (AL,BL,ML) and PEB and whether the relationship is moderated by GHRM. Studies have been undertaken on several models established by other authors. The conceptual model shown in Figure 1 is the combination study of O'Donohue and Torugsa (2015) and Unler and Kilic (2019). O'Donohue

and Torugsa (2015) investigated the moderating effect of GHRM on financial performance. On the other hand, Unler and Kilic (2019) determined the relationship between PL and organizational commitment. Therefore, the study proposed the conceptual model as shown in Figure 1:

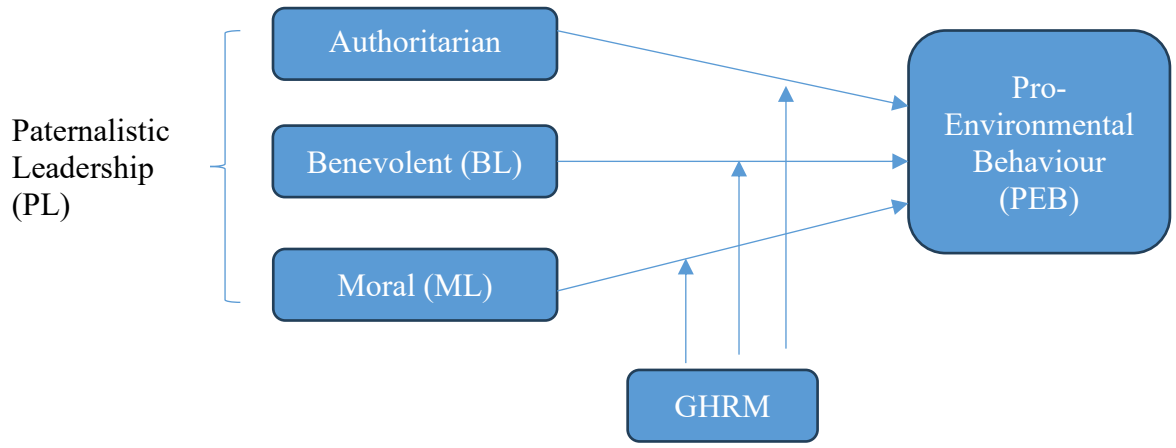


Figure 1: Proposed Research Model

Conclusions and Recommendations

Although great number of publication and study focuses on individual PEB, but this topic still need further attention by the researchers, especially when it is related to how leadership and green practices can be used to influence the PEB. In this paper, the discussion is focus from the organisational factors, specifically from the views of paternalistic leadership and GHRM in influencing PEB. Few researchers have studied the direct influence of GHRM practices and policies on PEB at work (Pellegrini et al., 2018; Pinzone et al., 2016), but as far as we know, the direct influence of PL on PEB was not explored especially among businesses in Malaysia. Also, the moderating effect of GHRM in the relationship between PL and PEB also has not been examined previously.

This paper proposed this relationship with the understanding that in order to enhance the role of PL on PEB, the organisation must put attention in promoting green practices in their HRM functions that is GHRM, especially when this green practices promise energy saving and environmental friendly conditions. Further, it is anticipated to enhance the knowledge in this area of PL, GHRM on PEB at work.

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THE EFFECT OF TASK REPETITION ON ORAL FLUENCY AND ACCURACY IN SECOND-YEAR STUDENTS AT UFLS, UDN

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Abstract: *This study investigates the effect of task repetition on oral fluency and accuracy in second-year students at the Faculty of English, University of Foreign Language Studies (UFLS), the University of Danang. Recognizing that developing oral fluency and accuracy in speaking remains a challenge for L2 learners, particularly second-year students, this research aimed to determine if repeating oral tasks would lead to significant improvements in these areas. A control experiment was conducted with a sample of 24 second-year students who engaged in a series of oral tasks designed to assess both fluency and accuracy. The study compared a task repetition (TR) group with a control group. Oral fluency was measured as speech rate (meaningful syllables per minute), and oral accuracy was measured as the percentage of error-free clauses. The analysis of the data revealed a statistically significant positive effect of task repetition on the accuracy of the TR group in the second trial of the task. It also suggested that learners in TR group had greater accuracy compared to ones in control group. These results indicate that repeating the task facilitated a reduction in errors and an increase in the production of error-free clauses. However, the study did not find a statistically significant effect of task repetition on speech rate. The study concludes that task repetition can enhance accuracy in monologic speaking tasks, but its influence on fluency, as measured by speech rate, was not statistically supported in this context.*

Keywords: *task repetition, oral fluency, oral accuracy, task-based language learning, L2 language learning*

Introduction

Speaking skill as a second language has increased significantly in the past few years, yet 'the ability to speak English fluently and accurately remains a goal for the majority of the English language learner.' (Rahayu et al., 2020). This is also the target for many English-majored students, particularly students at Faculty of English, the University of Foreign Language Studies to achieve. However, it is challenging to speak English fluently and accurately, even for students who specialize in English. Thus, developing an approach that can improve ones' oral fluency and accuracy will help them master English speaking skill.

The effect of task repetition is often identified through cognitive processing theories. When learners perform a task, their cognitive resources are heavily engaged in conceptualizing, formulating and articulating the message linguistically, which leads to limitations in accuracy and fluency due to the limited attentional capacity (Skehan, 2009). However, upon repeating

the task, learners now benefit from having already processed the message content, helping them free up cognitive resources. This allows learners to shift their attention towards the linguistic aspects of their output, such as word choice, grammatical structure, and pronunciation.

Despite the growing body of research on TBLT and TBLL, there is a significant gap in understanding the specific benefits of task repetition in enhancing oral fluency and accuracy in performing descriptive tasks in certain materials. Moreover, improvements in accuracy and fluency through task repetition are inconsistent across studies. This results in whether there are any specific conditions for consistent accuracy and fluency gains with repetition for learners. To address this, the current study aims to investigate the effect of task repetition on oral fluency and accuracy in sophomore students of ULFS.

Literature Review

Definition of Task

The notion of 'task' has been considered one of the central activities in classroom environment, which varies in numerous studies. Branden (2016) indicate that task or pedagogic task in terms of language learning is considered to an activity working towards a goal and requiring to use language meaningfully. Another definition by Patanasorn (2010) show that individuals use language with the intention of attaining personal, social, or professional goal, resulting in the language used needs to have meaning. Samuda and Bygate (2008) quotes: "A task is a holistic activity which engages language use in order to achieve some non-linguistic outcome while meeting a linguistic". The shared idea in these definitions seems to align with the explanation of what 'a task' is by Skehan (1998). In his study, the theory of task is determined following criteria: the primary focus of meaning, a definite goal, outcome-evaluated activities, the existence of real-word relationship (Skehan, 1998).

The consensus among authors on the concept of 'task' is evident. The criterion of meaning-driven results in task performance seems to be accepted by most of the researchers (Bygate et al., 2001; Ellis, 2003b; Nunan, 2004). The task outcome is also one of the major points among the discussion of task, which they think that the outcome should be non-linguistic (Ellis, 2003b; Long & Porter, 1985). Although the task – real life relationship remains controversial, it does not affect the definition of task in current study as task will be remained strictly in the classroom environment. All previous reasons lead to the term 'task' in current study defined as learning or teaching activities utilized in classroom environment aiming to reach a non-linguistic goal, where students can use language with meaning and thus, their learning could be improved.

Accuracy and Fluency in terms of Task-based Research

In task-based research, accuracy within the CAF framework generally refers to the ability of a language learner to produce language that conforms to the norms of the target language and avoid errors in their performance. (Ellis, 2003b; Lennon, 1990; Skehan, 1996a). It seems to be the oldest, most transparent and most consistent amongst these dimensions, reflecting a learner's level of control over the language system. It can also indicate a more conservative approach to language production, where learners might avoid challenging structures to minimize errors. In Ellis's work (2009), accuracy is defined as "the ability to avoid error in performance, possibly reflecting higher levels of control in the language as well as a conservative orientation, that is, avoidance of challenging structures that might provoke error".

In task-based research, accuracy, or grammatical accuracy are measured by the proportion of errors produced in varied task conditions as indices of learners' attention to form (Lambert & Kormos, 2014). They also mention two approaches that are commonly applied to calculations of the errors: the ratios of errors in a text to production units such as words, clauses and sentences; and the proportion of error-free production units. Ahmadian (2011, pp. 274–275) used the measure of his previous research (Ahmadian & Tavakoli, 2011) on the same topic. He pointed out that accuracy is calculated by the percentage of the clauses that were not erroneous (error-free clauses) and the percentage of all verbs which were used correctly in terms of tense, aspect, modality and subject-verb agreement.

Fluency, in the current literature, refers to the L2 learners' ability to process language with "native-like rapidity" (Lennon, 1990, p. 390), or particularly as characterized by the perceptions of the ease, eloquence, and smoothness of speech or writing (Chambers, 1997).

Ellis (2009) mentioned fluency as "the capacity to use language in real time, to emphasize meanings, possibly drawing on more lexicalized systems. Fluency can be viewed broadly or narrowly in L2 speech. Fluency is also often taxonomized as break-down fluency (pausing behaviors, numbers of pause, or length of pause), speed fluency (rate of delivery and density of linguistic units), and repair fluency (false starts, the frequency of repetitions, self-corrections, and misformulations). (Bosker et al., 2013; Skehan, 1998, 2009; Tavakoli & Skehan, 2005). Speech rate is one of the most common measures used in task-based research in terms of fluency. It is often calculated as ratios of syllables produced to the duration to produce such. Ahmadian (2011) refers his measures of fluency as numbers of syllables produced per minutes, calculated by the number of syllables and divided by the number of seconds used to complete the task and multiplied by 60, and number of meaningful syllables per minutes, with the same procedure but the repeated, reformulated, or replaced syllables, words, and phrases be excluded. In another study by Kim and Tracy-Ventura (2013), fluency was measured by the number of syllables per minute and the number of reformulations per minute.

Task Repetition

Bygate and Samuda (2005, p. 43) defined it as the approach involving asking L2 learners to repeat the same or slightly altered tasks at intervals of one or two weeks. Ellis (2005) was of the same opinion as she quotes 'task repetition is a kind of planning that refers to the repetition of the same or slightly altered task'. Task repetition is arguably 'a kind of planning' (Ellis, 2005) and 'has the potential to lead to integration of knowledge and performance', which could "facilitate changes, particularly in the phases of conceptualization and formulation in the production process" (Bygate & Samuda, 2005). During task, two phases of task repetition is theorized as a first execution of task, involving the organization of cognitive content, structural grammar, and lexical units, thus, producing the multifaced, cognitive layout for the articulation phase (Bygate & Samuda, 2005). Then, in the second execution of task, as they mention, learners now can correct the conceptualization and formulation process of their first performance. Task repetition is proved to provide L2 learners opportunities for language learning process, therefore, allows them to improve their use of target language, particularly for the appropriateness and the linguistic structure of the language (Cook, 1994). Bygate (2001) mentions that task repetition helps learners shift their attention to linguistic forms in their second task performance as the task content can be more familiar gradually (Bygate, 1996),

leading to the more attentional resource are available that learners can use to focus on their forms, words selections, appropriate grammatical structure or mistakes in their first performance.

The study

Research question

- Does task repetition lead to the improvement of L2 learners' oral fluency and accuracy when performing a new task?
- How does task repetition lead to the improvement of L2 learners' oral fluency and accuracy in the second trials of task repetition (TR) group?

Hypothesis

- Hypothesis 1: Students in the task repetition (TR) group are expected to gain oral accuracy compared to the control group.
- Hypothesis 2: Students in the task repetition (TR) group are expected to gain oral fluency compared to the control group.
- Hypothesis 3: Second-year students' oral accuracy gains are expected upon the second performance of the discussion task.
- Hypothesis 4: Second-year students' oral fluency gains are expected upon the second performance of the discussion task.

Methodology

Research Design

This research adopted quantitative research design and experiments. With the aim to investigate the effects of the task repetition on L2 learners' oral fluency and accuracy, the research design included a control experiment conducted on learners of Faculty of English at UFLS.

Participants

The experiments conducted on 24 second-year students at the Faculty of English, UFLS. The participant included Vietnamese native speakers, using English as the second language for learning. 24 participants in this study were students participating in the English skills course in the university. A one-way ANOVA test was conducted on the participants' oral task performance, specifically on task 1 to realize the homogeneity of control and experimental group in the context of level of proficiency. The results of homogeneity of variances, which is shown in Table 1, indicated that there were no significant differences between both groups in accuracy (error-free clauses $F(1,22) = .271$; $p = .608$) and fluency measures (speech rate $F(1,22) = .155$; $p = .697$). The alpha of all the statistical analyses was set at .05, which represents a 95% confidence level for the results of the research.

Table 1: The homogeneity of the participants

	Control n = 12		TR n = 12		F(1,22)	p
Measure	**M**	**SD**	**M**	**SD**		
Accuracy						
The Percentage of Error-free Clauses	.70	.13	.67	.16	.271	.608
Fluency						
Speech Rate	154.7	31.1	149.1	39.5	.155	.697

Research Instrument

The instruments employed in this study are topic-related, monologic speaking tasks in the form of a cue card, which replicates the IELTS Speaking Task 2 as participants in the current study have familiarized with the exam format. Three tasks were chosen and given to all groups in the experiments, which were used for the 3-week intervals of the research.

The study also used a recorder-like device to record the speaking of all participants, which was transcribed and analyzed later to examine their fluency and accuracy. The monologic description task was picked due to several reasons. First, the familiarity of description tasks was evident in the context of learning speaking skills at UFLS as they were already lectured in the Pathways 3 textbook. Hence, the task training for participants is not necessary for validity of this research. Second, the monologic task was proved to be more controllable for measuring fluency and accuracy as it requires the simpler pragmatic needs for preparation (Tavakoli, 2016). In addition, monologue task type does not require the interaction between students or students and other interlocutors. This made monologues more accessible for the methodology in investigating the effect of task-based activities on L2 learners' oral fluency and accuracy.

Finally, monologic description task was aligned with the practical needs of L2 learners (Crowther et al., 2015), particularly amongst second-year English-majored students at Faculty of English, UFLS since the majority of the students learn language for the purpose of attending English test like IELTS for their graduation requisite. This is more appropriate with the intention of the current study compared to picture-description task type, which are widely used in numerous previous research on the effect of task repetition (Bygate, 2001, Ellis & Yuan, 2005; Foster & Skehan, 1996; Gass et al., 1999; Tavakoli & Foster, 2011; Tavakoli & Skehan, 2005). Moreover, the description task was integrated into the curriculum of the UFLS as well as frequently appeared in the Pathways 3, a course book used as fundamental materials for teaching speaking in UFLS and background for the current study, reflecting the real-word language use that are often mentioned in theories related to task-based activities or approaches (Ellis, 2003b; Long & Porter, 1985; Nunan, 2004; Oxford, 2006).

Research Procedure

The control group, consisting of 12 students, was assigned a task on a specific topic. The students will be required to answer the question (referred to as Task 1) in approximately 2 minutes. All the speeches will be recorded and transcribed for analysis. A week later, they were given a question of a different topic (referred to as Task 2) and followed the same procedure: answering the question, recording their responses, and providing full transcripts. After another week, the group received a question of another topic (referred to as Task 3) and proceeded

similarly. The experimental group, including 12 students, was assigned a particular topic question (Topic 1). All the speeches were recorded and fully transcribed for analysis. After one week, the experimental group were asked to repeat Task 1, and their responses were recorded and fully transcribed. After repeating Task 1, the group was given a new question, Task 2, and the same procedure was followed. After another week, they were required to repeat Task 2, perform the same process, and get a new question, Task 3, on which the same procedure will be followed.

Measurements of the Dependent Variables

The percentage of error-free clauses was used, following the same measurements of Ahmadian (2011) and Almadian & Tavakoli (2011). This approach was chosen due to several reasons. Firstly, accuracy is often defined as the ability to produce language free from errors in grammar, lexicon, and morphology as mentioned before in the study. Thus, measuring the percentage of error-free clauses directly assesses this ability by quantifying the proportion of a learner's output that adheres to target language norms. Secondly, the percentage of error-free clauses is a frequently adopted measure of accuracy in studies investigating the effects of different pedagogical interventions like task repetition (Ahmadian & Tavakoli, 2011; Ellis & Yuan, 2005; Kim & Tracy-Ventura, 2013), allowing for comparisons across different studies. Finally, this measure offers an overall picture of how accurate a learner is across their language production, encompassing various linguistic aspects within the clause - Accuracy: The percentage of error-free clauses. The percentage is calculated by the number of error-free clauses divided by the total number of clauses multiplied by 100.

Errors can be defined broadly to include syntactic, morphological, and lexical deviations from the target language norm (Ahmadian, 2011).

The study employed speech rate as the measure of fluency due to several factors. Firstly, speech rate, typically calculated as the number of syllables or words produced per minute, directly indicates how quickly a learner is speaking. A faster speech rate is often associated with more fluent speech. Secondly, several studies have found that speech rate correlates highly with native speakers' perceptions of fluency. Listeners often perceive speakers with a faster rate of speech and fewer pauses as more fluent. For instance, studies by Derwing et al (2004) and Kormos and Dénes (2004) found speech rate to be a strong predictor of rater judgments of fluency. Finally, speech rate is a widely adopted measure in studies investigating second language fluency (Ahmadian, 2011; Ahmadian & Tavakoli, 2011; Derwing et al., 2004; Ellis & Yuan, 2005; Kim & Tracy-Ventura, 2013; Lambert & Kormos, 2014). Its prevalence allows for comparisons across different research findings.

-Fluency: speech rate. the number of meaningful syllables per minute, considering both amount of speech and length of pauses. It is calculated by the number of syllables produced without repeated, reformulated or rephrased syllables, sentences, phrases and words, divided by the time taken to complete speech and multiplied by 60.

Results

Oral Accuracy and Fluency Performance when Performing a New Task

The TR Group's Oral Accuracy in Comparison to Control Group's

Regarding accuracy in the task performance, an independent samples t-test revealed a statistically significant difference in accuracy between the control group and the task repetition (TR) group (t(22) = -2.97, p = 0.007). Specifically, the TR group (M = .82, SD = .06) demonstrated significantly higher accuracy compared to the control group (M = .66, SD = .17). Thus, it is concluded that the effect of task repetition on the oral accuracy of the participants was evident, and the TR group was more accurate in the task performance. This result responded to the first question of the study investigating the effect of task repetition on oral accuracy of L2 learners. Table 2 includes the statistics details.

Table 2: Difference in Accuracy between Control and TR Groups when Performing a New Task

Measure	Control		TR		t(22)	p
	M	SD	M	SD		
Percentage of Error-free Clauses	.66	.17	.82	.06	-2.9	.007

The TR Group's Oral Fluency in Comparison to Control Group's

In terms of fluency, although the descriptive statistics of the TR group showed that it could outperform control group in fluency, the independent t-test shown in Table 3 indicated that the difference between control and TR groups for speech rate (t (22) = .358, p = .724 > 0.05) was statistically not significant. In conclusion, the result revealed that there were no differences in fluency between control group (M = 164.2, SD = 34.2) and the TR group (M = 159.2, SD = 38.04), and the task repetition did not lead to more fluent language when performing tasks, which answered the first question of the study whether task repetition leads to more fluency.

Table 3: Difference in Fluency between Control and TR Groups when Performing a New Task

Measures	Control		TR		t(22)	p
	M	SD	M	SD		
Speech Rate	164.9	34.2	159.6	38.04	.358	.724

Oral Accuracy and Fluency when Performing Repeated Task in Different Trials

The TR Group's Oral Accuracy in the Second Trials of Task 1 and Task 2

In Table 4, the paired samples t-test revealed a significant difference in accuracy between two trials of Task 1 with the interval of one week. With the t(11) = -4.55; p = .001 < .005 and the test showed a negative mean difference, the percentage of error-free clauses in the second trial of Task 1 (M = 0.81, SD = .04) outperformed the first execution (M = .64, SD = .13) in terms of percentage of error-free clauses (Table 5). Therefore, it is concluded that the TR group was able to elicit more accurate language when performing Task 1 again. In other words, the effect of task repetition on participants' oral accuracy was evident in helping participants avoid clausal–level errors.

Table 4: Results of Paired Samples Test of Task 1 Performance in terms of Accuracy

Pair	M	SD	t(11)	p
Task 1 - 1st – 2nd Trial	-.167	.12	-4.554	.001

Table 5: Percentage of Error-free Clauses of Task 1 Performance in First and Second Trials

Error-free Clauses %	M	SD
Task 1 - 1st Trial	.64	.13
Task 1 - 2nd Trial	.81	.043

Table 6 shows the results of paired samples t-test on the measures of accuracy in performing Task 2 repeatedly in the period of one week. The results indicated that there was a significant difference between the first and second trials of Task 2 performance for the percentage of error-free clauses ($t = -5.395$, $p < .001$). With a negative mean difference in the paired samples test ($M = -.128$, $SD = .082$), the percentage of error-free clauses of Task 2 performance in the second trial ($M = .83$, $SD = .04$) exceeded that of the same group in the first trial ($M = .71$, $SD = .09$), shown in Table 7. Thus, the statistics showed that the TR group could produce more accurate language when repeating Task 2, or specifically, the effect of task repetition on oral accuracy of the participants in performing Task 2 was considerable.

Table 6: Results of Pair Samples Test of Task 2 Performance in terms of Accuracy

Pair	M	SD	t(11)	p
Task 2 - 1st – 2nd Trial	-.128	.08	-.180457	.000

Table 7: Percentage of Error-free Clauses of Task 2 Performance in first and second trials

Error-free Clauses %	M	SD
Task 2 - 1st Trial	.71	.094
Task 2 - 2nd Trial	.83	.045

The TR Group's Oral Fluency in the Second Trials of Task 1 and Task 2

Regarding the oral fluency in the performance of Task 1 in two trials, the results of paired samples test showed that there was no significant difference between the first and second trials of Task 1 performance for speech rate ($t(11) = -.942$, $p = .366 > .005$) (Table 8). Although the difference was insignificant, shown in Table 9, the speech rate of the second performance of task 1 ($M = 153.1$, $SD = 39.1$) did outweigh the speech rate in the first trial ($M = 149.1$, $SD = 39.5$). In conclusion, the effect of task repetition on participants' oral fluency when performing Task 1 again after one week was irrelevant, or the repetition of Task 1 did not lead to more fluent language production of the participants.

Table 8: Results of Pair Samples Test of Task 1 Performance in terms of Fluency

Pair	M	SD	t(11)	p
Task 1 - 1st – 2nd Trial	-4.06	14.94	-.942	.366

Table 9: Speech Rate of Task 1 Performance in First and Second Trials

Speech Rate	M	SD
Task 1 - 1st Trial	149.1	39.5
Task 1 - 2nd Trial	153.1	39.1

In terms of fluency in Task 2 performance in two trials, the statistics of paired samples test revealed no significant difference between first and second trial of the Task 2 performance for speech rate (t = 1.01, p = .331) (Table 10). The speech rate between two trials in this performance emerged a different picture compared to the performance of Task 1 since in the first trial of Task 2, participants showed that they were able to produce more fluent language in comparison to the second performance, with a mean speech rate of 168.5 in the first performance and 154.4 in the second performance (Table 11). It is thus concluded that the effect of task repetition on participants' oral fluency was insignificant, and the repetition of Task 2 did not affect participants to elicit more fluent language.

Table 10: Results of Paired Samples Test of Task 2 Performance in terms of Fluency

Pair	M	SD	t(11)	p
Task 2 - 1st – 2nd trial	14.04	47.7	1.01	.331

Table 11: Speech Rate of Task 2 Performance in the First and Second Trials

Speech Rate	M	SD
Task 2 - 1st Trial	168.5	39.8
Task 2 - 2nd Trial	154.4	33.4

Discussion

The Effect of Task Repetition on L2 Learners' Oral Accuracy and Fluency When Performing a New Task

The results of the analysis suggested that the TR group was able to produce more accurate output than the one produced by the control group in the performance of a new task. It was possible that the effect of task repetition did transfer when speakers were required to perform new tasks. There were some explanations for this situation. One of them was that L2 learners could build on their cognitive frameworks, grammatical structures, or sets of vocabulary based on what they had experienced in the first encounter of task, leading to the possibility of producing more accurate language in their second trial. This seemed to be aligned with Bygate's findings (2001). He also suggested that the basis of how task repetition can assist leaners' performance simply comes from the fact that learners were able to keep in their memory part of the conceptualization, formulation and articulation work in the first enactment of the task and use it on the second performance. Another possibility could be that task repetition provided the opportunity of enhanced monitoring that allows learners to be more aware of their errors made in the first attempt of speaking. The second attempt, thus, provides the opportunity to test hypotheses about correct language use and potentially avoid making errors made in the first place.

The descriptive analysis of the study revealed that task repetition did not assist learners to produce more fluent language as the difference between control and TR group in oral fluency was not significant. There were possible reasons for this phenomenon. One possible explanation was that although leaners were potentially beneficial from task repetition in the way that it could enhance their oral performance, the effect of repetition did not necessarily transfer to all areas of performance that in this situation, learners did not benefit from the impact of task repetition on their oral fluency. This finding is in consistent with Ahmadian's (2011).

Another possibility was that due to the fact that the fluency gains of L2 learners through task repetition was not found in the current study, it suggested that the benefits of task repetition on oral fluency might require more than one or two repetitions or a longer interval for gains to become considerable. For instance, in the study of Ahmadian (2011), he conducted a "massed task repetition" with six months interval to examine its effect, and the results of that study revealed that the experimental group outperformed control group in fluency. Lambert et al (2017) also suggested that task repetition could effectively enhance speech fluency on different measures. However, these measures might show changes in different rounds of repetition.

The Effect of Task Repetition on L2 Learners' Oral Accuracy When Performing Repeated Tasks

The current study found a positive effect of task repetition on the oral accuracy in second-year English-majoring university students in UFLS, which aligns with findings from studies (Bygate, 1996; Lynch & Maclean, 2001; Ahmadian, 2011; Ahmadian & Tavakoli, 2011; Sample & Michel, 2015; Kim & Tracy-Ventura, 2013; Fukuta, 2016; Bozorgian & Kanani, 2017; Anh & My, 2024; Nguyen et al., 2023). And there are several possible explanations for the results. One prominent reason is that in the first performance of a task, learners primarily focus on conceptualizing the meaning and formulating the message, relating to Levelt's model of speech production that the current study were using. Learners during this occasion are more likely to focus on the planning of the message that they are going to say. However, this initial cognitive load might limit their attention available for monitoring their linguistic accuracy. This phenomenon aligned with the situation that Bygate (1996) mentioned. He believed that because learners often rely on their automatic cognitive abilities when conceptualizing and formulating language in their first try, they are more prone to producing less accurate language. But in the second attempt, learners are now able to produce language output with better accuracy due to the fact that they are more cognitively familiar with the content or the structure of the task, and they are more prepared as they know beforehand what vocabulary they should use, what grammatical structure would be suitable for the topic of the task (Bygate & Samuda, 2005), and their planning time are less compared to the first performance (Bozorgian & Kanani, 2017). The freeing up of attentional resources now allows learners to shift their focus towards the linguistic form, including grammar and word choice, leading to improved accuracy in the second performance.

Case Studies of Accuracy Performance

Two participants, namely Participant 1 and Participant 2, were selected for the analysis of case studies, which helped the researcher to explore possible explanations for the findings. There were two reasons these two cases were chosen. First, due to the limited space of the thesis, the investigation in all cases would be impossible to follow, leading to the lengthy and

unnecessarily wordy explanations. Second, these two participants were able to represent the two different situations of task repetition that were used to give some possible explanations for the study as Participant 1 represented an increase in accuracy when conducting task repetition of the same content, while Participant 2 showed a mixed result in accuracy during the task repetition of the same task, but different stories, resembling the purposive sampling.

Here are the transcripts of the participants selected to provide a more detailed analysis of the explanations. In the transcript for the first performance of one participant (namely Participant 1), the participant made some grammatical mistakes and poor word choice.

Extract 1: Participant 1's First Performance of Task 1

So, one of the most enjoyable shopping ***experience*** *that I* ***have*** *was during uh* ***a*** *trip to Tokyo last spring. I usually go when I* ***travels*** *and I love to explore new* ***store*** *and find unique* ***item*** *that are not available in my home uh country. This particular experience took place in uhShibuya, a vibrant shopping district uh known for trendy fashions and cutting edge technology. You know, I was there with my best friends, who share my enthusiasm for shopping. We had planned this day in advance and* ***setting*** *aside a few* ***hour*** *to explore some well-known store, including um a massive* ***multip story*** *department store, and a few independent boutique. I actually ended up buying a stylish leather jacket from a* ***Japanese design brands,*** *as well as um some limited edition sneaker that I've been searching for.*

I also ***pick up*** *a few* ***souvenir*** *and specialty to um bring back to my homes. And I suppose that the one that* ***make*** *this experience truly memorable was not just the incredible variety of the product, but uh it also about the atmosphere. Well, the store* ***were*** *beautifully designed and the staff what exceptionally um polite and helpful. There was a exciting buzz in the air that I can feel is very overwhelming. The fact that I was shopping uh in a city and I* ***has dreaming*** *up uh of visiting make me feel more special. Plus sharing* ***this experiences*** *with my best friend who has a great eye for fashion can even make it more enjoyable. So, I love these shopping trips because* ***it's combined*** *my passion for fashion and it's also with the excitement of being in the news, exotic and dynamic environment. It wasn't just uh about purchasing things, it was about the experience itself from discovering hidden gems to immersing yourself in a different culture. So, that is what* ***make*** *my trip and also my shopping experience it unforgettable.*

It can be easily seen that he[3] often made grammatical mistakes, most of them are using wrong tenses as he was required to describe a shopping experience that he enjoyed. The correct tense to use in this situation was mainly simple past and other tenses depending on the content of the message that he wanted to deliver. However, he was confused whether he should use simple past sentences or other tenses like present perfect (e.g., ***I also pick up***).

Another problem he encountered during the first performance was that he unintentionally mispronounced and missed final sounds, mostly /s/ sound, in some certain words (e.g., ***travels, experiences, were***), causing many mistakes in his first attempt. Additionally, he also used some incorrect words to elicit his ideas (e.g., ***multip story department store, design brands)***.
However, he was able to correct some of his mistakes in his second trials of the task, which can be seen in Extract 2.

Extract 2: Participant 1's second performance of Task 1

So, uh one of the most enjoyable shopping experiences I have had was during a trip to Tokyo last spring. I usually go shopping when I travel as I love to explore um new stores and find unique items that are not available in my home country. And this particular experience uh took place in Shibuya, a vibrant shopping district known for its trendy fashions and uh cutting edge technology. I was there with my best friend who shared my enthusiasm enthusiasm for shopping. We had planned this day in advance and ***setting*** *aside a few hours to explore well-known stores um including a massive multiple story department store and uh a few independent boutiques. I actually ended up buying a solid leather jacket from a Japanese designer local brand as well as some limited leather* ***jacket and sneaker*** *that I have been searching for. Additionally, I picked up some few souvenirs and specialties um to bring back to my hometown. And what made this experience truly memorable was* ***just not um*** *the incredible variety of the product, but* ***it also about*** *the atmosphere. The store was beautifully designed, and the staff were exceptionally polite and helpful, and there was an exciting buzz in the air. The fact that I was shopping in a* ***city has*** *that I have always been dreaming of visiting made it even more special. And I do believe that sharing these experiences with my best friend who has a great eye for fashion and it uh makes it more enjoyable for me. I love this shopping trip because it combines my passion for fashion with the excitement of um being in a new and dynamic environment. It wasn't just about buying some things; it was about the experience itself. From discovering hidden gems to immerging yourself in a different culture, and that is what made it unforgettable.*

Table 12: Participant 1's Accuracy Performance of Task 1

	Total Clauses	Error-free Clauses	Error-free Clauses %
1st Performance	35	23	65.7
2nd Performance	32	27	84.4

In his second attempt, most of the mistakes he made during the first performance were fixed. He seems to have paid attention to the grammatical points he should use depending on the situation instead of confusingly using them. (e.g., '*shopping experience that I have*' → *'shopping experience that I have had'*). He also noticed his tendency to miss the final sounds, particularly /s/ sound at the end of the sentence, and fixed in his second trial (e.g., *'travels'* → *'travel'; 'a Japanese designs brands'* → *'a Japanese designer brand'*). His overall performance was improved as he was more conscious about his problems, and he repaired them in the second try. This finding is in line with Swain's (1985) as he quoted "under certain circumstances, output promotes noticing".

Another reason for his improvement in oral accuracy is that he basically retold the same content of his first trial with some additional information in the second performance, which relieved him from the burden of planning a new story or a new set of vocabulary. This happened because of the nature of the task. The monologic descriptive task used in the current study was designed to replicate the IELTS Speaking Task 2 as mentioned in the previous section. Although the task was pinpointed to a certain topic, there were many ways to complete the task requirements depending on the speakers' experience. This led to the fact that participants could describe a story in the first trial, but telling a different story in the next performance. When conducting the experiment, the researcher already told them that they were encouraged to repeat or retell the same story that they told in their first performance. However, if they wished to deliver a different message, it would also be acceptable. In this situation, participant 1 decided to retell

his original story from the first performance. With increased attentional resources available during the second attempt, he was better positioned to monitor his language production more effectively, allowing him to identify and potentially self-correct errors in his grammar and vocabulary. This opportunity proved to be effective since his performance in the second attempt outweighed his first.

When transferring to another task (Task 2), he showed that his performance was also improved, consistent with his performance in Task 1.

Extract 3: Participant 1's first performance of Task 2

*One of my favorite electronic gadgets would be my iPad, which I have **had it** for around three years. And since the day I got it, I have used this on a daily basis, and it has been **a** indispensable part of my daily routine. I use my iPad for a variety of purposes. It often **serve** as a **way to for** entertainment, such as watching movies, browsing social **medias** and reading ebooks. Um, Additionally, it is extremely useful to uh work and study. I often take notes, organize my tasks and even edit documents on it, which is very convenient. I believe so. And the Apple Pencil, yeah**, is** add even a more functionality. It **allow** me to sketch, annotate PDFs and create digital artwork. And the reason why I use my pass so often is down to its convenience and versatility. Unlike a laptop, it is lightweight and easy to carry around. And yes**, it's offer** a large enough screen for comfortable readings and multitasking. The battery life is impressive as well. It often lasts for around 8 **hour** without needing a recharge. Also, **the smooth** performance and **user friendly** interface make it more enjoyable to use. Uh, whenever I'mworking, studying or just relaxing, spending a little time to let my hair down, my iPad often **come** in handy, which is why I rely on it so much.*

It is noticeable that there were some similar mistakes that he had made in the performance of Task 1. The prominent problem he experienced is his tendency to misuse or miss the /s/ sound at the end of certain words. Another problem that happened in this execution of Task 2 was that he frequently added unnecessary words (e.g., *'it's offer', 'have had it', 'the smooth'*). However, these problems were repaired in his second attempt, which can be seen in the Extract 4.

Extract 4: Participant 1's Second Performance of Task 2

*One of my favorite electronic gadgets is my iPad, which I have owned for around three years, and since the day I got it, I have used it almost daily and it's been an indispensable part of my daily routine. I rely on my iPad for a wide range of **activity**, and it is an excellent source of entertainment, allowing me to watch movie, browse social media and read ebooks effortlessly. Um, additionally, it plays a crucial role in my work and study. I frequently take notes, manage my tag and edit documents with ease. And the Apple pencil further **enhance** its functionality, enabling me to sketch, annotate PDF file and create digital artwork with precision. What makes my iPad so essential is its parable, convenience and versatility. Unlike a bulky laptop, it is light wake and portable and its large screen provides a comfortable experience for reading and multitasking. The impressive battery life **ensure** uh that I can use it for an extend this period without worrying to recharge it. Moreover, its smooth performance and intuitive user interface **make a very interaction** seamless and enjoyable. Whenever I am working, studying, or just simply unwinding my mind, my iPad is always by my side um and it's also a useful tool in my daily life.*

In the second attempt, his performance was significantly improved as he was able to correct some of his problems, one of which was his tendency to add words that were unnecessary and grammatically incorrect. However, he still missed the /s/ sound in certain words and made a mistake by putting words in wrong order, which happened once in his speech.

Table 13: Participant 1's Accuracy Performance of Task 2

	Total Clauses	Error-free Clauses	Error-free Clauses %
1st Performance	25	15	60
2nd Performance	22	18	81.8

An opposite illustration of the same results was provided through the case of Participant 2 as can be seen in the transcripts of his performance.

Extract 5: Participant 2's First Performance of Task 1

So, I would like to talk about a shopping experience I had last year when I visited a large uh shopping mall in my city. The mall is called Mega Market and it's a popular destination for both ***local*** *and tourists because it offers a wide variety of stores, restaurants, and and entertainment options.* ***On this particular day****, I went there with my friends because we were looking to buy some clothes for uh a an upcoming event.*

We had been searching for something special, and this mall has a number of high-end brands as well as trendy boutiques, so we were confident we'd find something great. I spent a few hours browsing through different shops, trying on, you know, various outfits, so I ended ***up with*** *buying the beautiful dress from a boutique that specializes in contemporary fashion. The dress was perfect for the occasion, and I love how it* ***fits in the uh unique design.***
My friends also bought a few items, including shoes and accessories, so we all we were all delighted with our purchases. What made this uh shopping experience especially enjoyable was the atmosphere of the mall. It wasn't too crowded, so we had plenty of space to explore.

Additionally, the customer service in the store was excellent. The staff were friendly, helpful, and gave a great suggestion for styling the dress. We also took a break at one of the cafes in the mall where we chatted and, you know, enjoyed some coffee, ***making*** *a fun outing, as well as a successful shopping trip.*

Overall, I really enjoyed that shopping experience because it was not just about buying something, but also bout about spending quality time with friends, discovering new styles, and being able to enjoy the whole process in a relaxed and com comfortable environment.

In this performance of Task 1 by Participant 2, it can be seen that his common error was that he often added or missed some items when producing his speech (e.g., *'local', 'ended up with buying', 'fits in the unique design'*). These problems were quite similar to what Participant 1 had encountered in his performance, although the number of errors was less dense compared to Participant 1's.

Extract 6: Participant 2's Second Performance of Task 1

So now I'm going to talk about a favorite shopping experience that I have it I had ***that was*** *when I visited a local independent bookstore during a weekend trip. The store had a cozy* ***welcome*** *atmosphere, with* ***stop lighting****, um,* ***lighting comfort, comfortable*** *reading books and*

the smell of the coffee in the air as well. As I wandered through the aisles, I came across a small section dedicated to local authors, and the books were curated thoughtfully and ***ended up*** *chatting with the owner, who recommended a few novels based on my interest. It felt more like a conversation with a friend than uh a typical shopping trip. The personal touch combined with the unique selection of books made it an experience I won't forget. Plus, I left a few with a few new reads that I wouldn't have found in a larger chain store.*

Table 14: Participant 2's Accuracy Performance of Task 1

	Total Clauses	Error-free Clauses	Error-free Clauses %
1st Performance	29	24	82.7
2nd Performance	15	11	73.3

Participant 2's second performance, on the other hand, showed that it was more error-dense than his performance in the first trial even though the numbers of errors in two performances were basically the same. Because he decided to tell a different story in the second attempt, he risked his familiarity with the content of the message, as well as the preparedness he had from the previous task performance. This explained the reason why his result declined statistically yet the errors he made remained. It is possible that the familiarity of the content has a significant relationship with the accuracy of speakers during task repetition. This finding is aligned with Gass et al (1999) as said that learners are more likely to attend more to linguistic resources thanks to the increased familiarity of the content from the speaking task repetition.
As can be seen from Extract 7, the descriptive statistics in the performance of Task 2 were also aligned with the findings in the performance of Task 1.

Extract 7: Participant 2's First Performance of Task 2

Um now I'm going to describe ***a um electronic devices*** *that uh I use daily and that is my smartphone. Uh it's really, you know, essential for almost everything I do. It's a really reliable tool for staying connected, whether for messaging, emailing or video calls. Beyond communication, it's my go-to for navigating, checking the weather, managing* ***task*** *and even* ***read the news.***

I also use it for entertainment like streaming music or shows, uh, you know, surfing and browsing social media and the internet, and also playing games on my smartphone. The convenience of having a mini computer in my pockets ***makes*** *an indispensable device for both productivity and leisure. Plus, the camera is really fantastic for capturing moments on the go, and it's also the companion with me on whatever and whatever I do, um, on my daily basis.*
Common errors that appeared in the extract were his confusion of when he should use singular or plural words in certain situations. Another mistake was that he forgot expressing in parallelism, or parallel grammatical structures (e.g., *'checking ..., managing ..., and even read'*)

Extract 8: Participant 2's Second Performance of Task 2

So, I'm going to talk about um an electronic device that I use often and that's my laptop. It's an essential tool for work, communication and entertainment with a fast processor, ample storage and a high-resolution display. It allows me to multitask efficiently. Um, whether I'm browsing the internet, writing documents or managing emails, or ***do everything*** *at the same time.*
And um, I also use it for virtual meetings, uh, streaming videos, and also occasional gaming sometimes. And the portability of my laptop makes it ***convenience*** *for both home and travel,*

allowing me to stay productive anywhere. Additionally, with various software ***application****, I can organize my schedule, um, collaborate with others and learn new skills.*
It's *combination of power, speed and versatility makes an in makes it in indispensable part of my daily life, helping me stay connected and efficient in both professional and personal* ***task****.*
Besides the same errors in using singular or plural form he made in the first attempt, he also failed to put article in some words (e.g., *'it's combination of ...'*).

Table 15: Participant 2's Accuracy Performance of Task 2

	Total Clauses	Error-free Clauses	Error-free Clauses %
1st Performance	12	9	75
2nd Performance	12	7	58.3

Another reason for a reduction in the proportion of error-free clauses in this task performance is that although the first performance of the task allowed him to identify useful vocabulary and grammatical structures, and create a cognitive framework, his decision to tell another story in the subsequent performance made him lose the opportunity to correct his errors in the first performance as they were likely to be different in each attempt. This, therefore, made him less aware of his linguistic weaknesses.

The Effect of Task Repetition on L2 Learners' Oral Fluency When Performing Repeated Tasks

Although the positive outcomes in L2 learners' accuracy were found during the task repetition, a different situation emerged regarding the oral fluency measures. The results of descriptive analysis indicated that task repetition did not enhance L2 learners' oral fluency in the task production. This finding, however, was inconsistent with findings of other studies that also investigated the effect of task repetition on the fluency of EFL students. (Ahmadian, 2011; Bygate, 2001; Finardi, 2008; Hunter, 2017; Kim & Tracy-Ventura, 2013). There were possible explanations for these results.

One possible explanation was that the attentional resources learners obtained from the opportunity of task repetition might be used for other aspects of the performance. This explanation followed the 'trade-off hypothesis' (Skehan, 2004, 2009), in which he suggested that by repeating the same task, one aspect of the performance might be greater than others at the expense of other aspects. For example, there were many findings indicating that task repetition could result in greater complexity and fluency at the expense of accuracy (Gass et al., 1999; Patanasorn, 2010). Fluency, in task-based research, is often associated with the meaning of the content, while accuracy is often related to a focus on linguistic form. When performing a task, learners often face competition between dimensions due to the limited attentional capacity. This is what Skehan (2009) noted as "conflict between form and meaning". In the case of current study, the oral accuracy of L2 learners was proved to gain during task repetition. This can arguably imply that participants, when performing the repeated task prioritized more control, accurate output for better fluency.

Another reason to explain this situation is that the type of task used in this study could have influenced the outcome of analysis. One of the most common task types chosen as the instrument for the research on task repetition is narrative task, which appeared in many studies, including Bygate's (1996). These narratives were often in the form of animated short videos.

Another common task type that was frequently used in the field was picture description task (Finardi, 2008). These task types were selected because the content of the task is usually fixed, and no matter how speakers express the content, the main message in the story or video will not differ significantly between the first and subsequent performances. However, in the current study, a topic-related, descriptive task was used as the instrument of the study, which was designed to mirror IELTS Speaking Task 2 format. And because of that, the content of the first and second performance might differ. As mentioned before, although the topic and the requirements of the task did not change across the performance, speakers can still tell a completely different story, which still fits the requirements of the task. The benefits of task repetition as mentioned earlier can help learners shift their focus from message content (fluency) to more accurate and appropriate formulations (accuracy). However, when learners decided to change their message content, they had to use their attentional resources to produce meaningful content and at the same time correct their errors in their first performance. This leads to ineffective use of the opportunity of first performance since speakers cannot benefit from the initial linguistic choice and the ability to monitor and self-correct their errors. Thus, studies using narrative or picture description tasks as their research instruments were able to show consistent results, yet it was not the same case in the current study since the results of analysis can differ significantly depending on whether speakers retell the story in the first performance, or they decide to deliver a new experience.

Implications

The findings of task repetition led to more accurate, but not fluent language for L2 learners offers insight into learners' processing priorities and the effect of task repetition for different aspects of oral performance. Firstly, the analysis strongly advocates for Skehan's (1998) Trade-off hypothesis, focusing on the competition for attentional resources in L2 production. The recorded improvement in accuracy along with a lack of fluency gains suggests that learners may have allocated their limited attentional resources towards monitoring their output for correctness during the repeated task, potentially at the expense of the speed and smoothness of their speech. This aligns with the notion that focusing on one aspect of performance, particularly accuracy, can sometimes come at the cost of another, namely fluency.

Secondly, the accuracy gains indicate that task repetition in the context of current study facilitated a greater focus on linguistic form rather than meaning. Learners are more likely to use the opportunity of task repetition to pay more attention and correct errors in their grammar and vocabulary. This is due to the nature of the task selected for the study. The message content of the task (meaning) can easily be replaced in the second performance, depending on the learners' personal choice. Therefore, it is more convenient for learners to focus more on their form (accuracy) rather than the meaning or the content (fluency).

Finally, the lack of fluency gains might propose that task repetition, in this particular context, was insufficient to promote the automatization of language processes necessary for fluent speech. While repetition can lead to increased familiarity with content, it does not always translate into more automatic retrieval and production of language, which is crucial for fluency. Furthermore, the improvement in accuracy can be attributed to increased self-monitoring during the second task performance. With the benefits of having performed the task once, learners were able to be aware of their linguistic shortcomings and thus, focus more on self-correcting in the subsequent attempt.

Limitations

There are several potential limitations in the current study, considering its findings that task repetition led to greater accuracy, but not fluency in L2 learners' performance.

First, the current study, similar to other studies on task repetition, suffers from a small sample size, which limits the generalizability of the findings (Ahmadian, 2011; Bei, 2013; Bongsun, 2017; Sample & Michel, 2015). This leads to a significant limitation in making broader claims about all L2 learners.

Secondly, the study might have examined a limited number of task repetitions (e.g., one or two repetitions), which may not have been sufficient to observe significant gains in fluency and accuracy. In fact, it was one of the reasons that affected the improvement in fluency as mentioned previously. Finally, the long-term investigation of the effect of task repetition may be needed to ensure fluency gains in the study. It is possible that fluency gains may have emerged over a longer period with more sustained repetition or follow-up activities.

Conclusion

The findings of the study revealed a significant enhancement in L2 learners' oral accuracy through task repetition without a corresponding improvement in oral fluency. This outcome aligns with the trade-off hypothesis, suggesting that the cognitive resource of learners during task repetition may have been preferentially allocated towards monitoring and improving the formal aspects of their language, thereby leading to greater accuracy but constraining their ability to speak more fluently. The observed increase in accuracy with task repetition, as confirmed by the independent samples t-test, underscores the potential of this pedagogical technique for fostering the development of correct language use. Learners were able to use the opportunity to repeat the monologic description task to attend to and refine their grammatical and lexical choices, leading to a statistically significant improvement in accuracy compared to the control group. However, the lack of significant gains in fluency suggests that task repetition alone, within this study, was not sufficient to promote the automatization of language production necessary for smoother, faster speech. This could be attributed to several factors, some of which may represent limitations of the current research. In addition, the nature of the monologic description task might have inherently encouraged a focus on careful formulation rather than spontaneous output, potentially prioritizing accuracy over fluency during repetition. In conclusion, while this thesis provides empirical support for the positive impact of task repetition on L2 oral accuracy in the context of a monologic description task, it also highlights that task repetition alone may not be a panacea for improving oral fluency. Future research should consider investigating the interplay between task repetition and other pedagogical interventions, such as explicit fluency-focused instruction, varied task types, and strategies to build learner confidence, to achieve a more comprehensive development of both accuracy and fluency in L2 oral production. The limitations of this study, including the specific task type, the time interval between repetitions and the number of repetitions, should also be addressed in future investigations to further our understanding of the complex relationship between task repetition and the multifaceted nature of L2 oral performance.

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FACTORS INFLUENCING EDUCATORS ADOPTION OF AI IN HIGHER EDUCATIONS

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Abstract: (*The emergence of Artificial Intelligence (AI) in higher education is fundamentally altering the methods of knowledge delivery, access, and evaluation. As AI tools become more integrated into educational frameworks, various factors influence their adoption by educators are pedagogical beliefs, which affect their willingness to incorporate AI into their teaching methods; their self-efficacy, which encompasses the confidence and skills necessary to effectively utilize AI technologies; and the speed of technological advancement, which impacts the availability, usability, and relevance of AI tools in academic settings. It is essential to comprehend how these factors shape educators' choices to effectively guide strategic implementation and cultivate an educational environment that is prepared for the future.A qualitative case study analysis was performed at various higher education institutions to investigate the impact of pedagogical beliefs, self-efficacy, and technological advancements on educators' adoption of artificial intelligence. The research focused on reviewing curriculum design documents, faculty development plans, and institutional AI strategy reports to understand how these elements inform practical decisions regarding the integration of AI in teaching and learning. The research indicates that educators' adoption of AI in higher education is affected by their pedagogical beliefs, self-efficacy, and the swift progress of technology. To successfully integrate AI, it is essential to foster positive attitudes, build confidence, and implement supportive institutional strategies. For successful implementation, it is crucial to foster positive beliefs, enhance skills, and develop institutional strategies. Additionally, continuous adaptation is necessary to stay aligned with the swift evolution of technology.*

Keywords: *Pedagogical Beliefs, AI Adoption, High Education, Educators,Artificial Intelligence, Technology Advancement*

Introduction

The advancement of technology has significantly impacted teaching management, educational innovation, and the analysis of learning behaviours (Nelson et al., 2019). Notably, the progress in speech recognition, natural language processing, and deep learning has heightened educators' interest in artificial intelligence (AI) technologies. AI is defined as the use of computers to replicate human cognitive functions, such as thinking, learning, and problem-solving (Hwang, 2003; Nilsson, 2014). These AI technologies are capable of analyzing students' learning processes, offering adaptive learning resources, and providing evaluations and recommendations based on individual performance, thereby acting as diagnostic tools for learning (Colchester et al., 2017; Hwang et al., 2011; Timms, 2016).

As AI technologies evolve, they are progressively transforming the role of educators in the learning environment. Teachers can now choose suitable AI tools to oversee students' learning journeys and deliver personalized, timely support (Edwards et al., 2018). Researchers have suggested that creating virtual laboratories, intelligent teaching platforms, or AI-based learning tools can enhance various learning methodologies, offering personalized guidance, prompts, and feedback, while also aiding students in developing higher-order thinking skills (Hwang, 2014; Lin et al., 2018; McArthur et al., 2005). Furthermore, the rise of communication and computing technologies has made Artificial Intelligence in Education (AIEd) a critical topic within the educational landscape (Hwang et al., 2020c; Chen et al., 2020b).

From the viewpoint of precision education, artificial intelligence (AI) technologies have the potential to analyse and forecast students' academic performance. Intelligent tutoring systems (ITSs) can offer tailored instruction and support by assessing learners' progress and behaviours, diagnosing their learning conditions, and providing automated feedback, thereby aiding teachers in evaluating instructional effectiveness (Chen et al., 2020a; Hwang et al., 2020c; Hwang et al., 2014; Lin et al., 2021). The field of Artificial Intelligence in Education (AIEd) is heavily reliant on technology and spans multiple disciplines. Despite the integration of AI technologies into educational settings, challenges persist in their application for teaching.

For instance, researchers may struggle to effectively implement AI in education tools and activities if they lack a comprehensive understanding of AI's role in education and the specific functions of these technologies (Hwang et al., 2020a). Furthermore, educators who grasp the capabilities and characteristics of AI technologies can select appropriate AI applications for their classrooms, thereby enhancing students' motivation, engagement, and academic success (Chen et al., 2020a; Hwang et al., 2020c; Hwang et al., 2021). In this context, it is essential to comprehend teachers' perspectives on the use of AI in education, including their attitudes and intentions regarding its application, as their acceptance or resistance will significantly influence the integration of AI into the teaching process (Popenici & Kerr, 2017).

While recent studies, such as those by Guillén-Gámez et al. (2023), have investigated the factors that affect the incorporation of technological tools in academics, the specific application of AI tools in academics has not been thoroughly examined. This lack of empirical investigation highlights a significant gap that warrants attention. It is crucial to comprehend the distinct challenges and incentives that influence educators' adoption of AI tools for academic purposes, as this understanding can guide institutional policies and foster environments conducive to integration. By addressing elements such as pedagogical beliefs, self-efficacy, and advancements in technology, universities can improve research output, fully utilize the capabilities of AI, and enhance the quality and efficiency of academic research in an increasingly competitive academic environment.

The current research, entitled Factors Influencing Educators Adoption of AI in Higher Education examines the primary elements that impact educators' willingness to accept and utilize AI tools in their scholarly activities. This study emphasizes three fundamental factors—pedagogical beliefs, self-efficacy, and technological progress—to explore how these aspects influence educators' choices regarding the adoption and integration of AI technologies into their academic research methodologies.

Literature Review

Artificial Intelligence in Higher Educations

Advancements in computer technology have facilitated the creation of intelligent systems that closely replicate human reasoning, decision-making, and problem-solving abilities. Artificial Intelligence (AI), commonly known as machine intelligence or computational intelligence, seeks to emulate human cognitive functions. It is characterized as a computer-controlled system that possesses the ability to learn, reason, and self-correct (Chen et al., 2020b; Hwang, 2003; Nilsson, 2014; Shi & Zheng, 2006). In recent decades, AI has found successful applications in various fields, such as chess, speech recognition, poetry creation, intelligent personal assistants (IPAs), and medical diagnostics (Aibinu et al., 2012; Hwang et al., 2020c; Russell & Norvig, 2003).

In the realm of education, AI in Education (AIEd) has emerged as a ground-breaking sector within educational technology. By utilizing mobile and adaptive technologies, AIEd removes barriers related to time and location, allowing learners to access resources and engage in practice at their convenience. AI-enhanced learning systems offer personalized assistance by adjusting to the specific context and requirements of each learner (Hung et al., 2014; Liu et al., 2019). A review conducted by Zawacki-Richter et al. (2019) identified four primary areas of application for AIEd: profiling and prediction, assessment and evaluation, adaptive systems and personalization, and intelligent tutoring systems (ITSs). These systems tailor content according to the characteristics and progress of learners, providing timely support to improve educational outcomes (Chen et al., 2020a; Huang & Chen, 2016; Hwang, 2003; Van Seters et al., 2012). Additionally, adaptive and intelligent web-based learning environments can respond to both cognitive and emotional states of learners, enhancing performance, especially among those who are lower-achieving (Hwang et al., 2020b). With the incorporation of big data analytics, researchers are also creating user learning models that utilize extensive data from educational settings (e.g., Rau et al., 2017). (TNR, 12, single spacing, justify)

Pedagogy Beliefs

Pedagogical beliefs significantly influence how teachers utilize technology in their classrooms. These beliefs can act as both facilitators and obstacles to the effective integration of technology. Ertmer (2005) identified these beliefs as second-order barriers or enablers in the context of technology integration. In contrast, first-order barriers refer to external challenges such as limited access to necessary infrastructure and software, a lack of time for instructional planning, and insufficient technical and administrative support. Second-order barriers, on the other hand, are internal to the educator and encompass factors such as their beliefs about teaching and learning, their attitudes towards information and communication technology (ICT), and their willingness to embrace change.

Simultaneously, the evidence indicates that the utilization of technology can result in the formation of new, restructured, or reinforced beliefs (Tondeur et al. 2017). The connection between pedagogical beliefs and technology usage appears to be reciprocal. Generally, research suggests that educators who embrace more constructivist beliefs are more likely to be active users of technology (Ertmer 1999).

Furthermore, they tend to employ technology in ways that are more centred on student engagement. For instance, teachers with constructivist beliefs have been noted to utilize

Technology as a tool for information management (such as retrieving, selecting, and presenting informal Pedagogical beliefs significantly influence how teachers utilize technology in their classrooms. These beliefs can act as both facilitators and obstacles to the effective integration of technology. Ertmer (2005) identified these beliefs as second-order barriers or enablers in the context of technology integration. In contrast, first-order barriers refer to external challenges such as limited access to necessary infrastructure and software, a lack of time for instructional planning, and insufficient technical and administrative support. Second-order barriers, on the other hand, are internal to the educator and encompass factors such as their beliefs about teaching and learning, their attitudes towards information and communication technology (ICT), and their willingness to embrace change.

Thus, it can be concluded that educators are likely to adopt computer practices that align with their teaching beliefs. On) and as a means to foster students' development of higher-order thinking and problem-solving abilities. Specifically, these educators leverage technology to enhance students' ability to apply knowledge and skills for analysis, reasoning, and effective communication as they identify, address, and interpret problems across various contexts. In contrast, teachers with more traditional, teacher-cantered beliefs are significantly more inclined to use information and communication technology (ICT) as a learning tool rather than as an information tool, where the focus is on independent interaction between students and the subject matter. When ICT is employed for research and information processing, students are afforded greater autonomy compared to when it is used for online drill-and-practice activities (learning tool). Thus, it can be concluded that educators are likely to adopt computer practices that align with their teaching beliefs.

Self -Efficacy

In the realm of information technology, self-efficacy (SE) is frequently characterized as an individual's confidence in their ability to utilize technology effectively to accomplish specific tasks (Compeau & Higgins, 1995; Teo, 2019). Research has shown that SE not only has a direct

Impact on users' perceived usefulness of technology but also influences their attitudes toward adopting it (Motaghian et al., 2013; Teo & Zhou, 2014; Yeşilyurt et al., 2016). For educators, SE is defined as their confidence in their own skills, which can enhance student learning and is crucial for the successful integration of technology in teaching (van Dinther et al., 2013). Studies have demonstrated that teachers with higher levels of SE are more likely to effectively incorporate technology into their instructional practices (Bai et al., 2019). For instance, during flipped classroom activities, university instructors' SE significantly affects their attitudes toward technology use (Lai et al., 2018). The aforementioned research highlights that teachers' SE regarding technology reflects their belief in its application in teaching, which in turn influences their perceived ease of use and overall attitude (Teo & Zhou, 2014; Yeşilyurt et al., 2016).

Technology Advancement

Advancements in technology are significantly transforming the teaching and learning environment in higher education through the implementation of AI-driven platforms and digital resources. As highlighted by (Bozhko et al.2016,) it is crucial for educators to adopt digital tools that are in line with modern educational standards and methodologies. AI technologies

are increasingly vital in facilitating these advancements by providing adaptive learning experiences, personalized feedback, and automated assessments.

The incorporation of AI-based educational tools brings forth new responsibilities for teachers, compelling them to develop more flexible, interactive, and collaborative learning settings. This evolution promotes greater student autonomy while fostering teamwork and ongoing feedback. As AI becomes more integrated into higher education, the importance of digital literacy and technological competence rises for educators, who must not only adeptly utilize these tools but also assist students in mastering them.

Methodology

Research Design

This research utilized a qualitative case study methodology to investigate the Factors that Influence educators in Adoption of Artificial Intelligence (AI) tools in higher education. The case study framework was selected for its ability to deliver comprehensive and contextual insights into intricate social dynamics, especially within institutional environments.

Case Studies

Three higher education institutions were intentionally chosen due to their recorded involvement in AI integration, the diversity of their academic disciplines, and the availability of institutional documentation. These institutions exhibit a range of AI maturity levels, from initial adoption phases to more developed digital environments, facilitating a comparative analysis of the factors that influence their practices.

Analytic Framework

The collected documents were analysed using thematic content analysis. A coding framework was established, focusing on three key factors:

Table 1.0 Shows the Thematic Analysis for This Case Study

Main Themes	Sub-Themes	Sample Evidence	Data Resources	Analytic Purpose
1.Pedagogy Beliefs	a)Teaching Philosophy (Constructivist vs. Traditional) -Willingness to embrace technology-driven instruction - Compatibility of AI with educational methods	-“AI enhances my student-focused teaching approach.” -“Automation is not compatible with my instructional style”	-Curriculum frameworks, Statements of teaching philosophy, Course development documents	-Comprehend the role of value-based education in the adoption of AI.

2.Self-Efficacy	b)Confidence in Digital Skills - Participation in faculty training programs - Perception of technological complexity - Familiarity with educational technology	-"I feel uncertain about utilizing AI tools." -"Workshops have increased my confidence in using AI."	-Faculty enhancement plans, Educational resources, Digital competency assessments	-Examine the influence of educator preparedness and training on the adoption process.
3.Technology Advancement	c)Access to AI Platforms - Availability of infrastructure and digital resources - Support systems from IT departments - Institutional commitment to investment	"The university offers access to an AI lab." "There is no technical assistance available for AI platforms."	-Artificial Intelligence strategy papers, Information Technology investment analyses, Institutional regulations, Technology audit summaries	-Analyse the effect of institutional resources and frameworks on the integration of AI.

Ethical Considerations

This research entailed the gathering and examination of institutional documents, including curriculum frameworks, faculty development strategies, and digital strategy reports. All documents were either publicly accessible or obtained with official consent from the respective institutions. To ensure confidentiality, the identities of the institutions and individuals referenced in internal documents have been anonymized. The data collected were utilized solely for academic research and were stored in a secure manner. Since the study did not engage directly with human participants, ethical approval was not necessary; nonetheless, the research adhered rigorously to institutional guidelines regarding responsible research practices.

Findings

Pedagogical Beliefs and Teaching Approaches

I) Institution A prioritized inquiry-based, student-centred learning in its curriculum documents, integrating AI for formative assessments and adaptive learning pathways. Educators were encouraged to utilize AI-driven tools to foster exploration, including AI simulations and personalized feedback systems.
AI tools are essential for facilitating self-paced inquiry and knowledge discovery,' (Curriculum Framework, Institution A)

ii)In contrast, Institution B's course syllabus and policy documents indicated a teacher-centred approach with limited references to AI or digital personalization, favouring lecture-based instruction and standardized assessments
'Although digital tools are accessible, the focus remains on traditional face-to-face teaching,' (Faculty Handbook, Institution B).

iii) Meanwhile, Institution C adopted a transitional model, with some departments investigating blended learning and AI-enhanced platforms, while others continued with traditional methods. Supportive language regarding innovation was evident, but the implementation varied across faculty.
'Innovative teaching strategies, such as AI-driven modules, are being tested in certain departments,' (Teaching and Learning Strategy, Institution C).

Overall, constructivist pedagogical beliefs at Institution A were more closely aligned with AI integration compared to the traditionalist perspectives at Institution B, while the mixed approaches at Institution C resulted in inconsistent adoption.

Self-Efficacy and Digital Readiness

i)Institution A demonstrated a commitment to faculty development through comprehensive training in AI ethics, prompt engineering, and adaptive platform design, integrating AI usage into performance evaluations and innovation grants.
*Staff training initiatives included AI boot camps and practical simulations to enhance digital fluency, as noted in the (Staff Developm*ent *Plan of Institution A)*

ii) Institution B lacked formal AI training programs, with faculty expressing concerns in internal communications about their insufficient digital skills and support.
Feedback from faculty indicated a keen interest in AI, yet a significant gap in their understanding of its effective application, as highlighted in the (Internal Faculty Feedback Report of Institution B).

iii) Institution C offered general digital workshops, such as those on LMS usage and cloud computing, but these did not focus specifically on AI. While faculty showed considerable interest in AI, their confidence in utilizing AI tools for research or teaching remained low.
The Tech Skills Audit Report from Institution C noted that although basic digital tool workshops were available, there was a clear demand for AI-specific training)

Overall, the interpretation suggests that high digital self-efficacy, bolstered by targeted training at Institution A, facilitated proactive AI adoption, whereas low self-efficacy at Institution B and non-specific digital skill development at Institution C hindered AI engagement.

Technology Advancement and Institutional Support

i) Institution A has developed a detailed AI strategy document that emphasizes investments in infrastructure, such as AI laboratories, licenses for adaptive learning platforms, and cloud-based research tools.
The university has pledged to transform into an AI-enhanced campus by 2025, as stated in the AI Strategy White Paper from Institution A.

ii) In contrast, Institution B showed minimal references to AI tools or infrastructure, with most of its digital systems being outdated and lacking the capacity for AI-enhanced learning.
The IT Infrastructure Report from Institution B notes that the current systems do not support AI functionalities.

iii) Meanwhile, Institution C has made moderate investments in AI-ready learning management systems; however, usage reports reveal that these tools are underutilized due to insufficient faculty awareness and training.
The Technology Utilization Review from Institution C indicates that while tools are available, adoption rates are low because of the absence of a structured implementation plan.

Overall, the degree of technological advancement and readiness has significantly impacted the adoption of AI. Institution A's proactive investment and strategic planning have resulted in effective integration, whereas Institution C possesses the necessary tools but lacks effective adoption strategies, and Institution B is deficient in both areas.

Table 2.0 Shows the Comparison of Institution using the factors for the academic

Factor	Institution A	Institution B	Institution c
Pedagogy Beliefs	-A solid constructivist framework; artificial intelligence perceived as a facilitator of education.	-Conventional educational philosophy perceives AI as superfluous	-Diverse perspectives exist; there is some innovation, yet the implementation is inconsistent.
Self-Efficacy	-High assurance stemming from comprehensive AI training initiatives.	-There is a lack of confidence due to the absence of formal digital training	-Confidence levels are moderate; training is offered, although it is not specifically focused on AI.
Technology Advancement	-AI laboratories, cloud-based resources, and adaptive systems; a well-defined strategic plan.	-Infrastructure is limited and systems are outdated	-While tools are sufficient, communication is lacking and utilization remains low.

This comparative analysis determines that the effective implementation of AI tools by educators in higher education is greatly affected by the congruence of constructivist pedagogical beliefs, AI-related digital self-efficacy, and the availability of strong technological infrastructure along with institutional support. Without these interrelated elements, efforts to adopt such tools frequently fall short, are inconsistent, and fail to achieve significant integration.

Discussions

This research aimed to investigate the elements that Factors that Influence educators in Adoption of Artificial Intelligence (AI) tools in higher education employing a case study

methodology centred on pedagogical beliefs, self-efficacy, and technological progress. The results suggest that the effective incorporation of AI tools is influenced not by a solitary factor, but by the convergence of teaching philosophy, digital competence, and the preparedness of the institution.

Pedagogical Beliefs and Barrier

The findings indicate that educators who hold constructivist and student-centred pedagogical beliefs are more inclined to perceive AI tools as supportive of their teaching methodologies. This is consistent with earlier research conducted by Cabero-Almenara et al. (2024), which highlighted the significance of progressive teaching philosophies in the acceptance of generative AI. Conversely, traditional teaching perspectives were associated with limited or superficial integration of AI, demonstrating a hesitance to modify conventional practices.

Self - Efficacy and Digital Confidence

Instructors who indicated increased self-efficacy—enhanced by specialized training programs focused on artificial intelligence—exhibited heightened initiative and innovation in the application of AI tools. These results support previous research conducted by Mah & Groß (2024), which recognized self-efficacy as a crucial factor for ongoing technology utilization. It is important to note that when training was limited to general digital literacy, the adoption of AI was often reluctant or irregular.

Technology Advancement and Institutional Support

Institutions that have established robust digital ecosystems and strategic AI initiatives fostered more conducive environments for faculty adoption. This aligns with the findings of Wang et

al. (2021), which indicated that the quality of infrastructure plays a crucial role in technology adoption. In cases where infrastructure was inadequate or policy guidance was lacking, even motivated educators encountered considerable obstacles.

Significantly, the research indicates that these elements are intricately linked. For instance, in situations where educators held progressive teaching philosophies, insufficient institutional backing or training frequently resulted in minimal interaction with AI tools. On the other hand, robust infrastructure was inadequate when teachers lacked confidence or perceived AI as misaligned with their instructional approach.

Conclusion

This research examined the Factors that Influence educators in Adoption of Artificial Intelligence (AI) tools in higher education using a qualitative case study methodology. By analysing institutional documents and policies from various universities, the results indicated that the adoption of AI is influenced by three interconnected factors: educators' pedagogical beliefs, their self-efficacy, and technology advancement within their institutions. Pedagogical beliefs played a crucial role in determining whether educators perceived AI as a complement to or a conflict with their teaching methods. Self-efficacy, particularly regarding digital confidence and previous experience with AI tools, emerged as a significant factor in readiness for adoption. Technological aspects, such as the availability of infrastructure, institutional

backing, and the clarity of digital strategies, were identified as either enabling or obstructing effective integration. Collectively, these insights imply that the adoption of AI is a multifaceted and context-sensitive process that cannot be simplified to individual characteristics but should be understood through the intricate relationship between belief systems, skills, and institutional contexts.

The findings of this study provide valuable insights for both AI tool developers and higher education institutions (HEIs) focused on facilitating effective AI integration among educators. From a technological perspective, it is crucial for developers to create AI tools that seamlessly integrate with existing platforms used by educators, such as Learning Management Systems (LMS) and Microsoft Word, as this minimizes cognitive and technical challenges while improving overall usability. User-friendly interfaces, straightforward navigation, and comprehensive tutorials are especially advantageous for educators with diverse levels of technical proficiency, particularly those who are new to AI.

Regarding self-efficacy, HEIs should emphasize the importance of enhancing educators' digital confidence through specialized training, continuous support, and accessible learning opportunities, including workshops and online courses offered through platforms like Coursera or edX, to empower effective utilization of AI in research, writing, and data analysis. Strengthening self-efficacy promotes independence, innovation, and deeper engagement with AI tools. From a pedagogical standpoint, it is essential that AI tools are in harmony with educators' instructional values and bolster their teaching philosophies. Training should encompass not only technical competencies but also illustrate how AI can enhance learner-centred, research-informed practices. When educators perceive AI as a complementary tool rather than a disruptive force to their pedagogical objectives, its adoption becomes more intentional, impactful, and sustainable.

This research, which examined the Factors that Influence educators in Adoption of Artificial Intelligence (AI) tools in higher education —specifically pedagogical beliefs, self-efficacy, and technological progress—has several limitations that warrant attention. The case studies utilized a purposive sample of institutions, which may not adequately reflect the wider diversity of higher education settings, potentially constraining the generalizability of the results. Therefore, future investigations should encompass a broader range of institutional types and contexts to improve external validity. Moreover, the study's cross-sectional design captures merely a single moment in time, while the adoption of AI tools, particularly in relation to evolving pedagogical beliefs and shifts in educators' digital confidence, is inherently fluid. Longitudinal studies would be more appropriate for comprehending these changes over time. Additionally, this study depended on document analysis, which, although useful for institutional insights, may not fully represent educators' personal experiences and interpretations.

Future research should integrate qualitative approaches such as interviews or focus groups to enrich understanding. Lastly, broadening the scope to include other significant stakeholders—

Such as institutional leaders, policymakers, and digital learning coordinators—would offer a more holistic perspective on the systemic factors affecting AI integration, including the alignment of institutional strategies with teaching philosophies and the provision of adequate technological support.

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ADVANCES IN THE REGULATORY NETWORK AND THERAPEUTIC TARGETS OF AMPK/SIRT1/PGC-1A PATHWAY IN INTERSTITIAL FIBROSIS OF DIABETIC NEPHROPATHY

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Abstract: Diabetic Kidney Disease (DKD) is a major microvascular complication of diabetes mellitus, and Renal Interstitial Fibrosis (RIF) is a key pathologic process in its progression to End-Stage Renal Disease (ESRD). RIF is a key pathologic process in the progression to ESRD. Although existing treatments can delay the progression of DKD to some extent, the complex molecular mechanisms of RIF have not been fully elucidated, leading to a lack of curative therapies. In recent years, increasing evidence suggests that disorders of energy metabolism, mitochondrial dysfunction, and oxidative stress imbalance play a central role in the development of RIF. Among them, the AMP-activated protein kinase (AMPK)/silent information regulator 1 (SIRT1)/peroxisome proliferator-activated receptor γ coactivator 1α (PGC-1α) signaling pathway, as a key regulatory hub, integrates cellular energy sensing, metabolic adaptation, mitochondrial homeostasis, redox homeostasis, and anti-fibrotic responses. Aberrant inactivation of this pathway is thought to be an important factor driving DKD-associated RIF. This review aims to systematically analyze the biological functions of the AMPK/SIRT1/PGC-1α pathway, to deeply explore its regulatory abnormalities and its molecular mechanisms in the pathological process of RIF in the diabetic setting, and to summarize the current therapeutic strategies and cutting-edge research advances developed by targeting this pathway, to provide new ideas and potential targets for the prevention and treatment of DKD.

Key words*: AMPK/SIRT1/PGC-1α pathway; diabetic nephropathy; fibrosis5*

Introduction

Diabetes mellitus (DM) has become a major public health challenge globally and its prevalence continues to climb (Sun et al., 2022). Among the many complications of diabetes, DKD is not only one of the most common microvascular complications but also the leading cause of ESRD

(Alicic et al., 2021), which imposes a heavy economic and health burden on patients and society (Zheng et al., 2021). The pathology of DKD has a complex characterization, including glomerular basement membrane thickening, tethered membrane expansion, podocyte injury, as well as tubular injury, and interstitial fibrosis (Sun et al., 2022). thickening, tethered membrane dilatation, podocyte injury, tubular injury, and renal interstitial fibrosis (RIF) (Toth-Manikowski & Atta, 2020). In particular, RIF is considered to be a common pathway and core pathology for the irreversible progression of DKD to ESRD (Chen et al., 2023), which is characterized by renal tubular atrophy, inflammatory cell infiltration, and excessive deposition of extracellular matrix (ECM) in the renal interstitium (Qi & Wu, 2021). Although current clinical strategies such as glycemic control, blood pressure management, and the recent introduction of sodium-glucose cotransporter protein 2 (SGLT2) inhibitors and glucagon-like peptide-1 (GLP-1) agonists, have been used to delay the course of DKD to some degree (Heerspink et al., 2020), it is not clear whether these strategies can be used in the treatment of DKD (Neuen et al., 2024), but still fail to completely stop the progression of RIF (Yao et al., 2024), and there is no effective therapy that specifically targets RIF. Therefore, in-depth investigation of the molecular mechanisms underlying the development of RIF and the search for new targets for intervention are essential for the development of more effective therapeutic strategies for DKD.

Recent studies have revealed that disruption of cellular energy metabolic state, particularly mitochondrial dysfunction and the consequent increase in oxidative stress, is a key factor driving the progression of RIF (Duann & Lin, 2020). The AMPK/SIRT1/PGC-1α signaling pathway is a highly conserved energy metabolism regulatory network that plays a central role in the maintenance of cellular energy homeostasis (Hall et al., 2021), mitochondrial biosynthesis, and function, antioxidant defense, and suppression of inflammatory and fibrotic processes (Cantó et al., 2019; Packer, 2022). In the diabetic state, the activity of this pathway is generally inhibited, leading to the failure of a range of downstream protective mechanisms that contribute to the onset and development of RIF (Wang et al., 2020). Given its centrality in the pathophysiology of RIF, the AMPK/SIRT1/PGC-1α pathway has emerged as an attractive therapeutic target. In this review, we will focus on the biological functions of this signaling pathway, describe its regulatory abnormalities and its mechanisms in DKD-associated RIF, and systematically review the cutting-edge therapeutic strategies such as pharmacological interventions, non-coding RNA regulation, gene editing, and metabolic reprogramming targeting this pathway, to explore the potentials, challenges, and future directions of its clinical translation (Chen et al., 2022).

Biological functions of the AMPK/SIRT1/PGC-1α pathway

AMPK: A Central Regulator of Energy Metabolism

AMPK is an evolutionarily highly conserved serine/threonine protein kinase that serves as the cell's primary energy receptor (Entezari et al., 2021). AMPK is activated when intracellular ATP levels decrease and AMP/ATP or ADP/ATP ratios increase. Activated AMPK coordinates the balance between catabolic pathways (ATP production) and anabolic pathways by phosphorylating its numerous downstream substrates to restore cellular energy homeostasis (Steinberg & Hardie, 2023).

Inhibition of Anabolism

AMPK phosphorylates and inhibits the mammalian target of rapamycin protein complex 1 (mTORC1), which reduces the synthesis of proteins, lipids, and nucleic acids and saves energy consumption (Kim et al., 2020). Meanwhile, inhibition of mTORC1 can deregulate its inhibition of the autophagy initiation complex (ULK1), which in turn promotes cellular autophagy, removes damaged organelles and aberrant proteins, and maintains the stability of the intracellular environment (Li & Chen, 2019).

Promoting Catabolism

AMPK phosphorylates and inactivates Acetyl-CoA carboxylase (ACC), which reduces the production of malonyl-coenzyme A and lifts its inhibition of carnitine palmitoyltransferase 1 (CPT1), thereby promoting the entry of long-chain fatty acids into mitochondria for β-oxidation, increasing ATP production, and attenuating lipotoxicity caused by fatty acid accumulation-induced lipotoxicity (Carling et al., 2020).

Anti-Inflammatory And Antifibrotic Effects

Activation of AMPK also shows significant anti-inflammatory and antifibrotic effects. It can reduce the production of pro-inflammatory cytokines by inhibiting the nuclear factor-κB (NF-κB) signaling pathway (Hou et al., 2020). In addition, AMPK can directly or indirectly inhibit the activity of the transforming growth factor-β (TGF-β)/Smad signaling pathway, which is a key pathway driving fibrosis (Mao et al., 2020; Lee et al., 2021).

SIRT1: NAD+-Dependent Metabolic Regulatory Hub

Silent information regulator 1 (Sirtuin 1, SIRT1) is a member of the NAD+ (nicotinamide adenine dinucleotide)-dependent class III histone deacetylase family, with a distribution in both the nucleus and cytoplasm (Pollard et al., 2022). The activity of SIRT1 is strictly dependent on intracellular NAD+ levels, making it a key molecule linking the cellular metabolic state to the regulation of gene expression (Maynard et al., 2022). SIRT1 is involved in a wide range of physiological processes such as cellular metabolism, stress response, DNA repair, inflammation, senescence, and cell survival, through the deacetylation of a variety of protein substrates.

Enhancement Of Mitochondrial Function

A key downstream target of SIRT1 is PGC-1α. SIRT1 enhances the transcriptional co-activation activity of PGC-1α by deacetylating it, thereby promoting the expression of genes related to mitochondrial biosynthesis and oxidative phosphorylation, and enhancing the mitochondrial function and number (Zhang et al., 2020).

Anti-oxidative stress

SIRT1 deacetylates forkhead box protein O3 (FOXO3), promotes its entry into the nucleus and activates the transcription of downstream antioxidant genes, such as superoxide dismutase 2 and catalase, which enhances the ability of cells to scavenge Reactive Oxygen Species (ROS).

Delaying Senescence and Maintaining Cellular Homeostasis

SIRT1 is involved in the DNA damage repair process and protects cells from various stresses by inhibiting the p53-mediated apoptosis pathway, which helps to maintain genome stability and cell survival, thus delaying the aging process of cells and tissues (Wu et al., 2020).

PGC-1alpha: A Coordinator of Mitochondrial Function

Peroxisome proliferator-activated receptor-gamma coactivator 1-alpha (PGC-1alpha) is a transcriptional coactivator known as a "master regulator" of mitochondrial biosynthesis and function (Jannig et al., 2021). PGC-1α does not directly bind to DNA but interacts with multiple transcription factors to synergistically regulate the expression of target genes expression (Fan & Evans, 2020).

Regulation Of Mitochondrial Biosynthesis and Function

PGC-1α is a key factor driving mitochondrial DNA replication and expression of mitochondrial genes, thereby increasing mitochondrial number and enhancing oxidative phosphorylation (Scarpulla, 2022).

Promoting Antioxidant Defense

PGC-1α can induce nuclear factor E2-related factor 2 (NRF2) mediated antioxidant response, upregulate the expression of various antioxidant enzymes and detoxification enzymes, effectively scavenge excessive intracellular ROS, and mitigate oxidative damage (Wu et al., 2021).

Coordination Of Energy Metabolic Pathways

PGC-1α promotes gluconeogenesis in the liver and fatty acid oxidation and thermogenesis in skeletal muscle and adipose tissue, helping the body to adapt to different states of nutritional and energy requirements and maintaining overall metabolic homeostasis (Qian et al., 2024).

Interaction Network of Pathways

There is a close mutual regulation among AMPK, SIRT1, and PGC-1α, forming a powerful signaling cascade. First, AMPK can directly phosphorylate specific sites of SIRT1 protein and enhance its deacetylase activity (Price et al., 2020). Second, AMPK activation can increase intracellular NAD+ levels, thereby indirectly activating SIRT1 (Fulco et al., 2021). Activated SIRT1 subsequently deacetylates PGC-1α, releasing it from its acetylation-inhibited state and significantly enhancing the transcriptional co-activation of PGC-1α (Jägersberg et al., 2020). As a result, the core regulatory axis "AMPK-SIRT1-PGC-1α" was formed. The synergistic activation of this axis integrates the cellular energy state with NAD+ dependent metabolic regulation, and ultimately regulates a wide network of downstream target genes via PGC-1α, which together achieve fine regulation of energy metabolism homeostasis, mitochondrial homeostasis, antioxidant defenses, and inhibition of fibrotic processes (Chung et al., 2021). PGC-1α regulates a wide network of downstream target genes.

Abnormal regulation of the AMPK/SIRT1/PGC-1α pathway in diabetic RIF

High Glucose-Induced Pathway Inhibition

A sustained hyperglycemic environment is the initiating factor for the development of DKD, which directly or indirectly inhibits the activity of the AMPK/SIRT1/PGC-1α pathway through multiple mechanisms.

AMPK Inactivation

High glucose leads to a relative excess of intracellular ATP production, which reduces the AMP/ATP ratio and thus inhibits the phosphorylation activation of AMPK (Hawley et al., 2021). In addition, high glucose-induced oxidative stress and inflammatory responses may also indirectly inhibit AMPK activity through other signaling pathways (Gao et al., 2020). Reduced AMPK activity diminishes its ability to regulate downstream metabolic pathways and its antifibrotic effects.

Down-Regulation and Activity Inhibition of SIRT1 Expression

Intracellular NAD+ levels were significantly decreased under a high sugar environment. This is mainly because high sugar-induced DNA damage activates poly (ADP-ribose) polymerase-1 (PARP-1), which consumes large amounts of NAD+ as a substrate for poly modification (Bai et al., 2021). The depletion of NAD+ directly leads to the decrease of SIRT1 activity. At the same time, it has been found that high glucose can also inhibit the transcriptional expression of the SIRT1 gene through epigenetic mechanisms (Villeneuve et al., 2020). The dual inhibition of the expression and activity of SIRT1 renders it unable to function effectively in the deacetylation regulation (Xu et al., 2020).

PGC-1α Acetylation Accumulation and Dysfunction

As a result of insufficient upstream SIRT1 activity, the level of acetylation of PGC-1α protein is elevated. Acetylated PGC-1α has reduced binding capacity to its transcriptional partners and its co-activating transcriptional activity is inhibited (Zhou et al., 2024). This results in blocked mitochondrial biosynthesis and down-regulated expression of antioxidant genes, further exacerbating metabolic disturbances and oxidative damage in cells (Luo et al., 2020).

Mitochondrial Dysfunction and Oxidative Stress

Imbalance In Mitochondrial Dynamics

In DKD kidneys, mitochondrial morphology is significantly altered, as evidenced by increased mitochondrial fragmentation. This is associated with upregulated expression and enhanced activity of mitochondrial fragmentation proteins and downregulated expression of mitochondrial fusion proteins (Galloway & Yoon, 2020). Inactivation of the AMPK/SIRT1/PGC-1α pathway is involved in this process, e.g., a decrease in SIRT1 may lead to overactivation of Drp1. reduction may lead to hyperactivation of Drp1 (Wang et al., 2021). Mitochondrial fragmentation affects energy production efficiency and is associated with impaired mitochondrial autophagy and increased susceptibility to apoptosis.

ROS Burst and Inflammatory Response

Mitochondria are the main intracellular source of ROS. Malfunctioning mitochondria produce excess ROS such as superoxide anions (Murphy et al., 2022). Meanwhile, decreased PGC-1α activity leads to a weakened NRF2-mediated antioxidant defense system, resulting in insufficient ROS scavenging capacity and a dramatic increase in intracellular oxidative stress levels (Suzuki & Yamamoto, 2020). Excess ROS directly damages cellular macromolecules and activates multiple pro-inflammatory signaling pathways. For example, mitochondrial ROS (mtROS) is a key signal that activates NLRP3 inflammatory vesicles, leading to Caspase-1 activation, which in turn cleaves and releases the well-established pro-inflammatory cytokines interleukin-1β (IL-1β) and IL-18, amplifying localized inflammatory responses and promoting kidney injury and fibrosis (Abais et al., 2021).

Renal Tubular Epithelial Cells (Tecs) Injury

TECs have a high energy demand and are particularly sensitive to mitochondrial dysfunction and oxidative stress. Sustained mitochondrial damage can lead to the collapse of mitochondrial membrane potential, triggering the apoptotic program (Czabotar & Garcia-Saez, 2023). In addition, damaged TECs may undergo Epithelial-Mesenchymal Transition (EMT), losing epithelial cell properties, acquiring a mesenchymal cell phenotype, and generating a large number of ECM components, which directly contribute to the formation of RIF (Shi et al., 2023). Inhibition of the AMPK/SIRT1/PGC-1α pathway was shown to be involved in the regulation of apoptosis and EMT in TECs.

Amplification Of Fibrotic Signaling Cascades

TGF-B1/Smad3 Pathway Dominance

TGF-β1 is the most potent pro-fibrotic cytokine identified to date, and its signaling pathway plays a central role in RIF (Wang et al., 2021). Activation of both AMPK and SIRT1 has been reported to inhibit TGF-β1 expression or its downstream Smad3 phosphorylation and nuclear translocation, thereby inhibiting the transcription of target genes (Liu et al., 2022). Conversely, in DKD, inhibition of the AMPK/SIRT1 pathway deregulates the TGF-β1/Smad3 pathway, leading to excessive ECM protein synthesis and deposition (Huang et al., 2022).

Abnormal activation of Wnt/β-catenin

The Wnt/β-catenin signaling pathway plays an important role in embryonic development and tissue homeostasis, but its aberrant activation under pathological conditions promotes cellular proliferation, EMT, as well as activation of fibroblasts and production of ECM (Zhou & Liu, 2020). It has been shown that activation of AMPK inhibits the Wnt/β-catenin signaling pathway, and reduced AMPK activity in the diabetic state may lead to over-activation of this pathway, further exacerbating RIF (Zhou et al., 2022).

Taken together, dysfunction of the AMPK/SIRT1/PGC-1α pathway in DKD collectively drives the onset and progression of RIF by interfering with cellular energy metabolism, disrupting mitochondrial homeostasis, exacerbating oxidative stress and inflammatory responses, and ultimately amplifying key pro-fibrotic signaling pathways.

Therapeutic Strategies and Cutting-Edge Advances in Targeted Pathways

Pharmacological Interventions

AMPK Agonists

(1) Metformin: As a first-line drug for the treatment of type 2 diabetes mellitus, one of the main mechanisms of metformin is the indirect activation of AMPK (Foretz, Guigas & Viollet, 2023). In addition to its hypoglycemic effects, several preclinical studies and some clinical observations suggest that metformin has renoprotective effects. For example, it can attenuate glomerular hypertrophy and proteinuria by inhibiting mTORC1 activity through activation of AMPK (Lv & Guo, 2020). Several retrospective studies and ongoing clinical trials suggest that metformin may slow the rate of decline in glomerular filtration rate in patients with DKD (Preiss et al., 2021).

(2) AICAR (5-Aminoimidazole-4-carboxamide ribonucleotide): As an analog of AMP, AICAR is a classical direct AMPK agonist. In several animal models of DKD, AICAR treatment was shown to improve mitochondrial function, reduce oxidative stress, and inhibit inflammatory responses and renal fibrosis (Xu et al., 2020; Sharma, 2020). However, its clinical application is limited by bioavailability and potential side effects.

SIRT1 Activator

(1) Resveratrol: As a naturally occurring polyphenolic compound, resveratrol has been reported to activate SIRT1 through a variety of mechanisms, including the possible activation of AMPK to indirectly elevate NAD+ levels (Bonkowski & Sinclair, 2021). Resveratrol has been shown to attenuate renal injury and fibrosis in DKD in several animal studies (Gao et al., 2021). A phase II clinical trial initially showed that resveratrol treatment may help reduce urinary protein levels in DKD patients, but larger studies are needed to confirm this (Saldanha et al., 2020).

(2) Selective SIRT1 activators (STACs) such as SRT1720: These compounds are designed to more specifically activate SIRT1 (Dai et al., 2020). Animal studies have shown that STACs such as SRT1720 are effective in ameliorating metabolic syndrome and prolonging lifespan while also reducing renal fibrosis (Mengozzi et al., 2022). However, their long-term safety and clinical efficacy have yet to be validated.

PGC-1α Inducers/Activators

Fibrates as agonists of peroxisome proliferator-activated receptor alpha (PPARα), fibrates are mainly used for the treatment of hyperlipidemia. PPARα induces the expression of PGC-1α. Several studies have suggested that fibrates may exert renoprotective effects by activating the PPARα/PGC-1α axis and improving mitochondrial function and fatty acid metabolism (Nakamura et al., 2021). Subgroup analyses of the FIELD study have shown that fenofibrate may slow the progression of proteinuria in patients with DKD (Drury et al., 2011). Combining a fibrate with an AMPK activator is expected to synergistically enhance metabolic improvement and antifibrotic effects (Liu et al., 2022).

Non-Coding RNA Regulation

Non-coding RNAs (ncRNAs), especially microRNAs (miRNAs) and long-chain non-coding RNAs (lncRNAs), play important roles in the regulation of gene expression and are involved in the regulatory network of the AMPK/SIRT1/PGC-1α pathway, which has emerged as a new target for intervention.

Targeted Inhibition of Pro-Fibrotic Mirnas

MiRNA-34a expression is up-regulated in high-glucose environments and has been shown to directly target mRNAs that inhibit SIRT1, thereby exacerbating pathway inhibition and kidney injury (Chen et al., 2020). Theoretically, inhibition of miRNA-34a activity using specific antisense oligonucleotides (ASOs) or miRNA antagonists would be expected to restore SIRT1 expression and pathway function and attenuate RIF. A 2023 review may discuss the potential of such strategies (Mahtal et al., 2022).

Targeted Regulation of Protective Lncrnas

lncRNAs can regulate gene expression through a variety of mechanisms, including adsorption of miRNAs as sponges of miRNAs, thereby deregulating the inhibition of target genes by miRNAs. It was found that lncRNA MALAT1 expression was downregulated in DKD, and overexpression of MALAT1 could improve renal function and reduce fibrosis by adsorbing miR-145, which represses SIRT1, and then upregulating SIRT1 expression and activating the AMPK/mTOR signaling pathway (Song et al., 2022). Targeting to restore the expression level of such protective lncRNAs is another potential therapeutic avenue.

Gene Editing and Metabolic Reprogramming

CRISPR/Cas9 Gene Editing Technology

Using the CRISPR/dCas9 system, it is possible to target and activate the expression of endogenous genes without the need to introduce exogenous genes. Using this technology to specifically activate the expression of endogenous AMPK or PGC-1α genes in kidney cells in a mouse model, researchers observed significant reductions in renal fibrosis and improved renal function (Wang et al., 2022; Bel B. et al., 2023). This provides proof-of-concept for the development of gene activation-based therapies, but their safety and delivery efficiency remain challenges.

Nad+ Precursor Supplementation

Since NAD+ depletion is a key cause of decreased SIRT1 activity, supplementation with NAD+ precursors has been suggested as a promising strategy. Studies have shown that NR supplementation effectively elevates NAD+ levels in cells and tissues, enhances SIRT1 activity, improves mitochondrial function, and demonstrates benefits in a variety of aging-associated disease models, including possible models of kidney disease (Covarrubias et al., 2021).

Ketogenic Diet (KD)

KD is a very low-carbohydrate, high-fat, moderate-protein dietary pattern that induces the body to produce ketone bodies (mainly β-hydroxybutyric acid, β-hydroxybutyrate, BHB). BHB is not only an alternative source of energy but has also been found to function as a signaling molecule, by directly activating AMPK and may improve mitochondrial function and suppress inflammation through other mechanisms (Puchalska & Crawford, 2017; Rojas-Morales et al., 2020).

Challenges and future directions

Translational Medicine Bottlenecks

Drug Specificity and Off-Target Effects

Many existing pathway activators have multi-target effects, and their renoprotective effects may not be entirely dependent on the target pathway, while also potentially introducing unanticipated side effects or off-target toxicity (An et al., 2020). The development of highly selective agonists or inhibitors is key.

5.1.2 Long-Term Safety and Potential Risks

Long-term, systemic activation of certain pathway members can be potentially risky. SIRT1 is thought to have a role in promoting tumorigenesis or progression in some cases (Li & Kazgan, 2021). Therefore, a deeper understanding of its role in different tissues and pathological states is needed, as well as exploring the development of tissue-specific delivery systems to improve efficacy and reduce systemic risk (Eirin et al., 2020).

5.1.3 Individualized Differences and Efficacy Prediction

There may be significant individual differences in patient response to therapy, which may be related to a variety of factors such as genetic background, disease stage, and comorbidities. There is a lack of effective biomarkers to predict which patients will benefit most from treatment targeting this pathway (Cheng & D'Agati, 2021).

5.2 Emerging Technology Driven

5.2.1 Single-Cell Sequencing Technologies

Single-cell RNA sequencing and single-nucleus RNA sequencing are capable of resolving, with unprecedented resolution, transcriptomic changes and interactions among various cell types in the kidney in the course of the development of DKD RIF (Wu et al., 2024). This could help to identify subpopulations of cells that are particularly sensitive to or play a key driving role in fibrosis, as well as specific features of AMPK/SIRT1/PGC-1α pathway dysregulation in these cells, providing a basis for the development of more precise targeting strategies.

5.2.2 Artificial Intelligence (AI)-Assisted Drug Design

AI, especially deep learning models, has shown great potential in the field of drug discovery. AI models can be used to screen large libraries of small molecule compounds and predict drug candidates that can effectively regulate the activity of the AMPK/SIRT1/PGC-1α pathway (Schneider et al., 2020). AI can also help to optimize the structure of a drug and predict its pharmacokinetic and potential toxicity. Kinetic properties and potential toxicity, accelerating the process of new drug development (Zhavoronkov et al., 2021).

5.2.3 Liquid Biopsy and Dynamic Monitoring

Urine, as the "window" to kidney disease, contains a wealth of biological information. Detection of changes in specific components of urine, such as miRNAs carried by urinary exosomes (Baker et al., 2020) or miRNAs associated with pathway activity, is expected to serve as a non-invasive biomarker for early diagnosis, risk stratification, and dynamic monitoring of therapeutic response in DKD (Logias et al., 2022; Ghai et al., 2021). This could help to individualize treatment and efficacy assessment.

6. Concluding remarks

As a central integrator of cellular energy metabolism, mitochondrial homeostasis, redox homeostasis, and anti-fibrotic defense mechanisms, the AMPK/SIRT1/PGC-1α signaling pathway plays a key driving role in the dysfunction of renal interstitial fibrosis pathology in diabetic nephropathy. Inhibition of this pathway leads to disturbed energy metabolism, mitochondrial dysfunction, exacerbated oxidative stress, amplified inflammatory responses, and overactivation of pro-fibrotic signaling pathways, which ultimately combine to promote the irreversible progression of RIF. Therefore, restoring or enhancing the activity of the AMPK/SIRT1/PGC-1α pathway has emerged as an attractive multidimensional therapeutic target for intervention in DKD RIF.

Looking ahead, combining single-cell histology technology to deeply analyze the fine mechanisms of cellular heterogeneity and pathway regulation, using artificial intelligence to accelerate the discovery and design of novel, efficient, and specific drugs, developing liquid biopsy-based dynamic monitoring biomarkers, and exploring more precise interventions will be the key directions to advance the development of this field. Through multidisciplinary cross-fertilization and the application of innovative technologies, it is expected that the understanding of the mechanism of the AMPK/SIRT1/PGC-1α pathway will be translated into more effective clinical therapeutic strategies, which will ultimately improve the prognosis of patients with DKD, and delay or stop their progression to end-stage renal disease.

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Conflict of Interest

The authors declare there are no conflicts of interest.

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SHARIA-COMPLIANT INVESTMENT LOCATION CHOICE: A GEOGRAPHICAL ANALYSIS OF RESIDENTIAL REAL ESTATE POTENTIAL IN INDONESIA'S JABODETABEK REGION

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Abstract: *The Jabodetabek metropolitan region continues to attract private and household investors amidst rising urbanization and housing demand. Among these investors are Sharia-compliant individuals who seek ethical alignment in addition to financial returns. However, past studies rarely address the integration of financial motives, Islamic values, and spatial perceptions within a unified framework of investment behaviour. This research proposes a behavioural framework combining the Theory of Planned Behaviour and Residential Location Theory to understand Sharia-compliant investment decision-making. Using a qualitative-abductive method, the study will conduct semi-structured interviews with 20 residential real estate agents across Jakarta, Bogor, Depok, Tangerang, and Bekasi. Thematic analysis will uncover how investors evaluate capital appreciation, rental yield, location accessibility, infrastructure, and urban development through both financial and religious lenses. The resulting insights will contribute to mapping high-potential residential investment zones in Jabodetabek under both Sharia-compliant and conventional strategies. This research advances the intersection of behavioural finance, urban geography, and Islamic ethics in emerging market contexts.*

Keywords: *Sharia-Compliant Investment, Residential Real Estate, Theory of Planned Behaviour, Location Preference, Jabodetabek*

Introduction

Indonesia's rapid urbanization and shifting demographic patterns have transformed its residential real estate sector into a dynamic field of investment. Nowhere is this transformation more evident than in the Jabodetabek region—Jakarta and its surrounding cities of Bogor, Depok, Tangerang, and Bekasi—which has become a focal point for both population growth and infrastructure development. As housing demand intensifies, private and household investors are increasingly seeking opportunities that balance financial gain with strategic location preferences.

A growing segment of these investors adheres to Sharia-compliant principles, integrating religious values into their financial decision-making. These investors are not only motivated by capital appreciation and rental yield but also by ethical obligations derived from Islamic teachings. This dual pursuit of financial return and religious alignment introduces new complexities into residential investment behavior, particularly in terms of how location, infrastructure, and ethical considerations intersect.

Despite the increasing relevance of this investment profile, prior studies have tended to treat financial, spatial, and religious dimensions of investment in isolation. While financial studies emphasize rational profit-maximizing behavior, and spatial studies focus on infrastructure and accessibility, limited research explores how Islamic ethical values shape or interact with these other determinants. Likewise, studies on Sharia-compliant finance often concentrate on financial instruments rather than on investor behavior in real estate markets.

This research aims to fill that gap by developing an integrated understanding of how financial expectations, perceived locational advantages, and Islamic values collectively influence residential real estate investment decisions in Jabodetabek. Grounded in the Theory of Planned Behavior and Residential Location Theory, and operationalized through a qualitative methodology, the study offers a novel contribution to both behavioral finance and spatial investment literature in Muslim-majority contexts.

Literature Review

This research is anchored in three interrelated bodies of literature: the Theory of Planned Behavior (TPB), Residential Location Theory, and Islamic investment values. Together, these frameworks offer an interdisciplinary lens through which financial, behavioral, and religious factors can be systematically analyzed to explain investor decision-making in Indonesia's residential real estate sector.

Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB), developed by Ajzen (1985), serves as the principal behavioral framework for this study. TPB posits that human actions are shaped by three core psychological dimensions: attitudes (personal beliefs regarding outcomes), subjective norms (social and cultural influences), and perceived behavioral control (self-efficacy and control over conditions). In investment contexts, attitudes relate to perceived profitability (e.g., capital appreciation and rental yield), subjective norms refer to prevailing social or religious expectations, and perceived behavioral control reflects how investors perceive infrastructure, accessibility, and broader development conditions that affect feasibility.

While TPB has been extensively applied in finance and consumer behavior studies (Khai et al., 2024), its application in real estate has grown in recent years. Researchers such as Yan and Ming (2024), Sharma and Akinwalere (2023), and Singh et al. (2024) have extended TPB with constructs such as financial literacy, market awareness, risk perception, and interpersonal trust. Although these adaptations improve TPB's predictive power, most studies remain secular in focus, failing to consider faith-based motivations that are central to Islamic investors. Warsame and Ireri (2016), and Ashraf (2022) offer some early insights by incorporating Islamic moral values and religiosity, but integration with spatial and financial frameworks remains limited.

Residential Location Theory)

Residential Location Theory, as articulated by Alan W. Evans (1973), examines how individuals choose where to live based on trade-offs between housing costs, commuting distances, infrastructure, and quality of life. The theory suggests that location decisions are

driven by the minimization of economic costs and the maximization of utility—often expressed as access to employment, amenities, and transport infrastructure.

Empirical studies in Indonesia reinforce the relevance of this theory. Putranto and Louis (2020) in Greater Jakarta identified land area, infrastructure quality, and proximity to services as major influences on residential preference. Sundari et al. (2022) highlighted how toll road development along Jakarta–Bandung shifted housing demand to suburban zones. Aulia and Syahri (2018) found that young families prioritize access to trade and social facilities, while Pudjiwidyastuti et al. (2016) and Gusri and Riyanto (2020) emphasized transport services, land tenure security, and affordability. These findings confirm that accessibility, infrastructure, and urban development are consistent spatial determinants in Indonesian real estate decisions.

From an investment perspective, Evans (1973) further notes that the value of residential real estate is determined not just by income potential but also by location's economic lifecycle, such as gentrification or decline. These spatial-economic cycles directly affect both capital appreciation and rental income—two key financial criteria in this study.

Islamic Values in Investment

Islamic investment principles emphasize ethical, socially responsible, and interest-free financial behavior derived from Shariah law. As depicted by Antonio (2001) and based on Al-Zarqa (1959), Islamic finance integrates spiritual, ethical, and transactional aspects under the concept of *muamalah* (economic interaction).

Sharia-compliant investment prohibits *riba* (interest), *maysir* (gambling), and *gharar* (excessive uncertainty), and it promotes fairness, justice, and halal (permissible) enterprise. In residential real estate, these principles influence not only the financing mechanism but also the nature and location of the property itself. Perdana (2021) shows that Muslim investors prioritize properties near mosques, Islamic schools, halal commerce, and community centers. Infrastructure features such as gender-segregated amenities and privacy-enhancing design are also valued. Rental income must be generated through lawful means and be free from unethical uses of the property.

Ashraf (2022) introduced the Theory of Islamic Planned Behavior (TIPB), proposing that niyyah (intention), empathy, and moral values influence investment behavior. His research found internal moral values and external support to be key in shaping Islamic investors' decision-making. While TIPB and other Islamic finance studies (e.g., Farish & Karim, 2021; S. Ali et al., 2015) provide critical insight, few directly address how Islamic values interact with spatial preferences or real estate conditions.

Integrated Literature Gap

Despite growing interest in real estate investment behaviours, most literature remains siloed. Financial research (D'Lima & Schultz, 2020; Ramirez-Uribe et al., 2024) focuses on return maximization, spatial studies prioritize locational optimization (Correia et al., 2020), and Islamic finance remains centered on financial instruments like Sukuk. There is limited empirical integration of these dimensions.

Few studies map how Islamic investors evaluate property based on both religious norms and real estate fundamentals. Even fewer apply behavioural theory frameworks like TPB to model the complexity of investor decisions that include ethical, spatial, and financial considerations. Thus, this research fills a critical gap by combining TPB, Residential Location Theory, and Islamic investment ethics into a unified framework suitable for understanding Sharia-compliant residential investment in Jabodetabek.

This integrative approach contributes to behavioural real estate research in emerging Muslim-majority markets by offering a holistic understanding of how ethical commitments, perceived spatial conditions, and financial expectations collectively shape investor decisions.

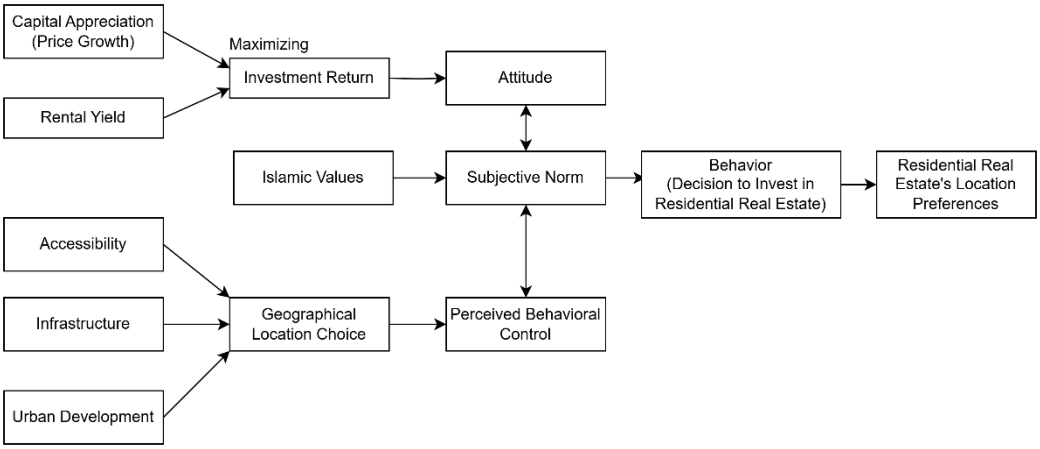


Figure 1. Conceptual Framework of Sharia-Compliant Residential Real Estate Investment Decision

Source: Author, 2025

Research Methodology Proposal

This research is anchored in three interrelated bodies of literature: the Theory of Planned Behavior (TPB), Residential Location Theory, and Islamic investment values. Together, these frameworks offer an interdisciplinary lens through which financial, behavioral, and religious factors can be systematically analyzed to explain investor decision-making in Indonesia's residential real estate sector.

Research Proposal

The research employs a qualitative design centered around semi-structured interviews with key informants—residential real estate agents and brokers—across five urban centers in the Jabodetabek region: Jakarta, Bogor, Depok, Tangerang, and Bekasi. These agents are chosen due to their continuous interaction with private and household investors and their ability to reflect investor preferences, trends, and constraints in the market.

The sampling method is purposive, with participants selected based on:

- A minimum of one year of experience in the residential property market
- Active engagement with property marketing or transaction processes in Jabodetabek

- Familiarity with Sharia-compliant housing principles

A total of 20 interviews are planned, with four participants drawn from each of the five cities. This number balances the need for regional representativeness and thematic saturation while remaining feasible for in-depth qualitative analysis.

Data Collection

Semi-structured interview guides are constructed to align with the three dimensions of the Theory of Planned Behavior:

- **Attitude**: Interview questions assess how investors evaluate properties based on capital appreciation and rental income.
- **Subjective Norms**: Questions probe the influence of Islamic values, Sharia compliance, and ethical investment considerations.
- **Perceived Behavioral Control**: The interview explores how accessibility, infrastructure, and urban development shape perceived feasibility and attractiveness.

The interviews will be conducted in person or virtually, recorded with consent, and transcribed verbatim. Interview questions are pre-tested for clarity and consistency, ensuring alignment with the research objectives.

Data Analysis

Thematic analysis will be used to identify and categorize patterns within the data. Coding will be carried out using NVivo software, allowing for structured analysis of how investment drivers manifest across different geographic zones and investor profiles. A scoring and weighting procedure will be applied to translate qualitative insights into comparative spatial indicators for mapping purposes.

Ethical Considerations

The research follows ethical guidelines aligned with APA standards and Indonesian academic protocols. Informed consent will be obtained from all participants. Confidentiality is maintained by anonymizing interview data, and participation is entirely voluntary. The study does not engage with sensitive financial or legal data, minimizing ethical risk.

This methodological framework ensures rigor and relevance in capturing the complex behavioral patterns and spatial preferences of Sharia-compliant investors in one of Southeast Asia's most dynamic real estate markets.

Introduction

This research is expected to contribute both theoretically and practically to the fields of real estate investment, behavioral finance, and Islamic economic studies.

Theoretical Contribution. The study integrates the Theory of Planned Behavior (TPB) and Residential Location Theory with Islamic investment values to develop a comprehensive model

of Sharia-compliant residential real estate investment. This integration addresses a critical gap in existing literature, where financial, ethical, and spatial factors are often treated in isolation. By exploring how these dimensions intersect in the decision-making processes of private and household investors, the study advances TPB into a culturally embedded framework suitable for Muslim-majority societies. It also expands Residential Location Theory by incorporating faith-based locational preferences, such as proximity to mosques and Islamic schools.

Empirical Contribution. Using primary qualitative data from real estate agents operating in different cities within Jabodetabek, the research offers grounded insights into how investor behavior varies across geographic and socio-religious contexts. The study moves beyond generalized investor typologies and contributes a region-specific understanding of how Sharia-compliant behavior manifests in practice.

Methodological Contribution. This study demonstrates the value of qualitative-abductive research in the context of real estate decision-making, especially for uncovering nuanced preferences and normative influences that are often missed by purely quantitative approaches. The integration of thematic analysis with scoring and spatial mapping also offers a novel mixed-method approach to location analysis.

Practical Contribution. The research will produce a spatial representation of high-potential residential real estate areas that align with Sharia-compliant investment preferences in Jabodetabek. This output is intended to support policy makers, urban planners, and real estate developers in aligning housing projects with investor demand rooted in ethical and religious considerations. Furthermore, the study will help Sharia-compliant investors make more informed, value-aligned decisions.

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PHRASEOLOGICAL ERRORS IN ACADEMIC WRITING AMONG ESL LEARNERS AT SPACE UTM

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Abstract: *Phraseological errors—such as incorrect phrasing, inconsistent verb forms, sentence fragments, and redundant constructions—significantly undermine the clarity and professionalism of academic writing. This study investigates the causes, types, and avoidance strategies of such errors in the academic texts of ESL learners, with particular attention to their frequency in second language (L2) writing tasks. Adopting a qualitative approach, the study employed content analysis to examine students' responses to a questionnaire on phraseological competence, focusing on idioms, collocations, and fixed expressions. The analysis identified recurring errors, including incorrect phrasing (4 instances), inconsistent verb forms (4 instances), and sentence fragments (2 instances). These issues were attributed to limited exposure to advanced linguistic structures, cognitive processing difficulties, and underdeveloped language processing skills. The findings highlight the need for targeted pedagogical interventions and self-editing strategies to enhance learners' phraseological accuracy. By integrating qualitative linguistic insights with quantitative frequency data, the study offers a comprehensive understanding of phraseological errors and presents practical recommendations for educators and institutions aiming to improve the quality and readability of student academic writing.*

Keywords: phraseological errors, academic writing, linguistic analysis, editing strategies, student writing.

Introduction

In English as a Second Language (ESL) education, accurate phrase use is essential for achieving fluency and professionalism in academic writing. Despite its importance, many ESL learners continue to struggle with phraseological errors—such as incorrect collocations, idiomatic misuse, and awkward phrase constructions—which can compromise clarity, coherence, and overall communication. These errors are often caused by limited language

exposure, first language (L1) interference, and insufficient focus on phraseology in language instruction.

In Malaysia, where English is widely used in education and professional contexts, strong English proficiency is considered vital. Recognising this, numerous educational reforms have been introduced to improve English instruction across all levels. However, at SPACE UTM, ESL students still face persistent challenges in academic writing due to phraseological inaccuracies. These issues hinder not only academic performance but also students' confidence and communicative competence. Although considerable research has been conducted on grammar and vocabulary acquisition, phraseology remains an underexplored area—especially in the Malaysian context. The lack of targeted studies means that educators may not fully understand the scope of phrase-related issues faced by learners, making it difficult to design effective interventions. To guide the study, the following research questions are posed; a) What phraseological errors are commonly made by ESL learners at SPACE UTM? b) What recurring patterns can be observed in these errors?

This research fills a critical gap in ESL literature by focusing on phraseological competence—a key yet often overlooked aspect of academic writing. The findings will provide educators with deeper insights into the specific phrase-related difficulties students face. These insights can inform teaching strategies, curriculum development, and materials design, particularly in areas such as collocation training and idiomatic expression usage. By addressing these phraseological challenges, the study aims to enhance ESL learners' writing skills, support their academic success, and better prepare them for professional communication. The research also offers a valuable reference point for similar ESL programs aiming to improve phraseological instruction and learner outcomes.

Literature Review

Phraseology plays a crucial role in language acquisition and effective communication. It encompasses the study of fixed expressions, collocations, idioms, and other multi-word units that contribute to fluency and naturalness in speech and writing. Understanding phraseology is essential for ESL learners as it enhances their ability to convey meaning accurately and appropriately in various contexts. Research indicates that proficiency in phraseological competence can significantly impact learners' overall language proficiency, enabling them to engage more effectively in academic and social interactions.

A substantial body of literature has focused on the common errors made by ESL learners, primarily emphasising grammatical and vocabulary errors. Studies have identified frequent issues such as subject-verb agreement, verb tense inconsistencies, and incorrect word choices, which often stem from L1 interference and insufficient exposure to the target language. For instance, research conducted by Mehat and Ismail (2021) highlighted the prevalence of grammatical errors among Malaysian tertiary students, while Wan Khairunnisa’ Wan Ibrahim and Zarina Othman (2021) explored vocabulary-related challenges in Malaysian secondary school students. These studies underscore the need for targeted instructional strategies to address these common pitfalls.

While there is a wealth of research on grammatical and vocabulary errors, studies specifically addressing phraseological errors among ESL learners remain limited. Existing literature, such

as the work by Omongos and Villarin (2023), has begun to explore semantic and collocation errors, yet there is a notable gap in comprehensive analyses focusing on the phraseological challenges faced by learners. This lack of targeted research highlights the need for further investigation into the types of phraseological errors, their underlying causes, and their impact on communication.

Error analysis is a critical component of language learning research, providing insights into the nature and sources of learners' errors. Theoretical frameworks such as Corder's Error Analysis model and the Interlanguage Theory offer valuable perspectives on understanding the developmental stages of language acquisition and the influence of L1 on L2 learning. These frameworks facilitate the identification of systematic errors and help educators design effective interventions tailored to learners' specific needs. By applying these theories, researchers can better understand the complexities of language learning and the factors contributing to errors in phraseology. By addressing these gaps, this study aims to contribute to a more nuanced understanding of phraseology in ESL education and inform effective teaching practices.

In summary, this literature review will provide a comprehensive overview of the significance of phraseology in language learning, the common errors faced by ESL learners, the theoretical frameworks guiding error analysis, and the existing research on phraseological errors. By synthesising these areas, the review will establish a solid foundation for the current study, emphasising the need for focused research on phraseological competence among ESL learners at UNISEL.

Methodology

This study adopted a qualitative research approach by analysing textual data collected from the assignments of L2 learners of SPACE UTM. A qualitative method allows for an in-depth exploration of learners' experiences, perspectives, and use of language, prioritising meaning and context over numerical data. It is particularly effective in uncovering complex linguistic patterns and cognitive processes.

Content analysis was employed as the primary technique, enabling systematic examination of student writing to identify phraseological patterns, recurring errors, and underlying language issues. This method is well-suited to linguistic research, offering both descriptive and interpretive insights into how learners use idioms, collocations, and fixed phrases. The approach provides a robust framework for exploring how ESL learners engage with phraseological constructs in authentic academic tasks.

Sampling in qualitative research involves the deliberate selection of participants who are most likely to provide rich, relevant insights. Given the size and diversity of the student population at SPACE UTM, purposive sampling was used to identify participants who are actively engaged in English language learning.

The sample comprised ten ESL learners enrolled in English foundation courses at SPACE UTM. These students were selected based on their active participation in coursework involving academic writing. Purposive sampling ensured that data was collected from individuals whose experiences and outputs were directly relevant to the research objectives, thereby supporting a detailed exploration of phraseological competence.

The primary instrument used for this study was a coding sheet designed to analyse learners' responses to a structured questionnaire on phraseological competence. The questionnaire targeted learners' understanding and usage of idioms, collocations, and fixed expressions. Rather than evaluating responses as simply right or wrong, the coding scheme aimed to capture the depth of learner interaction with each phrase. The coding sheet included columns for; Learner ID, Item ID, Phrase Type (Idiom, Collocation, Fixed Phrase), Item Format (e.g., Sentence Completion, Matching), Response Type (Verbatim response), Interpretation Category (e.g., Literal Interpretation, Misapplication, Inappropriate Context) and Notes for qualitative insights into learner thought processes. Codes were emergent, derived inductively from student responses rather than predetermined. This allowed the study to capture subtleties in learner interpretation and usage. Thematic analysis was then applied to identify recurring issues and deeper patterns across responses, offering a nuanced understanding of phraseological development beyond surface-level correctness.

Data collection was conducted using a structured questionnaire administered to the selected ESL learners at SPACEUTM. The process was carefully managed to ensure consistency and reliability. Participants were provided with clear instructions outlining the objectives of the study and the nature of the tasks. The questionnaire was completed under controlled conditions to minimise distractions and support focused participation. Learners were given a fixed period to complete the tasks, ensuring standardisation across responses. Upon completion, the questionnaires were collected and securely stored for analysis. The structured design of the instrument facilitated efficient data gathering and allowed for systematic examination of learners' phraseological use. This method ensured that data collection remained consistent while still capturing the diversity of learner responses necessary for qualitative analysis.

Findings

Research question (1): What phraseological errors are commonly made by ESL learners at UTMSpace?

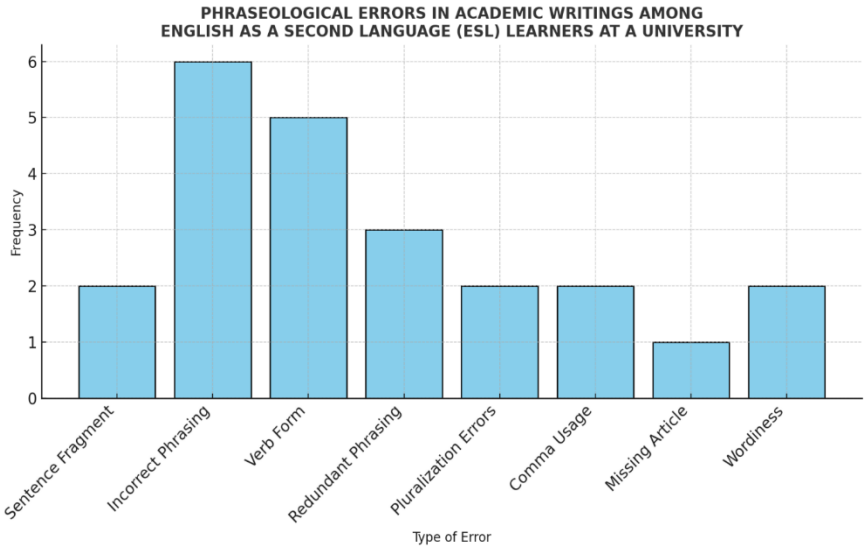


Figure 1: The Frequencies of Errors

Figure 1 illustrates the frequency of various phraseological errors identified in the academic writing of English as a Second Language (ESL) learners at SPACE UTM. This analysis responds to the research question: *"What are the phraseological errors made by ESL learners at SPACE UTM?"*

The most prevalent error type is **Incorrect Phrasing**, with **6 recorded instances**, indicating that students often struggle to express ideas using syntactically and semantically appropriate structures. This suggests challenges in mastering collocations, idiomatic expressions, and the overall natural flow of English. Following closely are **Verb Form Errors**, with **5 occurrences**, highlighting a common issue among ESL learners in appropriately conjugating verbs based on tense, aspect, and subject-verb agreement. This type of error may stem from first language interference or insufficient understanding of English grammar rules. **Redundant Phrasing** appears next with **3 instances**, revealing a tendency among learners to repeat ideas unnecessarily, possibly due to a lack of lexical variety or uncertainty in expressing complex thoughts concisely. Other observed errors, such as **Sentence Fragments, Pluralization Errors, Comma Usage**, and **Wordiness**, each occurred **twice**, while **Missing Article** was the least frequent, with **only 1 recorded case**. These less frequent errors still reflect broader concerns with grammatical precision, punctuation norms, and stylistic clarity in academic discourse.

Overall, the data highlights a clear need for focused instruction in grammatical accuracy, sentence construction, and lexical selection to improve the academic writing proficiency of ESL learners. Targeted interventions in areas like phrase structure, verb usage, and coherence development could significantly enhance learners' ability to produce clear and effective academic texts.

Research Question (2): To analyze recurring patterns in the identified phraseological errors.

ID	Type of Error	Frequency	Example Sentence (Based on Individual Mistakes)	Correction	Justification
1	Sentence Fragment	2	Student1: "With its engaging short-form videos, personalized content feed, and creative tools."	"TikTok is a popular social media platform that offers numerous benefits with its engaging features."	Fragments lack a main clause; they need completion to form a full thought.

			Student2: "Especially for those who are not able to showcase their talents physically."	"TikTok gives opportunities, especially for those who are not able to showcase their talents physically."	Fragments are incomplete ideas; adding a main clause makes the sentence stand alone.
2	Incorrect Phrasing	6	Student3: "This platform can open more career opportunities to everyone in a variety way."	"This platform can open more career opportunities for everyone in a variety of ways."	Awkward phrasing lacks grammatical flow and precision. The revised sentence uses standard grammatical structures.
			Student2: "TikTok has been a source of entertainment for many."	"TikTok is a significant source of entertainment for many."	Clarity is improved by rephrasing to highlight TikTok's relevance as a source of entertainment.
			Student3: "TikTok is increasingly used for educational purposes."	"TikTok has become increasingly popular for educational purposes."	Grammatical flow is corrected by rephrasing the sentence to use appropriate verb forms.
3	Verb Form	5	Student1: "TikTok provide knowledge to users."	"TikTok provides knowledge to users."	Subject-verb agreement error corrected; singular subject requires the verb 'provides' to align in

					tense and number.
			Student2: "Many influencers has started their careers on this platform."	"Many influencers have started their careers on this platform."	Plural subject ('influencers') must pair with the plural auxiliary verb 'have.'
			Student5: "TikTok provide a platform to show creativity."	"TikTok provides a platform to show creativity."	Singular subject 'TikTok' needs the verb 'provides' for grammatical accuracy.
4	Redundant Phrasing	3	Student6: "To put the statistics into words, TikTok increase job opportunities."	"To illustrate, TikTok increases job opportunities."	Excessive wording removed to make the sentence more concise while maintaining the intended meaning.
			Student7: "TikTok could help users earn a useful knowledge on all kinds of topic."	"TikTok helps users gain knowledge on various topics."	Sentence simplified by removing unnecessary modifiers for clarity and precision.
			Student8: "TikTok is a great app because it's easy to use, let us be creative, and connect."	"TikTok is a great app because it's easy to use, fosters creativity, and connects users."	Rephrased to reduce redundancy and create better parallel structure.

5	Pluralization Errors	2	Student3 "Users can upload shorts video to show their creativity."	"Users can upload short videos to showcase their creativity."	The plural noun 'videos' must agree with its modifying adjective 'short.'
			Student6: "Many people now earn full time income by doing small business."	"Many people now earn full-time incomes by running small businesses."	Corrected to pluralize 'incomes' and 'businesses' for grammatical agreement with 'many people.'
6	Comma Usage	2	Student4: "While TikTok initially popular with younger audiences it also has expanded."	"While TikTok was initially popular with younger audiences, it has expanded its appeal."	A comma is added to separate the dependent and independent clauses for proper sentence structure and readability.
			Student7: "TikTok is a source of entertainment with funny videos, creative challenges.	"TikTok is a source of entertainment with funny videos and creative challenges."	A comma between coordinate adjectives improves clarity by appropriately separating the descriptors.
7	Missing Article	1	Student10: "In conclusion TikTok is a beneficial platform."	"In conclusion, TikTok is a beneficial platform."	The article 'a' and a comma after 'In conclusion' are added to ensure grammatical completeness

					and proper punctuation.
8	Wordiness	2	Student3: "TikTok platform offers their users with filters, effects and soundtracks..."	"TikTok offers users filters, effects, and soundtracks..."	Wordiness reduced by removing 'their' and 'with,' simplifying for better readability.
			Student9: "This platform helps users earn money by creating and posting a video."	"This platform helps users earn money by creating videos."	Unnecessary repetition ('and posting') removed to simplify the sentence while retaining meaning.

The analysis of phraseological errors among ESL learners at SPACE UTM revealed several recurring patterns, highlighting common challenges in academic writing. The most frequent error identified was Incorrect Phrasing (6 occurrences), which reflects learners' difficulties in constructing natural and idiomatic expressions. This pattern suggests a reliance on literal translation from the first language and limited familiarity with authentic phraseological structures in English. Such errors often disrupt fluency and clarity in academic texts.

Following this, Verb Form Errors (5 occurrences) emerged as another prominent pattern. These errors involved incorrect tense usage, auxiliary verb misapplication, and inconsistent verb conjugation, indicating a need for more focused instruction on verb use within larger phraseological units. The tendency to mishandle verb forms also highlights a deeper issue in integrating grammatical accuracy into cohesive language chunks.
Redundant Phrasing (3 occurrences) was also observed, where learners repeated meanings unnecessarily, such as using expressions like "revert back" or "final conclusion." These errors suggest a lack of awareness regarding conciseness and precision in academic discourse.

Other less frequent but still notable patterns included Prepositional Collocations (2 occurrences) and Lexical Choice Errors (2 occurrences). Prepositional errors, such as "discuss about" or "depend in," point to weaknesses in mastering fixed multi-word units, while lexical misselections indicate gaps in vocabulary depth and register-appropriate word usage. Lastly, Article and Determiner Errors (1 occurrence) revealed occasional difficulties in constructing accurate noun phrases, although this was not a predominant issue.

Collectively, these findings point to a broader concern with learners' limited control over lexico-grammatical combinations, particularly in the context of academic phraseology. The recurrence of such errors underscores the need for pedagogical interventions that emphasise collocational competence, contextualised grammar instruction, and exposure to authentic language use through corpus-based resources or phrasebank integration. By addressing these recurring patterns, educators can better support ESL learners in developing fluency and precision in their academic writing.

Discussion

The analysis of phraseological errors in ESL learners' academic writing at SPACE UTM reveals key insights into the linguistic challenges faced by second language learners. The predominance of Incorrect Phrasing and Verb Form Errors underscores persistent issues in mastering natural-sounding English and grammatical accuracy—two fundamental components of academic writing fluency. These errors suggest that learners are not only grappling with complex grammatical structures but are also limited in their ability to use appropriate lexical combinations and collocations.

A recurring pattern across the dataset is the tendency for lexico-grammatical misalignment, often manifesting as awkward phrasing, redundant expressions, or inappropriate word choice. Such issues may be attributed to first-language interference, insufficient exposure to authentic academic input, and limited practice with fixed expressions commonly used in English academic discourse. While less frequent, errors involving prepositions, articles, and punctuation still signal important gaps in learners' overall writing competence.

These findings align with previous studies on phraseological competence, which emphasise the importance of teaching language as chunks or formulaic sequences rather than isolated words or rules (Wray, 2002; Boers & Lindstromberg, 2012). The data supports the call for pedagogical approaches that prioritise collocational awareness, contextualised grammar teaching, and repeated exposure to academic language models. Tools such as learner corpora, concordancers, and academic phrasebanks can serve as effective resources in this regard.

Ultimately, improving ESL learners' academic writing proficiency requires an integrated instructional approach—one that addresses both accuracy and fluency, while fostering an awareness of how meaning is shaped through natural and context-appropriate phrasing. By targeting the most frequent and recurring phraseological errors, educators can design more responsive and impactful writing interventions that lead to measurable improvements in student performance.

Conclusion

The analysis of phraseological errors in the academic writing of ESL learners at SPACE UTM highlights critical areas of concern, particularly in the use of natural phrasing, verb forms, and lexical appropriateness. The recurrence of these errors underscores the need for instructional strategies that move beyond rule-based grammar teaching to include a stronger focus on collocational competence and authentic language use. Addressing these recurring issues through targeted, context-rich interventions can significantly enhance learners' ability to

produce accurate, fluent, and effective academic texts. These findings serve as a valuable guide for educators seeking to refine writing instruction and support the linguistic development of ESL learners in higher education.

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STUDENT PERCEPTIONS OF PRACTICE OPPORTUNITIES IN MUET COURSES: A FOCUS ON THE FOUR CORE LANGUAGE SKILLS

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Abstract: *This study explores student perceptions of practice opportunities in MUET (Malaysian University English Test) courses, focusing on the four core language skills: listening, speaking, reading, and writing. Drawing on survey data from students enrolled in MUET preparatory courses at a Malaysian public university, the study examines the extent and effectiveness of practice opportunities provided for each skill. Findings reveal an imbalance in practice exposure, with students reporting greater emphasis on reading and writing tasks compared to listening and speaking. Many students expressed a desire for more interactive and communicative activities, particularly for speaking, to build confidence and fluency. The study highlights the need for more integrated and skill-balanced instructional approaches to better align with the MUET assessment structure and real-life language use. Implications for curriculum design, pedagogical strategies, and teacher training are discussed to enhance students' proficiency and performance in MUET.*

Keywords: *MUET Preparation, Language Skills, Perceptions, Practice Opportunities*

Introduction

Proficiency in English is a critical determinant of academic and professional success, particularly in multilingual societies where the language serves as a primary medium of instruction and communication in conjunction with the EMI. The Malaysian University English Test (MUET) is a standardized assessment designed to evaluate students' English language competency across four core skills; listening, speaking, reading and writing. With the increasing emphasis on EMI implementation across Malaysian public universities as according to Rahman & Singh (2022), MUET preparatory courses play a vital role in equipping students with essential academic English skills. However, the effectiveness of these courses hinges on the adequacy of practice opportunities provided to students, a factor that significantly influences their perceived readiness for the examination (Almuhanna, 2022; Mahmud et al., 2021). Given Malaysia's push for enhanced English proficiency through its EMI policy (Karnine et al., 2022), examining students' perceptions of practice adequacy in MUET courses becomes particularly relevant to ensure alignment with national educational goals and university language requirements.

Existing literature underscores the importance of structured practice in language acquisition, emphasizing that frequent and targeted exercises enhance proficiency as claimed by Schulz (1991) mentioned by Scott (2022). In the context of MUET, students' exposure to varied and sufficient practice opportunities directly impacts their confidence and performance. Conversely, some studies suggest that while some preparatory programmes offer comprehensive skill-based training, others may have disparities in student outcomes as shown by Zou and Jiang (2021) and Pearson (2020). This gap highlights the need to examine students' perceptions of practice sufficiency, as their experiences provide valuable insights into curricular strengths and shortcomings.

The focus of this study centres on MUET candidates, particularly those enrolled in preparatory courses, as their perceptions reflect the practical realities of language skill development. Research indicates that learner perspectives are instrumental in evaluating instructional efficacy, as they reveal discrepancies between intended and actual learning experiences whether MUET courses uniformly address all language skills or exhibit biases toward certain competencies, a concern raised in prior investigations (Rahman et al., 2023). Hence, understanding these perceptions can inform curriculum adjustments to ensure equitable skill development.

At the policy level, findings from this study may contribute to refining MUET preparatory guidelines, ensuring alignment with students' needs by emphasizing continuous improvement in support evidence-based reforms. If students perceive insufficient practice in specific skills, policymakers may consider mandating balanced and integrated instructional approaches across preparatory programmes. Such measures would enhance overall language proficiency, better preparing students for tertiary education.

In all, this study explores MUET students' views on practice opportunities in their courses. By analyzing their feedback, this research aims to identify strengths and weaknesses in current teaching methods. The results could help make MUET courses more effective, ensuring students receive balanced training in the four core skills; listening, speaking, reading and writing

Literature Review

English has held a significant place in the Malaysian education system for a long time, and this important role is further reflected in the Malaysian University English Test (MUET). MUET serves a critical function, particularly in preparing students for tertiary education. This is apparent in the objectives of MUET itself. According to Malaysian Examination Council (2019), MUET aims to measure the English language proficiency of candidates who wish to pursue undergraduate studies, helping institutions to gauge the readiness of prospective students for academic coursework as well as their ability to comprehend English across various contexts in a higher education setting. Apart from that, MUET also aims to measure the English proficiency of adult learners, including those who need to use English in the workplace. Since it assesses the four core language skills, namely speaking, listening, reading and writing, candidates are expected to be more well-versed in the English language, enabling them to perform effectively in their respective degree courses (Karnine et. al., 2022).

The fact that MUET serves as a university prerequisite underscores its importance for both academic and professional purposes in Malaysia, including academic preparedness,

employability and language development. First of all, English language has been commonly used as a medium of instruction for most of the local universities and the majority of the textbooks and reference books from different courses are presented in English (Sukri et. al., 2023). This demonstrates that the ability to comprehend the English language is a vital requirement to thrive in an academic setting at university level. A number of skills like communication, note-taking and academic writing can be mastered with decent English language ability. Furthermore, English is often associated with higher employability chances. Even though there are lots of other factors that come into play when it comes to employment, English language proficiency does have a substantial impact in influencing graduate employability (Jawing and Kamlun, 2022). Apart from that, MUET also plays a significant role in encouraging students to improve their English skills, which is essential in a globalised world. In a study conducted by Ting (2024), there is a significant increase in the students' MUET writing performance after the intervention of a vocabulary journal. This explains how MUET can also be a pushing factor in the improvement of both vocabulary and writing skills. Overall, MUET plays a pivotal role in Malaysia by not only serving as a prerequisite for university entrance, but also by fostering academic readiness, enhancing employability and promoting English language development among learners.

Importance OF THE Four Core Language Skills IinMuet

The four core language skills; listening, speaking, reading, and writing; play a pivotal role in academic and professional success, particularly in the context of the Malaysian University English Test (MUET). These skills are defined as follows: listening involves comprehending spoken discourse, speaking entails oral expression, reading requires textual interpretation, and writing demands coherent written production (Li & Pei, 2024; Kamaşak et al., 2021). Research highlights their significance in MUET, where reading is prioritized, followed by speaking and writing, due to their relevance in workplace communication (Rahman et al., 2023). Additionally, emotional intelligence has been found to predict MUET performance, suggesting that affective factors influence language skill development (Hamdzah et al., 2020). However, Mahmud et al. (2021) argue that MUET's washback effect may skew learning strategies toward test-specific skills rather than holistic proficiency. This indicates a need for balanced skill integration in language curricula to ensure both test readiness and real-world applicability. Thus, while MUET effectively assesses these skills, its influence on pedagogy warrants further scrutiny to optimize language learning outcomes.

In academic settings, writing and reading are the strongest predictors of success, whereas speaking and listening are crucial for communicative competence (Li & Pei, 2024; Yu et al., 2021). For instance, writing is essential for academic assessments, while speaking facilitates classroom interaction (Kamaşak et al., 2021). MUET evaluates these skills through structured tasks, such as listening comprehension, oral presentations, reading analysis, and essay writing (Fan, 2023). Studies show that targeted interventions, including digital tools, enhance skill mastery, with writing and reading demonstrating notable improvement (Karataş & Tuncer, 2020). However, challenges persist, as students often struggle with speaking and writing in English-medium instruction (Kamaşak et al., 2021). This underscores the necessity for integrated skill development to bridge gaps between test performance and real-world communication. Consequently, MUET's comprehensive assessment framework, though robust, must evolve to address diverse learner needs and contemporary communicative demands.

Practice Opportunities in Language Courses

Effective language acquisition depends on well-designed practice opportunities that balance structured and unstructured tasks while integrating both input and output-based activities. Structured practice, such as guided drills and interleaved exercises, enhances accuracy and skill retention, particularly when combined with varied contexts (Suzuki et al., 2020; Benati, 2020). Conversely, unstructured practice, including open discussions and reflective tasks, fosters communicative competence by allowing learners to apply language in authentic situations (Crane & Sosulski, 2020). Research indicates that hybrid approaches by mixing structured and unstructured methods yield the best outcomes, as they address both form-focused learning and real-world application (Suzuki & Sunada, 2020). However, students often prefer teacher-led, exam-oriented practice, suggesting a need to align structured tasks with learners' expectations (Stracke et al., 2023). This highlights the importance of balancing pedagogical structure with learner autonomy to maximize engagement and skill development. Thus, while structured input activities such as listening and reading exercises improve language processing, unstructured output tasks such as speaking and writing are equally vital for holistic proficiency.

The frequency and quality of practice, along with constructive feedback, significantly influence language learning success. High-variability practice enhances short-term retention, though long-term mastery may require additional reinforcement strategies (Bu et al., 2020). Feedback plays a critical role in fostering self-regulation, yet its effectiveness can be undermined by an overemphasis on testing or unrealistic expectations (Vattøy, 2020). Reflective and technology-assisted practices, such as digital language tools, are increasingly valued for supporting self-evaluation and adaptive learning (Thu, 2020). Furthermore, systematic practice opportunities in teacher education curricula promote lifelong learning by emphasizing relevance, clarity, and continuous improvement (Leaman & Edmonds, 2021). Despite these benefits, challenges remain in ensuring feedback is timely and actionable, particularly in large classrooms. Therefore, a well-rounded language course should integrate frequent, varied practice with meaningful feedback to enhance both skill acquisition and learner confidence.

Methodology

This study adopted a quantitative research design to investigate students' perceptions of the practice opportunities available in the SPACE UTM English courses, with a particular focus on the four core language skills: writing, reading, speaking, and listening. A structured questionnaire was employed to gather standardized data from a sizeable sample of students, enabling the identification of general trends and patterns in their learning experiences. The target population consisted of diploma students enrolled in UTMSPACE who had completed the required English language courses. The research was conducted in two distinct phases: a pilot study and the main study. In the pilot phase, a preliminary version of the questionnaire was distributed to 40 students to test its reliability and clarity. The main study involved distributing the finalized questionnaire to a sample of 130 students from various diploma programs. The data were analyzed using descriptive statistics, including frequencies, means, and standard deviations, via SPSS version 23. As the study aimed to describe general perceptions rather than examine statistical relationships, no inferential analyses were conducted.

Findings

This section presents the analysis of students' perceptions regarding the sufficiency of practice opportunities in the four core MUET language skills—Listening, Speaking, Reading, and Writing—based on survey responses. The data is represented through bar charts categorised by skill, with frequency counts across five Likert-scale responses: Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree.

Listening Skill

The findings reveal that the majority of students held a positive perception of the listening practice opportunities provided in MUET courses. The most frequently selected response was "Agree", followed by "Strongly Agree" and "Neutral." Only a minimal number of respondents indicated disagreement, with "Disagree" and "Strongly Disagree" responses being negligible. These results suggest that listening activities are generally perceived as sufficient. However, the notable proportion of neutral responses may imply that while practice opportunities are available, they may not always be sufficiently engaging or diverse to meet the varied needs and preferences of all learners.

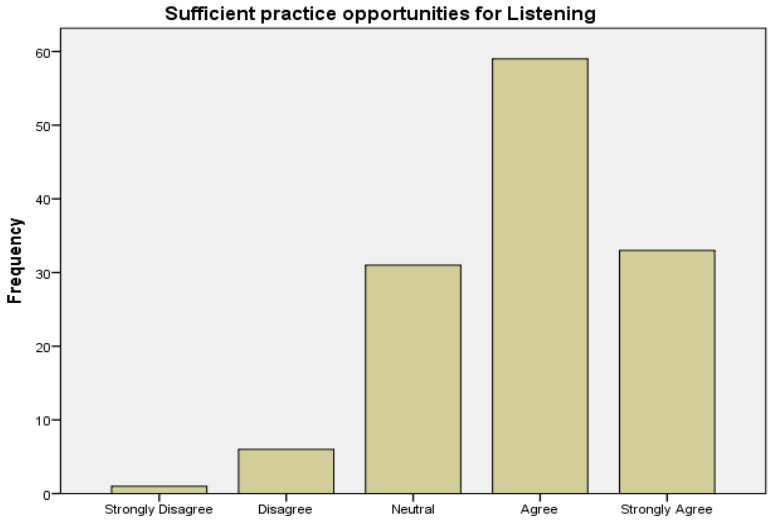


Figure 1: Sufficient Practice Opportunities for Listening

Speaking Skill

Similar to the findings for listening, the highest number of respondents selected "Agree" when asked about speaking practice opportunities, followed by "Strongly Agree" and "Neutral." Only a small proportion of students expressed negative perceptions, indicating overall satisfaction with the provision of speaking tasks. This suggests that the MUET courses are generally successful in integrating speaking activities into the curriculum. However, the slightly higher percentage of neutral responses compared to those for listening may reflect certain contextual challenges that affect the implementation or perceived effectiveness of these activities. Factors such as large class sizes may limit individual speaking time and opportunities for meaningful interaction. Additionally, time constraints within the lesson schedule may restrict the depth and frequency of oral practice. Another possible factor is learner-related, such as low self-confidence, fear of making mistakes, or anxiety when speaking in front of peers, which can hinder active participation despite the availability of opportunities.

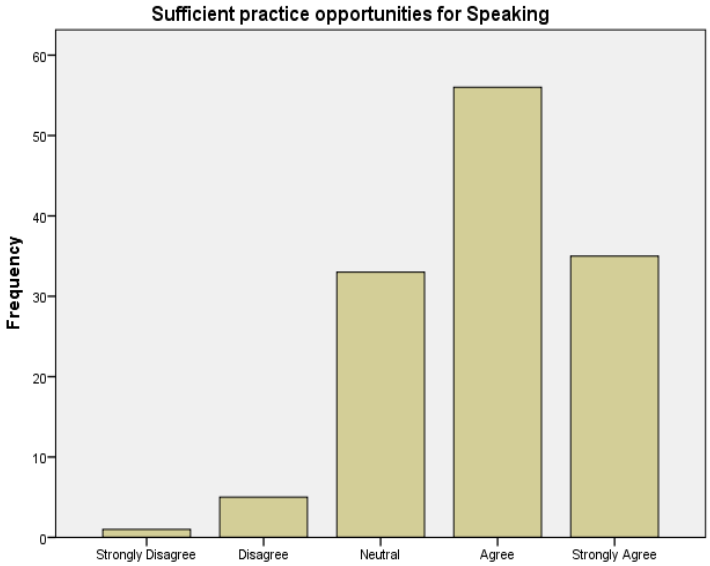


Figure 2: Sufficient Practice Opportunities for Speaking

Reading Skill

Student perceptions of reading practice opportunities mirrored the overall positive trend observed in the other core language skills, with "Agree" emerging as the dominant response. This indicates that most students acknowledge the inclusion of reading tasks in their MUET learning experience. However, a noteworthy feature in this category is the relatively higher proportion of "Neutral" responses compared to listening and speaking, suggesting a degree of uncertainty or lack of strong opinion about the quality or effectiveness of the reading instruction. Negative responses ("Disagree" or "Strongly Disagree") remained minimal, pointing to an overall absence of dissatisfaction but also a lack of strong endorsement.

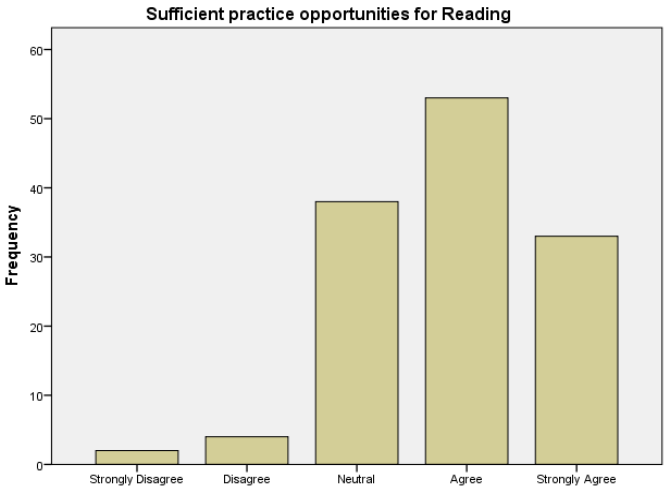


Figure 3: Sufficient Practice Opportunities for Reading

Writing Skills

Writing also recorded "Agree" as the most selected response, followed by a considerable number of "Neutral" and "Strongly Agree" responses. As with Reading, a substantial number of students selected "Neutral," indicating a moderate level of uncertainty or indifference.

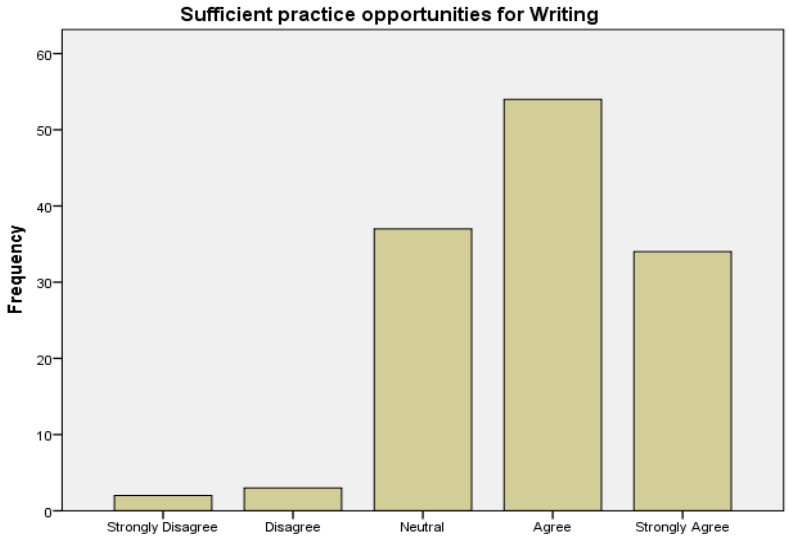


Figure 4: Sufficient Practice Opportunities for Writing

The results suggest that writing practice is provided but may not always be perceived as effective or sufficient. This could point to areas for improvement, such as providing clearer writing guidance, more frequent writing tasks, or detailed formative feedback.

Across all four skills, the summarized trend shows a strong agreement among students that sufficient practice opportunities are available. However, Reading and Writing recorded higher levels of neutrality, indicating potential areas for pedagogical enhancement.

Table 1: Summarized Trend of Students' Agreement

Language Skill	Predominant Response	Observations
Listening	Agree	High satisfaction, minimal disagreement
Speaking	Agree	Positive perception, slightly more neutral than Listening
Reading	Agree	Adequate but neutral responses suggest room for improvement
Writing	Agree	Similar to Reading, neutrality may reflect feedback or task depth

Discussion

The results of this study indicate that students generally perceive MUET preparatory courses as providing adequate practice opportunities across the four core language skills—listening, speaking, reading, and writing. However, nuanced variations in perception across the different skills suggest areas that warrant further pedagogical attention.

Listening and speaking skills received the most favorable responses, with a majority of students agreeing that practice opportunities were sufficient. This reflects positively on course instructors' efforts to integrate communicative tasks and oral activities into the curriculum. Nonetheless, the presence of a considerable number of "neutral" responses in these areas indicates that not all students experience the same level of engagement or effectiveness, possibly due to variations in classroom delivery, class sizes, or learner anxiety. These findings resonate with prior studies (e.g., Kamaşak et al., 2021; Yu et al., 2021), which highlight the importance of emotional readiness and interactional dynamics in language learning.

In contrast, reading and writing—though still rated positively overall—had relatively higher rates of neutral responses. This neutrality may stem from students perceiving these activities as overly test-oriented or lacking in variety and feedback. These perceptions align with concerns raised in the literature about MUET's washback effect, where instruction is sometimes narrowly tailored to examination formats rather than fostering comprehensive skill development (Mahmud et al., 2021). Moreover, the limited perception of engaging or meaningful practice in writing tasks could suggest the need for more formative assessment strategies, including peer reviews and process-based writing activities (Ting, 2024; Vattøy, 2020).

The findings also underscore a common challenge in language instruction—achieving a balanced integration of all four skills. While structured input practices like reading and listening are crucial for language comprehension, output practices like speaking and writing are essential for active production and fluency (Benati, 2020; Suzuki & Sunada, 2020). The imbalance noted by students, particularly in terms of how often they actively apply language in speaking or extended writing tasks, suggests a potential overemphasis on receptive over productive skills.

Furthermore, students' mixed perceptions may reflect broader issues such as time constraints, instructional design, or inconsistencies in teaching quality. The reliance on teacher-led, exam-oriented practice—while effective in the short term—may limit opportunities for independent learning and communicative competence (Stracke et al., 2023). The increasing use of digital tools, as cited in recent research (Fan, 2023), offers a potential avenue for more autonomous, varied, and personalized skill development.

In sum, while students generally appreciate the practice opportunities provided, the presence of neutral and less enthusiastic responses in certain skill areas points to the need for more engaging, balanced, and learner-centered instruction. Addressing these gaps will be crucial not only for MUET success but also for preparing students for academic and professional communication in English-medium environments.

Conclusion

The findings indicate a generally positive student perception of practice opportunities in MUET courses, particularly in Listening and Speaking. The relatively higher neutrality in Reading and Writing calls for instructional improvements in task design, variety, and feedback mechanisms to further support student skill development in these areas.

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ENGLISH COMICS AS EDUCATIONAL MATERIALS: EXPLORING THEIR ROLES IN IMPROVING STUDENTS' READING COMPREHENSION

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Abstract: *With their engaging blend of visuals and texts, English comics have emerged as a promising tool for enhancing reading comprehension in elementary classrooms. This study examined how incorporating English comics as educational materials and reading interventions impact students' reading comprehension. It also determined students' perceptions of using the comics. An explanatory sequential design was employed. Classroom action research was utilized in the quantitative phase. Total enumeration and pre-and post-test assessments were used to determine differences in students' reading comprehension performances. The qualitative phase used a semi-structured interview to determine selected students' perceptions of the comics. Using purposive sampling, the study involved 20 Grade 5 students at Palabayan Elementary School (PES), Tinoc, Ifugao, Philippines. Quantitative results showed significant improvement in students' reading comprehension after the comics intervention. Qualitative findings divulged four main themes: comics design, the impact of comics on reading comprehension, challenges encountered, and suggestions for comics improvement. Students indicated the positive influence of visually appealing design elements and well-designed picture and text alignment. They mentioned that it helped improve their reading comprehension and increased their reading enjoyment. Challenges encountered relate to the comics' visually overwhelming, visual and textual overload and students' limited vocabulary. Distractions caused by visuals, information overload, and vocabulary difficulties were also identified. Their recommendations include increasing the visual appeal and clarity of the comics, adding more pictures, and improving designs. Nonetheless, this study implies the impact of comics and supports its utilization as a reading intervention tool for enhancing young students' reading comprehension.*

Keywords: *Comics, English Comics, Educational Materials, Reading Comprehension, Reading Intervention*

Introduction

Students can improve their English language skills by reading comics. Reading becomes more enjoyable and engaging with it. Comics, a versatile medium blending text and visuals (Carrier & Oliker, 2001), offer a unique approach to education. Their ability to simplify complex ideas makes learning engaging for young students. The interactive nature of comics, with their panel-by-panel viewing, maximizes user engagement (Kunzle, 2024), making them a valuable tool for educators across various disciplines (Bolton-Gary, 2012). This multimodal approach promotes diverse learning styles and makes reading more enjoyable. Using comics as educational materials is particularly beneficial for enhancing comprehension (Källvant, 2015; Lopez, 2022; Sharma, 2020), fostering a deeper understanding of concepts, and encouraging active engagement in the learning process.

Comics are gaining recognition as valuable tools for teaching English at the elementary level. They can enhance students' multiliteracy skills, spark their interest in reading, and facilitate language acquisition (Källvant, 2015). It can help develop multimodal literacy skills, preparing students for the demands of the 21st century (Issa, 2017). These engaging resources are particularly beneficial for young English language learners (Losi et al., 2023), boosting language proficiency, enthusiasm, and knowledge retention in the classroom (Brown, 2023). Comics make learning English enjoyable and exciting, aiding students in remembering and understanding the language better. Using comics in teaching can improve academics and motivation, especially when learning English grammar (Jadán-Guerrero et al., 2022). These benefits have made comics a popular educational material in elementary schools, fostering positive character traits and enhancing students' understanding of the material and learning goals.

Reading comprehension plays a crucial role in students' academic performance across various educational levels, and it is a complex process that involves extracting and constructing meaning from written text (Duke et al., 2021). It requires constructing a coherent mental representation of text information, integrating the reader, the text, and the activity within a broader sociocultural context (Butterfuss et al., 2020). Students without reading comprehension problems do better on reading assignments at various grade levels. Reading comprehension is essential for understanding directions and building independent readers (Chang & Avila, 2014). Students with better reading comprehension skills tend to have higher self-perceived academic performance (Beluce et al., 2018) and improved problem-solving abilities (Jala, 2020).

In comics, visual literacy interventions can enhance comprehension and inferential understanding of educational comics. Comics significantly enhance reading comprehension by combining text and images to engage various cognitive processes simultaneously (Tiemensma, 2009). This unique storytelling format effectively conveys narratives and captivates readers with visually appealing content showcasing familiar characters and events, potentially boosting students' interest in reading. Particularly beneficial for struggling readers, the visual components of comics aid in improving text comprehension and overall learning, especially for individuals encountering difficulties in grasping written material. Comics excel at teaching conversational skills by visually modeling nonverbal communication (Sedliarova & Soloveva, 2021). They provide a contextualized learning environment for grammar structures (Jadán-

Guerrero et al., 2022), and their adaptability allows for repurposing linguistic content (Graham, 2011).

Comics have been found to boost grammar learning and motivation among students (Jadán-Guerrero et al., 2022) and can aid in recycling language content and introducing activities in the early years (Graham, 2011). Comics in English classrooms are supported by their ability to blend visual and textual elements, making them engaging and effective for language learning (Graham, 2011). However, there is a need for further research on students' production of comics, not just consumption, to fully harness their potential in English language education (Issa, 2017).

In the Philippines, reports and studies highlight ongoing challenges in reading literacy among Filipino students. The country ranked last in reading comprehension in the 2018 Program for International Student Assessment (PISA) report (Organization for Economic Co-operation and Development [OECD], 2019). The Philippines' performance in PISA 2018 revealed persistently low proficiency in reading compared to other countries (OECD, 2019), while in 2022, PISA results showed no significant improvement from 2018 (OECD, 2023). Lack of reading components, inadequate resources (Librea et al., 2023; Idulog et al., 2023), lack of reading elements, insufficient enthusiasm, teacher incompetence, and limited resources (Librea et al., 2023) contribute to low reading literacy skills among elementary grades. Significant difficulties with reading literacy are evident among Filipino pupils, especially in elementary school.

Literature Review

Theoretical Framework

In school settings, the constructivist theory of knowledge emphasizes students actively creating their understanding rather than passively absorbing information (Alanazi, 2016; Bada & Olusegun, 2015). Constructivism aligns well with using English comics to support students' comprehension. Comics provide a visual and contextual framework that helps students actively interpret meaning by combining text with images, promoting deeper understanding through interaction with the material. Students can infer context, identify patterns, and make connections between visuals and language by engaging with the narrative, fostering critical thinking and comprehension skills. The dynamic nature of comics supports constructivist principles by encouraging students to construct their interpretations, problem-solve, and apply their learning in a more engaging and accessible way.

Cognitivism is very useful for education in learning new knowledge and skills. It presents that learning is an active process that involves producing meaning and processing information (Winn et al., 2019). In language, cognitive activities may involve language to improve learning (Suharno, 2010). Over the years, it is considered that cognitive linguistics has contributed to the development of comics (Stamenković & Tasić, 2014). Cognitivism supports using English comics by supporting students' comprehension through a multimodal experience that engages visual and textual processing. As students interact with the comics, they activate prior knowledge, integrate new information, and organize it meaningfully. The combination of sequential imagery and dialogue aids in memory retention and cognitive processing, allowing students to build mental models that enhance understanding. By breaking down complex

language and ideas into digestible, visual narratives, comics provide a structured yet flexible way for students to comprehend, analyze, and recall content more effectively.

Behaviorism has played a significant role in education over the past two centuries. It focuses on observable behaviors and how external stimuli and reinforcement shape them (Nurfadillah et al., 2024). In the classroom, this theory often translates into structured teaching techniques that involve clear objectives, direct instruction, and positive reinforcement to encourage desired behaviors. Behaviorist approaches also emphasize assessment through measurable outcomes to determine whether students have mastered specific skills or knowledge. Behaviorism can be effectively linked to using English comics to support students' comprehension. In a behaviorist framework, students learn through repetition, reinforcement, and stimuli-response patterns. Comics can be a powerful tool in this context by providing a consistent, repetitive exposure to language and concepts through engaging visual narratives. As students repeatedly interact with the comics, they encounter new vocabulary, sentence structures, and context clues, reinforcing learning through direct association. Teachers can further reinforce comprehension by providing positive feedback when students demonstrate understanding, thus encouraging continuous engagement and the gradual development of language skills. Comics' clear, structured format allows for incremental learning, where students can progressively build their comprehension through guided exposure and reinforcement.

Comics in English Education

Using comics in the classroom has been linked to better knowledge retention, more motivation, and better language learning results (Brown, 2023). It may lower anxiety and improve recall of information (Karap, 2017). The visual nature of comics enhances student motivation and engagement, making the learning process more enjoyable. Visual elements of comics, such as illustrations and graphic design, can capture students' attention and hold their interest, leading to a more positive learning experience and making the learning process more enjoyable (Bolton-Gary, 2012).

These benefits extend to English education, where comics are effective tools for teaching various aspects of the English language, including composition, teaching English to speakers of other languages (TESOL), and creative writing (Issa, 2017). Comics have been found to aid in developing writing and reading skills among foreign language learners (Losi et al., 2023). Students who regularly read comics improved their ability to infer and draw conclusions from text. This is significant because it underscores the value of comics in developing critical thinking skills, a crucial element of reading comprehension (Smith, 2007).

Using comics as educational materials is an effective way to promote reading. Comics can bridge the gap between reluctant readers and the joy of reading. By providing a visual and engaging medium, comics can make reading more accessible and enjoyable for students who might find traditional text intimidating (Smith, 2006). Teaching reading through comics is a more effective way to teach reading than general materials full of printed texts (Robbani & Khoirotunnisa, 2021). Comics can provide a context for learners to practice and develop their language skills in a more engaging and accessible way (Issa, 2017).

Tanala (2023) observed that comic-based reading materials enhanced comprehension at the elementary level. This suggests that comics provide an engaging and effective approach to enhancing reading comprehension among young learners.

Csabay (2006) indicated that comics can be used as a powerful tool for teaching various subjects, not just reading, and can be particularly valuable in supporting visual learners and encouraging critical thinking and can be utilized as educational material in addition to being entertaining and engaging for students. Robbani and Khoirotunnisa (2021) determined that students taught using comics showed significantly higher levels of reading comprehension, vocabulary development, and overall reading engagement compared to those taught using traditional textbooks.

Karap (2017) found that students taught using comics showed lower anxiety and stress levels during the learning process. This was attributed to comics' engaging and visual nature, which made the learning process more enjoyable and less intimidating. Losi et al. (2023) found that comics can aid in developing writing and reading skills among foreign language learners.

Smith (2007) found that students who read comics improved their ability to make inferences and draw conclusions from text. Ridhwan et al. (2018) observed that comics can benefit elementary students, particularly those learning English as a Foreign Language (EFL). Significant improvements in students' reading comprehension and writing ability were observed. Liu (2004) found that reading comprehension significantly enhanced for low-level English as a Second Language (ESL) learners when presented with high-level texts.

English Education in the Philippines

English language education in the Philippines has a complex history rooted in American colonialism, shaping current policies and practices. Despite English's official status, most Filipinos learn it as an additional language, creating challenges for teachers and learners. The country's multilingual context is often overlooked in English language education, with monolingual perspectives dominating curriculum design, assessment, and classroom teaching (Kilag et al., 2024; Madrunio et al., 2016; Turmudi & Hajan, 2020). This approach perpetuates myths about English and marginalizes Filipino students. While English language education in the Philippines has been generally successful, there are areas for improvement.

Reforms by the Department of Education (DepEd) aim to address these issues and balance international demands with local culture (Lumidao, 2024; Madrunio et al., 2016). This includes the mother-tongue-based multilingual education (MTB-MLE) in the kindergarten to Grade 12 (K12) Curriculum (DepEd, 2019) and the implementation of the recent MATATAG Curriculum (DepEd, 2023). However, recognizing the diverse linguistic landscape and moving beyond traditional ESL labels remains crucial for effective English language teaching in the Philippines.

The English K12 curriculum in elementary schools focuses on developing foundational language skills and fostering a love for reading. It aims to give students a strong foundation in language arts and multiliteracies. It covers various topics, including reading comprehension, vocabulary development, literature, writing, grammar, and communication skills (DepEd, 2016; DepEd, 2023). The K-12 system strengthens students' foundation in crucial subjects and

improves English language skills, especially in reading and performance. Students can interact with people and broaden their perspective, which helps them to understand, interpret, and provide context for their interactions and cultural experiences.

Research Gap

Comics can be an effective tool for enhancing English language learning and reading comprehension. They are perceived as influential in improving reading skills due to their attractive visuals and ease of understanding. Incorporating comics into the curriculum can facilitate language recycling, introduce gap-fill activities, and provide opportunities for writing practice. The visual permanence of comics, combined with dialogue, creates engaging English language teaching materials suitable for primary school students. However, despite these advantages, there is still a need for further studies related to its utilization in English education. There is a lack of local studies explicitly examining the use of English comics to improve students' reading comprehension. This knowledge gap highlights the need for a localized investigation to assess the potential of comics as a pedagogical tool for enhancing English reading comprehension among students in this specific context.

Research Aims and Research Questions

This study aimed to investigate the effects of utilizing English comics as educational materials in the reading comprehension of elementary students. It aimed to establish whether the use of comics leads to a significant improvement in students' English reading comprehension skills. It also aimed to explore the students' experiences in using comics. The study sought to answer the following questions:

1. What are students' English reading comprehension performances before and after implementing the comics as educational materials?
2. Is there a significant difference in the student's English reading comprehension performances before and after implementing the comics as educational materials?
3. What are students' views on using comics in improving their reading comprehension?
4. What modifications can be made to the comics to strengthen their potential to support students' English reading comprehension?

Methodology

Research Design

This study used classroom action research (CAR) and mixed methods and designs. CAR is a systematic and iterative approach and was designed to improve teaching and learning practices in a real-world classroom setting (Khasinah, 2013). This study employed the stages of CAR by Strickland (1988). The stages were carried out in cycles and consisted of seven steps: identifying a problem, seeking information, planning an action, implementing the action, observing the action, reflecting on the observations, and revising the plan. Likewise, mixed-method design is a research approach that combines both qualitative and quantitative research methods. This approach allows researchers to collect, analyze, and interpret data in numerical and descriptive forms, providing a more comprehensive understanding of a research problem by integrating the strengths of both data types (Shanta Nair & Prem, 2020).

For the mixed-method design, the study used an explanatory sequential design to investigate and analyze the use of comics as educational materials to improve students' English reading comprehension. First, the quantitative phase involved collecting and analyzing numerical data to uncover patterns, make predictions and understand relationships (Creswell, 2003). It was a structured approach that used statistical analysis to draw conclusions and answer research questions (Barella et al., 2024). Moreover, a quasi-experimental approach using pre-and post-test assessments was used. It provided a quick and convenient way to evaluate a specific group undergoing an intervention (Stratton, 2019). The pre-and post-test results were used to determine students' reading comprehension performances.

During the qualitative phase, a semi-structured interview was used to understand motivations, attitudes (Adams, 2015), and the impacts of comics on the students. This method involves a guided conversation where knowledge is co-constructed between researchers and participants (Barrick, 2020). The primary focus of the interviews was the student's academic achievement, which led to an explanation of their opinions regarding the use of English comics. To enhance student engagement, the interviews were conducted in the students' native language. Volunteer students participated in the individual interviews. The researchers used recorded videos during the interview and subsequently translated them into English. Then, thematic analysis was applied to analyze the responses, including interview transcripts, familiarization, coding, and theme identification (Maguire & Delahunt, 2017). Incorporating English comics as educational materials and insights into the underlying meanings and relationships surrounding the students' reading comprehension performance was captured by organizing complex data into understandable themes.

Participants

Using total enumeration, 20 Grade 5 students at Palabayan Elementary School (PES), Tinoc, Ifugao, Philippines, were involved in the study. The students were selected through purposive sampling based on the grade section suggested by the school head, which one of the researchers handled. Specifically, there were 55% ($N = 11$) males and 45% ($N = 9$) females. Based on total enumeration, the students were all involved in data gathering of their reading comprehension performance scores during the quantitative phase. The students were assigned pseudonyms from S1 to S20. Meanwhile, ten students volunteered for the interviews during the qualitative phase. Their assigned pseudonyms identifying their scores were maintained in the interview responses. The study was conducted from February to April 2025, the fourth quarter of the academic year 2024 - 2025.

Materials and Instruments

The stories for the English comics were selected based on the learning competencies and lessons covered during the study. The stories were adapted from the teacher's modules and reading materials in the Phil-IRI assessments for English Grade 5. This process reflected congruence between the comics reading materials and the expected reading outcomes for the grade level. Four English comics were made: A Glass of Milk, Greedy Dog, Ant and the Grasshopper, and The Tortoise and the Hare. One comic was used per lesson. The comics were printed in full color and distributed individually to the students. The graphics and designs underwent rigorous selection and critique to ensure alignment with the stories.

The test items to measure students' reading comprehension were adopted in the teacher's modules where the stories were based. This ensured that teachers evaluated the test items as valid and reliable and followed the DepEd assessment protocols. The pre- and post-test assessment tools were the same. The guide questions were developed based on the research objectives and theoretical framework to ensure they directly address the study's aims (Barroga & Matanguihan, 2022). They were reviewed by an English subject specialist and two elementary teachers in the Grade 5 level to ensure that the questions accurately captured relevant information. Based on suggestions, the interview questions were modified and worded clearly and precisely to avoid confusion and to ensure they were interpreted in the same way by the students.

Procedures

Following explanatory sequential design, the qualitative phase involved the seven stages of CAR outlined by Stickland (1988). First, in identifying the problem, the students were observed to have issues related to their reading comprehension. This was based on the Phil-IRI evaluations conducted by the school. This also involved identifying the probable use of English comics as educational materials. Second, existing literature on using comics in language learning, reading, and reading comprehension was explored in seeking information. This stage included exploring how visuals paired with text aid in understanding. The pre-test was also conducted to identify students' strengths and weaknesses in their reading comprehension. Third, in planning an action, a plan to incorporate English comics into the reading lessons was developed, ensuring that the comics align with the student's reading levels and learning objectives. This stage included selecting specific reading materials, designing and developing, producing the comics, and setting measurable goals for comprehension improvement. This stage also involved lesson planning to incorporate English comics as educational materials.

Fourth, English comics were introduced and used in the lessons to implement the action. The comics may have been used for students' regular reading practice, motivation, lesson integration, guided discussions, vocabulary exercises, and comprehension assessments. Reading support was provided throughout. Fifth, observing the action and monitoring how students engage with the comics were done. Any changes in their reading behaviors, participation, and comprehension during comic lessons were noted. The post-test assessment was conducted to determine possible improvement in students' reading comprehension. Students' issues and concerns regarding the comics were also noted for later improvement. Monitoring, feedback, and support were provided. Sixth, reflections on the gathered data were done in reflecting on the observations. This also involved statistical treatment and analysis of the data gathered. This involved comparing students' comprehension levels before and after the intervention. Reflection on whether there was a need to adjust the use of comics to better support students' reading comprehension was covered. Lastly, in revising the plan, revisions were made to the plan for using comics in future lessons. This involved modifying the comics' contents, adjusting the difficulty level, adding more interactive elements, or incorporating additional strategies to support comprehension further. The revised plan would aim to optimize the use of comics to enhance students' English reading comprehension.

Afterward, individual interviews were conducted, and some volunteer students from the class were requested to participate. The interviews were done during breaks and after classes. They were conducted inside the students' classroom, making sure that the students were familiar with

their environment and were not threatening to them. The researchers' smartphones were used to record the interviews. Due to considerable students' shorter attention spans, the interview sessions were briefly conducted for about 15 to 30 minutes.

Before conducting the study, permissions from the School Head and the Class Adviser were requested. Once approved, informed consent from students' parents or guardians was sought. This explained the study's purpose, scope, potential student benefits, and risks involved in the study. It included the right of the parents or guardians to withdraw the participation of their child or ward in the study without repercussions. Since the study was conducted during class hours, the participation withdrawal would only involve non-collection of student data, but their inclusion in the lesson was guaranteed. The students were also oriented about the study and the significance of their participation in attaining the study.

Data Analysis and Management

The researchers were solely responsible for data collection and analysis. To ensure accuracy, researchers personally scored each participant's test paper during pre-and post-test assessments. The scores were recorded in a secure spreadsheet and would only be used for the study. After recording, students' papers were returned for transparency and immediate feedback. A pre-test was given at the beginning of delivering the learning competency, while the post-test was given at the end. The students' names were presented in codes, and no personal information was publicized. Mean (*M*), standard deviation (*SD*), and percentage were used to determine students' reading comprehension performances. A *t*-test was employed to evaluate the significant variance between the students' pre-test and post-test scores. This statistical analysis aims to ascertain whether there is a notable difference in academic performance before and after the intervention with English comics. Following the *t*-test, Cohen's *d*, a measure of effect size, was utilized to quantify the magnitude of the difference between the mean scores of the two assessments. This statistical approach provides a deeper understanding of the impact of the intervention on the students' learning outcomes, offering valuable insights into the effectiveness of incorporating English comics into their educational experience. For data analysis, the computation for reading comprehension in the Phil-IRI was used:

$$\text{Reading comprehension score} = \frac{\text{Number of correct answers}}{\text{Total number of questions}} \times 100$$

In interpreting reading comprehension performances, the Phil-IRI provides the descriptions in Table 1.

Table 1. Phil-IRI Reading Levels and Comprehension Scores

Reading Levels	Reading Comprehension Scores
Independent	80 – 100%
Instructional	59 – 79%
Frustration	58% and below

These reading levels were used as guidelines to determine the student's reading performance (DepEd, 2018). Students at the independent level could independently understand a text without significant help or difficulty. The reader could comprehend the material independently.

The instructional level represented a difficulty level where the text was slightly challenging for the reader but could be understood with some support. Readers might struggle with certain words, phrases, or concepts, but with guidance from a teacher, peer, or additional resources, they could comprehend and make sense of the text. At the frustration level, the text was too difficult for the reader, leading to frequent errors, misunderstandings, and a lack of comprehension. The reader may struggle to decode words, understand the meaning of sentences, or keep track of the plot. Reading at this level could cause frustration and hinder learning, as the text exceeded the reader's current capabilities, making it hard for them to engage meaningfully with the material.

Results

Quantitative Results

Students' English Reading Comprehension Performances

Table 2 shows the reading comprehension performances of the students collected before and after the integration of English comics. Results indicate an increase in their reading comprehension from the pre-test (M = 51.5%) to the post-test (M = 78.5%) after the comics interventions. More than half of the students were at the frustration levels during the pre-test, with 50% or less. There were four students with instructional levels while only one student attained an independent level. On the other hand, the post-test shows an overall increase in students' reading comprehension. Five students achieved perfect scores indicating their independent levels. Majority of the students progressed to instructional levels. There were four students who retained at the frustration levels.

Table 2. Students' Pre-and Post-test English Reading Comprehension Performances

Students	Pre-test Scores		Post-test Scores	
	Score	%	Score	%
S1	6	60	8	80
S2	5	50	10	100
S3	6	60	9	90
S4	4	40	5	50
S5	5	50	4	40
S6	5	50	9	90
S7	6	60	8	80
S8	8	80	9	90
S9	3	30	5	50
S10	7	70	10	100
S11	5	50	7	70
S12	6	60	10	100
S13	8	80	8	80
S14	3	30	4	40
S15	3	30	6	60
S16	2	20	8	80
S17	1	10	8	80
S18	7	70	10	100
S19	4	40	9	90
S20	9	90	10	100
Mean	5.15	51.5	7.85	78.5

As gleaned in Table 3, it was determined that there is a significant difference in the reading comprehension performances of the students during and after the comics interventions. Particularly, the post-test result is significantly higher than the pre-test. This indicates a significant improvement in the students' reading comprehension after using the comics. Further analysis shows that Cohen's effect size value suggested a moderate effect between the test scores.

Table 3. Difference Between the Student's English Reading Comprehension Performances

Tests	*M*	*N*	*SD*	*df*	*t*-value	*p*-value	Cohen's *d*
Pre-test	5.15	20	4.45	19	-5.9519*	.0001	0.60
Post-test	7.85	20	4.13				

Note: * = significant ($p < .05$); ns = not significant ($p < .05$); Cohen's $d = .20$ is small effect; $d = .50$ is moderate effect; $d = .80$ is large effect

Qualitative Findings

Comics Design

Student feedback emphasizes strong perceptions of the visual elements used in the comics. A student indicated that it has attractive colors. One student shared that the pictures were well-aligned with the words, while another indicated that the pictures and words were well-designed. Another expressed that the graphics used were visually appealing. As they shared,

S15: *"I like the color of the comics because it is attractive."*

S2: *"The pictures attract me because they are good. The pictures are aligned to the words."*

S18: *"I am happy to use the comics because the pictures and words are designed well."*

S1: *"The characteristics of the comics that make it easier to understand the story are the colors and pictures because they are attractive and visually appealing."*

Impact of Comics on Reading Comprehension

Improved Reading Comprehension

Students found that the comics significantly improved their reading comprehension. The visuals helped them follow the story's flow and visualize the events described. This active engagement with the visual elements enhanced their comprehension compared to reading traditional text-only books. They expressed,

S15: *"The pictures in the comics help me understand the story's flow."*

S1: *"I understand the story better when it has pictures because I can see what happens in the story."*

S10: *"I understand more the story in comics because it has pictures compared to the regular books with no pictures."*

S12: *"I easily understand the comics because they have pictures where I can see what happens in the story and who said the words or texts."*

Elevated Reading Enjoyment

The use of comics increased students' enjoyment of reading. Combining engaging visuals and straightforward storytelling made the reading process more fun. The students mentioned that they enjoyed reading the comics due to the short stories and pictures used. The divulged,

S4: *"It is enjoyable to read the comics because I understand the story."*
S10: *"I enjoy reading the comics because there are pictures."*
S17: *"Aside from the short sentences, I enjoy reading due to the pictures."*
S2: *"I enjoy reading the comics because the stories are short and good."*

Challenges in Using the Comics

Visually Overwhelming

While generally helpful, the visual elements sometimes proved overwhelming and distracting. A student indicated that they were distracted due to the pictures but pursued to finish reading the stories. Others mentioned losing their focus due to the placement of the dialogues, aside from the pictures. They revealed,

S10: *"I am distracted sometimes, especially when the pictures in the comics are funny, but I continue to read the story."*
S3: *"There are times that I was distracted by the pictures and lost focus in reading the dialogues."*
S4: *"There are times that I was distracted with the pictures and sometimes with how the dialogues are placed in comics."*

Visual and Textual Overload

An overabundance of visual and textual information presented challenges. Too many pictures or densely packed text affects students reading the comics. Sometimes, they find it hard to understand words and pictures that were close together. They commented,

S17: *"There is too much information and too many pictures in the comics, which makes them difficult to understand."*
S19: *"It is difficult to understand some words and pictures, especially when they are placed very close to one another."*

Limited Vocabulary

Difficulties with vocabulary were also reported as a challenge. The students mentioned that they had trouble understanding the story since they were unfamiliar with some words. Given this, they depended on the pictures used. They pointed out,

S12: *"Sometimes it is hard for me to understand the story. I do not know the meaning of some words. So, I depend on the pictures."*
S4: *"I do not know the meaning of some words used, even if there are related pictures."*

Suggestions for Comics Improvement

Students suggested improvements focusing on increasing the visual appeal and clarity of the comics. More pictures and improved design were frequently recommended. They mentioned

using larger font sizes for ease of reading. They also recommended using basic and few pictures and words so they will not be overwhelmed. They recommended,

S1: *"There needs to be more pictures in the comics."*
S18: *"I suggest adding more designs to make it more engaging."*
S15: *"It is difficult to understand the story when the font is small. So, I suggest that it must be in bigger font sizes."*
S17: *"Make the words bigger. Some of the dialogues seem small, making them harder to read."*
S19: *"Use simple and few pictures and words to avoid distractions."*

Discussion

The students' pre-test reading comprehension performances before the English comics intervention indicate that most were at the frustration reading levels. This reflects that most students had difficulty grasping or retaining the story's meaning. They struggled with understanding the central idea, interpreting key concepts, and making connections between information in the text, as described in the DepEd (2018) Phil-IRI. This mirrors the country's low reading comprehension ranking, as assessed by the OECD (2019, 2023). Even if they can decode the words, they may have failed to comprehend the story, leading to confusion and frustration. However, after the comics intervention and post-test assessment, their reading comprehension performances improved to instructional and independent levels. Though some were still at frustration levels, their scores were nevertheless higher than their pre-test scores. At the frustration levels, the students could now comprehend the main ideas, identify key details, and make inferences, but they may still need some support or guidance. Those who achieved independent levels were able to read and fully understand the story without the need for significant support or guidance and were able to independently identify main ideas, key details, and themes, as well as make inferences and draw conclusions, all with a high degree of accuracy. The shift from frustration levels to instructional or independent levels demonstrates students' attainment of better reading comprehension skills, as noted by Chang and Avila (2014), Källvant (2015), Lopez (2022), and Sharma (2020).

The measured significant improvement in students' reading comprehension indicates that the visual and narrative elements of comics utilized have effectively supported their understanding and engagement with the stories. The medium effect size between the pre-and post-test scores also supported this. This implies that the comics interventions used moderately impacted students' reading comprehension performances, with a noticeable but not overwhelming difference in the performance. It echoes that of observed enhanced reading comprehension by Liu (2004), Losi et al. (2023), Ridhwan et al. (2018), Robbani and Khoirotunnisa (2021), Smith (2007), and Tanala (2023). Comics, combining images, dialogue, and sequential storytelling, helped students connect words and visual context, enhancing their comprehension, particularly for frustration level readers. The visual cues in the comics provided context clues that aided in decoding unfamiliar words. At the same time, the structured format of panels, speech bubbles, and dialogues helped organize information in a way that was easier for the students to process. As a result, students have developed stronger skills in making inferences, identifying key details, and understanding narrative structure, all of which significantly improve their reading comprehension. This infers the potential of using comics for English language education among young learners and supports Bolton-Gary (2012), Brown (2023), Graham (2011), Jadán-Guerrero et al. (2022), Issa (2017), and Losi et al. (2023).

In analyzing students' experiences reading the comics, the study highlighted that they have strong positive perceptions of the visual elements in the comics used in the intervention, specifically regarding their aesthetic appeal, alignment with the text, and harmony between the graphics and words. The students emphasized the attractive colors and noted that the pictures and words were well-designed. This exhibits students' engaged cognition of the pictures and words, as Tiemensma (2009) indicated. This suggests that the visual presentation of the comics played a key role in engaging students and enhancing their reading experience. The students also pointed out that the graphics themselves were visually appealing, which could indicate that the illustrations supported comprehension and made the reading process more enjoyable. The consistent mention of colors and pictures and their effective integration with the text reflects the importance of visual design in improving students' understanding of the story. This shows the ability of comic visuals to capture student attention, as remarked by Bolton-Gary (2012).

The students indicated that the comics intervention helped improve their reading comprehension. Students consistently noted that the pictures in the comics were crucial in helping them follow the story's flow, providing a clear visual representation of the events and enhancing their understanding of the narrative. The visual cues clarified the sequence of events and helped establish a coherent structure for the story. Seeing the events depicted in pictures made the comprehension process more accessible. This indicates that the visual components of comics allowed the students to make better connections between the text and the action, reinforcing their understanding of key plot points. This may exemplify the students ' constructive abilities to interpret meaning by combining text with pictures based on Alanazi's (2016) and Bada and Olusegun's (2015) input of constructivist learning. The students also compared the experience of reading comics to traditional text-only books, indicating that including pictures made it easier for them to grasp the content, especially in contrast to more abstract or challenging narrative forms. This demonstrates how comics' visual elements support narrative comprehension and enhance the ability to track character development and dialogue. It may reflect students' enhanced cognitive linguistics, as Stamenković and Tasić (2014) and Suharno (2010) noted.

Beyond comprehension, students also expressed a boost in enjoyment when reading comics. Combining engaging visuals with concise storytelling made the reading experience more enjoyable. The visual elements helped break up the text, providing a dynamic and interactive format that students found more appealing than traditional books. This suggests that combining concise narratives and visually rich formats creates a more accessible and enjoyable reading experience, particularly for students who may find longer or text-heavy passages daunting. This parallels the ability of comics to reduce students' intimidation in reading full-printed texts, as Robbani and Khoirotunnisa (2021) and Smith (2006) pointed out.

Despite the benefits of the comics interventions, students revealed challenges they experienced when engaging with the visual elements of comics. While the visual elements were generally perceived as helpful for enhancing comprehension and engagement, they were sometimes overwhelming or distracting. The placement of dialogue and the pictures occasionally took their attention away from the narrative, causing them to lose focus on the story. Concerning the motivating characteristics of comics indicated by Graham (2011) and Jadán-Guerrero et al. (2022), the graphics used in the comics may have gone overboard with the visual designs of the pictures and the texts. This suggests that, while visuals can support comprehension, their

prominence or design may sometimes divert attention away from the narrative's flow, particularly for students whom the images themselves may more easily engage. This could also indicate that, while the integration of pictures and words is generally a strength of comics, the layout or formatting of the comic could impact how easily students can follow both the visual and textual elements simultaneously.

The comics' visual and textual overload also presented challenges for the students. They reported difficulty when there was an excessive amount of visual and textual information in close proximity, which made it harder for them to process and understand the content. It overwhelmed the students, notably when the content of comics exceeded their capacity to absorb and make connections. This reflects a common issue where an excessive number of pictures and texts within a page can disrupt the reading flow, causing students to feel overloaded. Instead of giving a positive learning experience among the students, as noted by Bolton-Gary (2012), the comics' visual and textual overload may have hindered their reading experiences. The cramped arrangement could lead to confusion, as students may struggle to differentiate between the image and the text or become distracted by trying to process both elements simultaneously. This suggests that, for comics to be truly effective, there needs to be a balance in the quantity of information and careful attention to the layout to avoid overwhelming students. A well-designed comic should allow enough space between the visuals and text, enabling students to easily differentiate between and engage with both elements without feeling distracted or confused.

Another problem mentioned by the students pertained to their limited vocabulary, posing a challenge when they engaged with the comics. Although the visual elements of the comics helped support comprehension, students reported that their lack of familiarity with certain words hindered their overall understanding of the story. The students with limited vocabulary often rely heavily on visuals to make sense of the narrative. This dependence on pictures suggests that while the visual elements helped fill in the gaps, they may not have always fully compensated for gaps in textual comprehension, especially when the unfamiliar vocabulary was central to the plot or understanding of key concepts. This also underscores the limitations of relying solely on images to convey meaning, such as when the pictures may not provide enough context or clarity for students to infer the meaning of certain words. Even when the visuals are related to the text, the relationship between the words and images may not always be sufficient for students to decipher the meaning of unfamiliar terms, especially if those terms are abstract or technical. Along with reading comprehension, vocabulary development is one of the literacy skills the DepEd (2016, 2023) aims to enhance as a foundational language skill through reading.

When asked about their suggestions for improving the comics, the students conveyed key suggestions while offering valuable insights into how the comics can be more visually appealing and easier to comprehend. They suggested increasing the visual appeal and clarity of the comics to enhance their reading experience. They recommended adding more pictures to make them more engaging and easier to follow, which could provide more context and support for comprehension. They emphasized that the visuals should aid comprehension and capture their attention, enhancing the overall experience. Another suggestion involved improving the font size of the text. They found that the texts were sometimes difficult to read due to small font sizes, indicating that readability was challenging for some. This feedback highlights the importance of ensuring that the text is legible, especially for students who may

have difficulty reading small print, and suggests that larger font sizes would improve the overall reading experience. Finally, students recommended simplifying the visual and textual content to avoid overwhelming, indicating the need to balance visuals and text. Students appreciated the balance of visuals and text, where the simplicity of both elements helped keep the story clear and engaging without creating cognitive overload. These changes would likely improve not only the accessibility of the comics but also their overall engagement, providing students with a more enjoyable and effective reading experience.

Conclusions, Implications, and Recommendations

Incorporating English comics into reading instruction offers a fresh and effective way to address young students' comprehension challenges. As a literacy tool, comics are a strategic educational resource that combines images, texts, and storytelling. They offer a dynamic and interactive reading experience among the students, making them confident and capable readers. This study aimed to explore the impact of comics on elementary students' reading comprehension. It also aimed to uncover students' experiences in using comics. As revealed, there was a significant improvement, though with a medium effect size, in students' reading comprehension after comics were used as interventions. Most of the students progressed from frustration levels to instructional or independent levels. This shift emphasizes how comics can improve reading comprehension, especially for those who struggle with reading. Student feedback revealed overwhelmingly positive perceptions of the comics' visual elements. The comics helped students understand the stories better and made reading enjoyable. On the other hand, students highlighted that overly complex visuals and densely packed text occasionally hindered their understanding. Some found the layout confusing, while others were distracted by excessive visual elements, indicating the need for careful design and formatting. Students also revealed that their limited vocabulary affected their understanding, even when supported by images.

Conclusively, this study affirms the promising educational potential of English comics as a viable and engaging intervention to improve students' reading comprehension. While there are design and instructional limitations to consider, improved comprehension, increased motivation, and greater enjoyment make comics a valuable addition to literacy education. It is a promising alternative medium fostering comprehension and positive attitudes toward reading. Educators and curriculum developers can harness comics as a bridge to deeper comprehension, critical thinking, and a lifelong love for reading by acknowledging how students learn best. As such, incorporating comics into educational practice enhances reading comprehension and aligns with the broader goal of creating inclusive, learner-centered, and engaging literacy experiences for all students.

The focus on reading comprehension and not considering other literacy development constructs is a limiting factor in this study. Other skills, such as vocabulary and fluency, were overlooked. Another limiting factor is the involvement of a class section with a small number of student participants in a local school. The study's findings are limited and do not necessarily reflect a larger population. Due to time constraints, the integration of comics was short-term. This may not provide a complete picture of long-term improvements in reading comprehension. Further research and thoughtful implementation of comics can refine their use, ensuring they contribute meaningfully to students' academic growth and language proficiency.

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CONCEPTUAL STUDY ON ARTIFICIAL INTELLIGENCE INFLUENCE ON FUTURE OF ACCOUNTING PROFESSION

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Abstract: *This research is done due to emerging of Artificial Intelligence (AI) that have change many industries for the past 12 months. Many human workforces from manufacturing labour, Information Technology specialist, blue collar and many more face fear due to job security uncertainty. It is important for a study to be carried out to investigate AI whether it is a friend or foe to accounting professions.*

This study will emphasize on the three factors should be consider that AI will be a partner to accounting professions. Cost effectiveness, reliability and high impact value should be the focus for this study to have an in-depth knowledge on how the AI can be part of accountants' partner in carrying out the routine task and strategic decisions making process.
Qualitative method will be used to collect the data from secondary sources so that the study able to clear the doubt exist currently in the accounting professions. Once the practitioners understand the benefits, they will be able to equip themselves with relevant knowledge and skill to embrace AI into their works.

Keywords: *Accountant, Artificial Intelligence (AI), Cost Effectiveness, High Impact Value, Reliability.*

Introduction

The emerging of Artificial Intelligence has been drastically changing many sectors and profession for the past one year. The most obvious sectors affected are information technology and manufacturing. According to Boritz (2023), 65,000 peoples lost their job in America in April 2024 and main reason behind the termination were due to artificial intelligence. About 800 employees from Information Technology sectors have been terminated in April 2024 and replace by artificial intelligence. In a recent survey done by CNBC, 750 business leaders intend to replace human with AI in next 12 months in America and employees described that 29% of their routine work has been replaced by AI.

The invention of AI has brought many fears to the many people, the fear of being replaced by the AI, reduction in job opportunities and even up to extend AI to dominate our future generation. Many professional jobs such as lawyer, doctor and accountant have been mentioned as profession to be taken over by the AI. The medical field has started implementing robotic technology for the last five years to smoothen and reduce the risk of surgery. Lawyers able to access to more case globally and cut down the cost of printing case journals. Nonetheless, accounting field has many changes since post COVID 19 with implementation of more powerful audit software, better accounting information interpretation or even blockchain technology. The normal job such as posting and closing of accounts used to be perform by account clerk or executive has been taken over by accounting software with high reliability and competent (Moll & Yigitbasioglu, 2019).

The Industry Revolution 4.0 has come to a new height, not only about automation, but digital new age which will have direct impact to human career as well as their personal life. From the entrepreneur and business perspective, the AI will bring productivity and expansion hence no reason for them to reject it. (Sherif & Mohsin, 2021).

The emerging of AI in many sectors for the past one year has created fears and worry to job market where thousands of operational level worker has lost their job, many recruitment agents has predicted many more to lose their job in manufacturing and information technology in near future to more supplicated AI (Rawashdeh, 2023). The doubt of choosing the right career pathway also raise the concern of become an accountant in the future. Many professional bodies have updated their course content and enhance on technology knowledge for the future accountant (Boritz & Stratopoulos, 2023). According to Zhang et al (2023), the demand for accountant globally has increase for the past few years. No doubt, routine job by junior accountant no longer seen to be relevant for many well-established organisation. The scope of work for accountants are focus on interpretation skill beyond financial statement, business and financial consultancy work such as asset utilization and financing. (Zhang et al., 2023).

The objectives of the research are to study the need of changes in accounting profession job scope to remain relevant and to identify on how to implement AI into accounting job scope.

The main contributions of this research to provide suggestion to enhance accountant job skill and knowledge in the new era with incorporate of AI in their job rather than view it as a threat to the profession. The study also to clear the doubt of high school leavers to continue their study in this profession without thinking it could be replaced by AI.

One of the research problem is where many previous researcher view AI as a threat to the accountant career in the future. As well as it has been viewed as lack of professional body support to upgrade the members knowledge in this area and become irrelevant.

Literature Review

Introduction

The profession of accountant has been regarded as stewards to safeguard the interest of shareholders and stakeholders, their job scope are important to ensure they able to obtain reliable and trustworthiness source to prepare financial statements. Hence with the

advancement in information technology incorporate the AI, they able to provide more accurate detail to the user. Malaysia Institute of Accountants (MIA) as the parent body to all practitioners has implemented the Digital Technology Blueprint to ensure that accountants in Malaysia are ready and equipped with updated skills and knowledge on technology edge era.

Implementing Artificial Intelligence (AI)

According to Schaudt (2023), AI in accounting is start from the book-keeping upto the financial statements preparation. The process is to be done by machine with human intelligence to enhance the quality of information and reduce time in preparing those accounts. Furthermore, Thakker and Japee (2023) implementation of AI able to assist accountant in fraud detection, minimise error, good analytical information, tax compliance and improve overall efficiency.

Embedded AI into accountants' task is unavoidable, many practitioners are busy attending courses related to AI to avoid they are being neglected or outdated in near future. It is not advisable to hire IT specialist to support their business due to high cost and the specialist may lack of accounting knowledge, particularly on compliance of accounting standards. (Awang et al 2022).

The fundamental of AI should be begin at education level such as Accounting Information System (AIS), it starts from the data entry of transactions until the interpretation of financial statements. However, the incorporating of AI has integrate various accounting scope such as financial reporting, auditing, management accounting and taxation. The co-ordination of scope has enabled accounting work to be more comprehensive, cost effective and efficient in delivering of information. (Korol & Klochko 2022).

According to Russell et al (2018), the origin of AI begins from the phase of Machine Learning (ML). The objective of the ML is to make the computer to have ability to do beyond programmed tasks. The goal of the development is to enable the computer to capture the trend of a business or transaction. Subsequently it able to help the business to perform forecasting, planning and controlling more effectively. The development of AI and ML has reach into large scale where it has benefited to users in large and at an affordable price. The increase in demand for AI has proven that it capability to assist in human work, reliable and most important it would not too costly for the businesses to own it.

To implement AI into any profession is not an easy task because of the fear of exist. Many see AI as a challenger to replace human in various ways. However, it would not possible for AI to replace human in any time soon as the professional well equipped with their professional experience throughout and tertiary skills. It is important to find and have a common understanding between human and AI to clear the doubt. Once this is done, the integration will exist with this two entity. It is very important especially we are in the Industry Revolution 4.0 and the big data era ((Stancheva et.al., 2018).

Scope of AI in Accounting

The number of population has grown hence brought the increase of new company formation. It is non-productive if human keep performing the repetitive work in accounting preparation. The volume of transactions and clients under-care by the accountants will also growth hence it

is better to automate the routine task and accountants focus on decisive work such as interpretation of financial information and strategic financial decision making (Peng at el, 2023). Fostolovych (2022) mentions that the speed and accuracy of AI able to minimise the risk of error by accountant and better decision making to advise the client.

According to Mirzaey (2018), the need of compliance of financial reporting standard has become more and more challenging and complicated for the practitioners to be fully complied. It is unavoidable that the practitioners need to invest or upgrade themselves with appropriate computer knowledge to offload their burden. The application of new technologies in accounting just come at the right timing to assist accountants to fulfil the compliance requirement in reporting standard.

Application of AI in Accounting

According to Zemenkova (2021), many large audit firms already start implement robotic AI into account preparation since 2019. The implementation seen to be an idea move as AI able to reduce the work pressure and meeting the dateline effectively. Many feedback indicates that AI managed to reduce the labour cost and productivity are better due to high reliability and accuracy.

The most common application use by those firms is Optical Character Recognition (OCR), Robotic Process Automation (RPA) and Natural Language Processing (NLP). According to Tarmidi et al, application of OCR and AI able to identify appropriate account need to prepare to record a business transaction. The application also able to scan complex documentation and recognise relevant keywords to capture and record the transaction according to the accounting concept and reporting standards.

RPA implementation able to transform a business into digitalisation of financial process and easy for the management to retrieve information for analysis and decision making. The tools able to provide simulation results from the scenario analysis which able the management to estimate the outcome of a decision rather imagination of the scenario. (Shi, 2020).

NLP application able to read unstructured character and document then effectively process it to become accounting information. The information usually can assist in internal audit and meeting compliance requirement. (Shi, 2020).

Cost Effective

According to Boritz (2023), the introduction of AI able to reduce the operational cost of an accountancy firm. He mentioned that the human headcount in the office could be reduce or better utilise to high revenue scope. The routine works such as preparing of journal, posting and reconciliation must be computerised with AI to free the human capital for high impact work. The return on Investment in AI will be high if the firm able to plan their human capital properly and better utilisation on high impact work such as analysis of financial performance and provide consultancy to the client with high reliability and confident to meet their expectation (Jackson 2023).

Alloui and Mourdi (2023) stated in their research targeted at accounting firm where the owners totally agreed that AI manage to cut down their operating cost as well as enable them to accept newer client due to efficiency in preparation of financial statements to meet the datelines.

According to Duffy (2018), 62% of the respondents indicate that they intend to employ AI into their organisation in next 12 months. The pioneer area to adapt AI will be those involve in repetitive task and time consuming. The respondents believe that replacing AI with human in this area will able to reduce their operational cost in long run and able to standardise their activity.

Increase reliability

According to Bose (2023), AI somehow able to overcome the human error and intention fraud. AI has been programmed and function according to the reporting standards and formats to fulfil the compliance requirements. It is very common to hear about the client complaint about the wrong information in the financial statements due to posting error, work under pressure to meet the dateline and noncompliance of reporting requirements. According to the research, many client satisfied with the AI assist financial report and highly reliable.

The accounting firm also satisfy with the AI tools to meet the dateline and rate of compliance. They foresee the cost of remedy to the client and authority will be reduce significantly due to non-compliance and negligent issue will be lesser. It is common to hear that accountant fail to give professional judgement, conflict of interest and bias decision and audit report. However, AI should be able to overcome those issue and provide true and fair view report as it will not have human emotional felling or self-conflict in carrying the task. (Abdullah & Almaqtari, 2024)

Since the subprime mortgage crisis in 2008, the expectation from the financial statement and report has become more complicated. The financial fraud and money laundering have become main risk of the institution failure. Shareholders' and stakeholders demanding more from the accounting profession when discharging their duty. Attention has shift to risk assessment, compliance of regulatory requirement and reporting standards which has give pressure to the accountant. The AI is able to reduce the risk for the professional with speedy and reliable capabilities in carrying out their role with the access to big data, blockchain technology and Enterprise Risk Management system ((Andrianopoulos et.al., 2019).

High Impact Advise

Main obstacle face accountant is due to tight dateline, with subsequently limit their source of income or deliver under par performance. The AI embedded software able to reduce the accountant limited time by automating the routine and non-decision-making process. AI has gone through radical changes for the last 12 months, it is not only able the perform routine task reliably but also able to apply its intelligent to utilise resources effectively and beyond it boundary to closely support accountant's role in provide consultation and decision-making (Boritz & Stratopoulos, 2023).

According to Khawaja & Hamdam (2023), the system able to think out of the box, drag into applications of big data to process the necessarily information on real time basis. Hence,

accountant able to provide more accurate forecasting and planning for the client with lesser time consumption. Refer to an earlier research by Moll et al (2019), the value of accountant should be beyond looking at the number of the past transactions. During the Industrial Revolution 4.0, the accountant needs to think from various perspectives to help their clients to make important decision in utilisation of their asset to maximise shareholders' value. Hence with the AI, accountant should fully utilise it to grab more revenue and create competitive edge for themselves.

Hesitation in Implementation of AI

Businesses and practitioners still lack confidence in adapting AI in their work. The AI software application still at introductory stage where many still doubt about the reliability and users lack familiarity. Selection of appropriate hardware and software play an important role, somehow, it is not the ideal software has been selected by the user but due to uncertainty about the requirements and the functions of the system. Furthermore, the initial investment needs to plan carefully, the capital expenditure inclusive of more advance hardware require to support AI system. The system needs to update frequently to ensure it can coordinate with other supporting system such as OCR, RPA, NLP and etc. (Tarmidi 2018).

One of the greatest obstacles in embracing AI into accounting firm is where many practitioners view AI as their competitors rather than peer. The high efficiency and effectiveness of AI in performing routine tasks such as generating invoice and posting of transactions has meeting the dateline has provide convenience and cost saving to the business. In China, a significant number of junior accountant has lost their job to AI due their task were too routine and lack of structural skill needed. Many university in China have to revamp their programme structure for accounting graduate to include many more subjects related to AI to ensure their students able to equip with appropriate skill and knowledge when graduate. (Shi 2020).

Research Methodology

This research will be a qualitative method and deductive approach. The approach required the research to identify hypotheses to be tested. Hence, for this research, cost effectiveness, increase reliability and high impact value have been selected as independent variables to best tested with the dependent variable, AI implementation in accounting profession.

The data will be collected base on the secondary research data, by doing a conducive study by searching for related journal articles from relevant databases then thoroughly study those journal to identify whether the selected hypothesis should be accepted or rejected. To ensure this research able to provide accuracy and reliable information to the users in the future, the data should be obtained from reliable sources such as Scopus, Taylor, Science Diet and Elsevier.

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THE EFFECTIVENESS OF CONSTRUCTION MODULE IN FASHION TECHNOLOGY TRAINING FOR THE WORLDSKILLS MALAYSIA COMPETITION

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Abstract: *This study aims to assess the effectiveness of the construction module in fashion technology training provided for participants of the WorldSkills Malaysia Competition. This module is designed to enhance technical skills in the process of garment and fashion equipment production, as well as to enable participants to master the techniques in pattern making and garment design required in the competition. By focusing on the aspects of high-quality garment construction, this study will analyse how the training provided can help improve participants' performance in facing competitive challenges that require precision in measurements and stitching, creativity in pattern design and garment creation, as well as efficient time management. This study will also focus on several key aspects that can affect the effectiveness of training, including weaknesses in mastering sewing techniques that may be caused by a lack of practical training, insufficient guidance, or ineffective teaching methods. Additionally, this study will examine errors in measurements and pattern designs, such as imbalances between the front and back of garments, as well as confusion between inch and centimetre measurement systems that often affect design accuracy. This research methodology is using quantitative as the primary approach to collect data through 50 respondents' online surveys and measurements, allowing for statistical analysis of the results in SPSS. By identifying these key areas of improvement, this study aims to provide practical recommendations for enhancing the training program and improving overall sewing skills. Finally, this study will examine the misunderstanding of the fabrics used, which can lead to the selection of inappropriate fabrics for certain types of stitching and affect the quality of the produced garments. All these factors will be analysed to determine the extent to which this construction module helps improve and overcome these weaknesses among the competition participants.*

Keywords:
Construction Module, Fashion Design, Sewing Techniques, Design And Pattern, Fabric Characteristic

Introduction

The WorldSkills Malaysia Belia (WSMB) competition is a national-level skills competition organised by the Ministry of Human Resources Malaysia through the Department of Skills Development. (JPK). This competition aims to identify and recognise talented youth in various fields of technical and vocational skills, such as fashion technology, graphic design, web design, and many more. WSMB serves as a platform for Malaysian youth aged 21 and below

to showcase their abilities in their respective fields of expertise. In addition to honing their skills, this competition also provides participants with the opportunity to compete internationally through WorldSkills International. Outstanding participants will have the opportunity to represent Malaysia on the world stage, thereby elevating the country's name in the arena of technical and vocational skills (WSMB, 2024). The main objective of WSMB is to foster excellence in education and skills training, enhance the skill levels of youth, and promote participation in Technical and Vocational Education and Training (TVET), in line with the National TVET Policy (TVET Madani, 2024). The main goal of WSMB is to foster excellence in education and skills training, enhance the skill levels of youth, and promote participation in Technical and Vocational Education and Training (TVET), in line with the National TVET Policy. Through the WSMB competition, the Fashion Technology field is one of the skill categories in the WorldSkills Malaysia competition that focuses on creativity and technical skills in the fashion industry. Through the WSMB competition, the Fashion Technology field is one of the skill categories in the WorldSkills Malaysia competition that focuses on creativity and technical skills in the fashion industry. This field aims to recognise talented youth in fashion design, garment production, and fashion technology. In this category, participants will showcase their skills in several key aspects, such as clothing design. They are required to create clothing designs based on a specific theme or requirement. They also need to create patterns and cut the fabric according to the design that has been sketched and then sew the complete and neat garments. In addition to technical skills, their designs will also be evaluated in terms of creativity, aesthetics, and the finishing of the final product. Timeliness and the participants' ability to innovate in producing garments that meet the demands of the fashion industry will also affect the participants' scores.

The module for Fashion Technology consists of four modules, namely module 1 patternmaking and lay. Module 2 is sketching, module 3 is draping, and module 4 is construction. The main focus is on the construction module, which involves pattern making and garment design. For that module, participants will create clothing sketches and pattern designs and then sew the garments based on the provided questions. Each element in the clothing design will be given through a voting process. Based on the given elements, it will test the participants' skills and proficiency in various aspects of garment making as well as the use of fashion technology. Each module is designed to test the technical abilities, creativity, and problem-solving skills of participants in the fashion industry. This module also focuses on the participants' skills in creating accurate clothing patterns. Participants will translate their designs into clothing patterns with precise measurements, calculate the fabric usage required, and ensure that the patterns can be used to produce perfect garments. Accuracy in calculations and details is very important in this module. Participants need to cut the fabric according to the produced pattern and sew the complete garment. This module assesses the participants' proficiency in using sewing machines, selecting appropriate sewing techniques, and producing high-quality garments. Additionally, participants will also be assessed based on how they present the finished garments, whether the garments meet the specifications of the question, and align with the fashion industry in terms of aesthetics, finishing, and functionality.

The production of clothing in the construction module includes design, pattern making, measurements, sewing techniques, and the fabrics used according to the established theme. The main aspect that often becomes an issue is the mastery of good sewing techniques for garments. The use of stitching techniques that are not suitable for certain types of fabric or designs can affect the quality and durability of the clothing. Lack of consistency in stitching can cause the

garment to appear untidy, with uneven or crooked seams (Johnson, 2023). Additionally, a lack of precision in finishing, such as edge finishing or improper zipper or button placement, can affect the appearance and functionality of the garment. Weakness in understanding and executing more complex and detailed sewing techniques such as pleats, darts, or piping can limit the ability to produce more stylish and professional garments (Brown, 2022). Lack of attention to detail can result in poorly constructed garments that do not meet quality standards. If the technique of measuring and adjusting patterns correctly is not mastered, the produced clothing may not fit the desired body shape or size. It will cause the design to become too loose or tight and not look neat. Understanding pattern design is crucial in tailoring to body shapes or design alterations, as it can result in unsatisfactory final outcomes. Additionally, not understanding how cutting lines and seams in patterns affect the overall design can lead to deficiencies in the appearance and comfort of the clothing (Wong, 2021). Therefore, it is essential for tailors to have a strong grasp of pattern design and cutting techniques to ensure the quality of their work. By mastering these skills, tailors can create well-fitted and visually appealing garments that meet the expectations of their clients. Without in-depth knowledge of fabrics, participants may overlook the aesthetic and functional elements of clothing. This will make their work not meet industry standards (Hoenes, 2023). The importance of understanding various types of fabrics and how they influence clothing design is essential because a lack of understanding of fabric properties such as durability and comfort will lead to unsatisfactory final results (Bliss, 2019). Participants risk producing clothing that is not only less visually appealing but also impractical. Finally, by educating themselves on different fabrics, participants can ensure that their designs not only look good but also meet the needs and expectations of their clients. This knowledge will help them create garments that are both stylish and functional, ultimately enhancing their reputation in the industry.

This objective aims to equip participation with a comprehensive understanding of various sewing techniques essential for garment construction. Mastery of these techniques, such as stitching, hemming, and finishing allows for greater precision and efficiency in creating garments. According to Zainuddin (2020), the integration of diverse sewing techniques not only enhances craftsmanship but also promotes creativity in design. Furthermore, Cahill (2021) highlights that practical experience with these techniques can significantly improve a student's confidence and capability in fabric manipulation and garment assembly. Besides that, the importance of aesthetic considerations in garment construction. Participants will learn to evaluate and apply design principles, such as balance, proportion, and colour theory, to create visually appealing garments. As outlined by Jin (2019), understanding aesthetics is crucial for fashion designers as it influences consumer preferences and market trends. Moreover, Reddy (2022) argues that a strong foundation in design principles not only helps participants produce attractive clothing but also prepares them for real-world challenges in the competitive fashion industry. Moreover, it focuses on the critical role that fabric knowledge plays in garment construction. Students will explore different types of fabrics, their properties, and them suitability for various designs and sewing techniques. According to Hoenes (2023), understanding fabric characteristics such as drape, texture, and durability is essential for making informed decisions that impact the overall quality of the garment. Additionally, American Profession Guide (2023) emphasizes that a strong grasp of fabric knowledge allows designers to create garments that not only meet aesthetic goals but also fulfil practical requirements, ensuring the end product is both functional and stylish.

Therefore, this study was limited to those who have a fashion design background, but the findings can still provide valuable insights for other industries. Moreover, the sample is a focus group that consists of both students, educators, and trainers, allowing for a well-rounded perspective on the topic. The TVET agency is the priority for this research and exploration. The results of this study can be used to inform future research and decision-making in the fashion industry. Furthermore, the results of this study can inform future research in related fields. Finally, the findings can contribute to the overall advancement and development of vocational education and training.

Literature Review

Mastery of precise and efficient sewing techniques plays an important role in producing quality sewing products. However, a study by Rahimah and Norliza (2019) shows that many individuals face challenges in mastering both basic and advanced sewing techniques. Weaknesses in mastering these techniques are often caused by factors such as lack of practice, ineffective teaching, and insufficient understanding of the proper use of tools and materials. Therefore, if more interactive teaching methods and individual guidance can help improve mastery of sewing techniques. According to a study by Azlina and Farah (2021), students who often lack a good foundation in hand skills are more likely to face difficulties in hand sewing. Frequent practice and step-by-step guidance are needed to improve basic sewing skills. Therefore, according to Siti Hawa (2020), the main error identified is the imbalance between the front and back parts of the garment. This occurs due to incorrect calculations in pattern design, which can result in imperfect or unbalanced clothing. Confusion in the use of measurement systems (inches to. centimetres) also contributes to errors in pattern preparation, as differences in measurement units can disrupt design accuracy. Additionally, the lack of understanding of how to take measurements and practical training in adjusting individual measurements to the basic pattern also causes difficulties for students in producing suitable and perfect garments. with the presence of demonstration-based training methods and individual guidance, it can improve accuracy in terms of measurements in pattern design. Based on previous studies, it is clear that the selection of unsuitable fabrics is one of the main causes of errors in sewing and garment design. Moreover, according to Farhana's (2021) study, about sixty percent of stitching errors were caused by the mismatch between the fabric and the type of stitching used. This shows the importance of a deep understanding of fabric characteristics, such as durability, elasticity, and thread tension, in producing quality garments. Imperfections in choosing the combination of fabric and stitching can lead to a final result that does not have the best impact. However, knowledge of fabrics is an important element in fashion design and pattern making. Misunderstanding or lack of knowledge about fabrics can lead to mistakes in the design process, which in turn affects the quality of the produced garments. To address this issue, fashion education needs to pay more attention to practical exposure to the characteristics of fabrics and the precise techniques in their use. (Muneera & Hassan, 2019). Ultimately, this will help aspiring designers create garments that not only look good but also feel good and stand the test of time in terms of quality and durability. By focusing on fabric knowledge and practical skills, fashion education can better prepare students for success in the industry in the future. This will also ensure that designers are equipped to make informed decisions when selecting materials and constructing garments, ultimately leading to a more sustainable and efficient fashion industry. By emphasizing the importance of fabric characteristics and construction techniques, fashion education can cultivate a new generation of designers who prioritize quality and longevity in their creations.

Research Methodology

Based on the construction of the hypotheses, the following model has been proposed in this study. From the conceptual model in Figure 1, it can be determined that the construction module in fashion technology training for the WSMB competition. These element factors have been treated as independent variables in this study. Thus, the enhancement of sewing techniques, aesthetic and design and understanding fabric is the dependent variable in this study on the effectiveness of this module in competition.

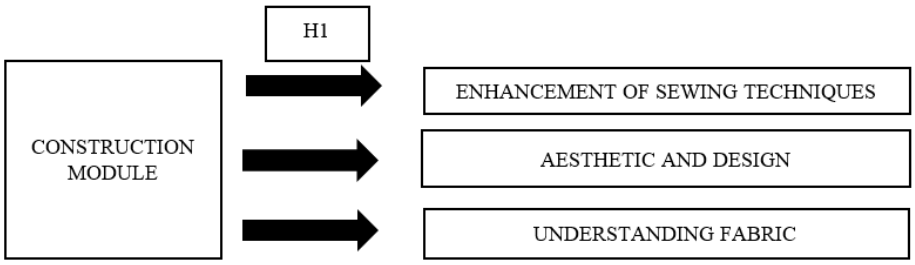


Figure 1: Conceptual Model.

Moreover, quantitative properties study deals with the measurement of any phenomena. This study is quantitative because data is collected through the questionnaire. The sequence of this study is documented in the research design framework as shown in Figure 2. The questionnaires are distributed using a Google form online survey to gather the information to answer the research questions.

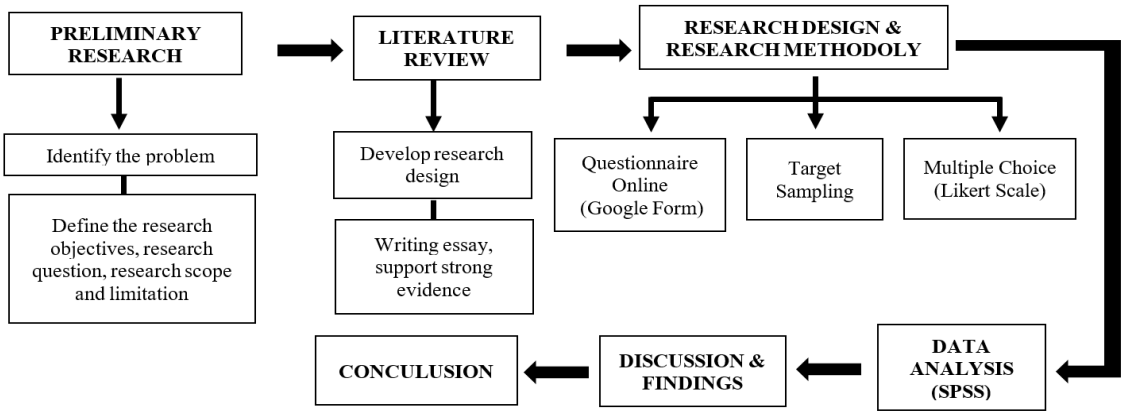


Figure 2: Research Design on The Study

Discussion and Findings

The researcher employed statistical software known as Statistic Package for Social Science (SPSS) to analyse the data and report the findings of the study. The data analysis is divided into four sections: Section A focusses on demographics; Section B explores the enhancement of sewing techniques; and Section C will examine the aesthetic and design; Section D focuses on understanding fabric in the construction module. The results of the data analysis revealed significant improvements in sewing techniques among participants. Additionally, the findings highlighted a positive correlation between understanding fabric and successful construction in the module.

Frequency distribution tests have been used to analyse the demographic features of data like gender, age (year old), qualification, background of study, and institution. The result of the frequency distribution indicated that most of the respondents are female, showing 86.2 percent. The individuals aged 19–25 years showed the highest overall response rate of 44.8 percent. Respondents who have a diploma level of qualification showed a higher response rate percent, which is 44.8 percent. Meanwhile, the respondents from Kolej Vokasional Muar have a higher response rate of 10.3 percent. The frequency distributions are shown in Table 1.

Table 1: Demographic

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	19-25	13	44.8	44.8	44.8
	26-30	4	13.8	13.8	58.6
	30-35	1	3.4	3.4	62.1
	35 years old and above	11	37.9	37.9	100.0
	Total	29	100.0	100.0	
Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	25	86.2	86.2	86.2
	Male	4	13.8	13.8	100.0
	Total	29	100.0	100.0	
Institution / Agency					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Baling Community College	1	3.4	3.4	3.4
	Giatmara	1	3.4	3.4	6.9
	Kolej Komuniti Baling	1	3.4	3.4	10.3
	Kolej Komuniti Baling	1	3.4	3.4	13.8
	Kolej Komuniti Batu Gajah	1	3.4	3.4	17.2
	Kolej Komuniti Raub	1	3.4	3.4	20.7
	Kolej Vokasional	2	6.9	6.9	27.6
	Kolej Vokasional	1	3.4	3.4	31.0
	Kolej Vokasional Ert Setapak Kuala Lumpur	1	3.4	3.4	34.5
	Kolej Vokasional Kuala Kangsar	1	3.4	3.4	37.9
	Kolej Vokasional Kuching	1	3.4	3.4	41.4
	Kolej Vokasional Kuching	2	6.9	6.9	48.3
	Kolej Vokasional Matang	1	3.4	3.4	51.7

	Kolej Vokasional Matang	1	3.4	3.4	55.2
	Kolej Vokasional Muar	1	3.4	3.4	58.6
	Kolej Vokasional Muar	3	10.3	10.3	69.0
	Kolej Vokasional Ert Setapak Kuala Lumpur	1	3.4	3.4	72.4
	Kv	1	3.4	3.4	75.9
	Kv Sepang	1	3.4	3.4	79.3
	Politeknik	2	6.9	6.9	86.2
	Politeknik	1	3.4	3.4	89.7
	Politeknik Ibrahim Sultan	1	3.4	3.4	93.1
	Polytechnic	1	3.4	3.4	96.6
	Student	1	3.4	3.4	100.0
	Total	29	100.0	100.0	

Background Study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DEGREE	9	31.0	31.0	31.0
	DIPLOMA	13	44.8	44.8	75.9
	MASTER	2	6.9	6.9	82.8
	SKM	3	10.3	10.3	93.1
	SKM, SPM, DIPLOMA, DEGREE	2	6.9	6.9	100.0
	Total	29	100.0	100.0	

The sewing techniques were very important in enhancing the potential of the successful in the competition. While the data provided may show certain trends in respondent demographics, it is important to consider the potential biases in the sample selection that could impact the results. Additionally, the emphasis on sewing techniques alone may overlook other important factors that contribute to success in a competition. The knowledge of sewing techniques and skills is just one aspect of a well-rounded competitor. The frequency of strongly agreed responses in surveys indicates a high level of consensus among competitors with a percentage of 79.3. Moreover, the respondents equally agreed in 44.8 percent that use of more advanced materials and equipment in sewing can also give a competitor an edge over others who are using basic supplies. The respondents strongly agreed (44.3 percent) that using new stitching techniques can reduce the time taken to complete tasks in competition. Twenty-five of the respondents strongly agreed (86.2 percent) that continuous practice is needed in improving sewing skills to sustain the use of new stitching techniques and maintain a competitive advantage. The result represented in Table 2 shows the enhancement of sewing techniques over time and the positive impact it can have on staying ahead in the competition.

Table 2: The Enhancement of Sewing Techniques

Knowledge of sewing techniques and their uses is very important for improving sewing skills.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	5	17.2	17.2	17.2
	Agree, Strongly Agree	1	3.4	3.4	20.7
	Strongly Agree	23	79.3	79.3	100.0
	Total	29	100.0	100.0	

The use of more suitable sewing tools will help me improve my sewing technique

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	13	44.8	44.8	44.8
	Neutral	3	10.3	10.3	55.2
	Strongly Agree	13	44.8	44.8	100.0
	Total	29	100.0	100.0	

The use of new stitching techniques reduces the time taken to complete tasks.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	10	34.5	34.5	34.5
	Agree, Strongly Agree	2	6.9	6.9	41.4
	Neutral	2	6.9	6.9	48.3
	Neutral, Agree	1	3.4	3.4	51.7
	Strongly Agree	14	48.3	48.3	100.0
	Total	29	100.0	100.0	

Continuous practice is needed to improve sewing technique skills.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	2	6.9	6.9	6.9
	Neutral	1	3.4	3.4	10.3
	Neutral, Agree	1	3.4	3.4	13.8
	Strongly Agree	25	86.2	86.2	100.0
	Total	29	100.0	100.0	

In terms of aesthetics and designing, the respondents agreed (48.3 percent) and understood that the creation of pattern designs must be according to the specifications of the question and design. Meanwhile, the respondents strongly agreed in 48.3 percent that the combination of design and patterns can create aesthetic appeal, and current trends, while adhering to the specification of the competition questions, can ultimately result in a winning submission. Sixteen respondents agreed that the design of clothing has a good balance between design

elements, and the functionality of the garment can be the most important factor in determining the success of a clothing design. Thus, about 55.2 percent strongly agreed that the pattern design is created with precise and appropriate measurements to produce neatly fitting clothing that is comfortable to wear. Table 3 shows the breakdown of responses by the aesthetic and design results.

Table 3: Exploring The Aesthetic and Design in the Construction Module

Understanding in the creation of pattern designs according to the specifications of the question and design.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	14	48.3	48.3	48.3
	Neutral	3	10.3	10.3	58.6
	Strongly Agree	12	41.4	41.4	100.0
	Total	29	100.0	100.0	

The combination of design and patterns creates aesthetic appeal and current trends while adhering to the specifications of the question.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	13	44.8	44.8	44.8
	Neutral	1	3.4	3.4	48.3
	Neutral, Agree	1	3.4	3.4	51.7
	Strongly Agree	14	48.3	48.3	100.0
	Total	29	100.0	100.0	

The design of clothing has a good balance between design elements and the functionality of the garment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	16	55.2	55.2	55.2
	Neutral	1	3.4	3.4	58.6
	Strongly Agree	12	41.4	41.4	100.0
	Total	29	100.0	100.0	

The pattern design is created with precise and appropriate measurements to produce a neatly fitting garment.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	13	44.8	44.8	44.8
	Strongly Agree	16	55.2	55.2	100.0
	Total	29	100.0	100.0	

The understanding of fabric in creating the clothing is the crucial element that will determine the overall quality and durability of the garment. Therefore, it is important for competitors to have a deep knowledge of different types of fabrics and their characteristics to win this competition. The respondents strongly agreed (65.5 percent) that knowledge about the types of

fabrics and materials is very important for clothing design to ensure they have the necessary skills to succeed. Sixteen respondents have strongly agreed (55.2 percent) that the competitors must understand the characteristics, such as texture, weight, and durability, of different fabrics in order to create high-quality outcomes of clothing. Respondents strongly agreed (62.1 percent) that the selection of fabrics, colours, and patterns aids in the design and manufacturing process of clothing in garment design. In the end, respondents strongly agreed (55.2 percent) and believed that the understanding of fabric handling and selection of the final finishing for clothing design would be the overall success of the clothing product. This understanding helps to ensure that the clothing product meets the desired quality and aesthetic standards.

Table 4: Determination of Understanding of Fabric.

Knowledge about types of fabrics and materials is very important for clothing design.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	7	24.1	24.1	24.1
	Agree, Strongly Agree	1	3.4	3.4	27.6
	Neutral	2	6.9	6.9	34.5
	Strongly Agree	19	65.5	65.5	100.0
	Total	29	100.0	100.0	

Understanding the properties of fabrics, such as texture, weight, and strength, can influence the outcome of clothing design.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	13	44.8	44.8	44.8
	Strongly Agree	16	55.2	55.2	100.0
	Total	29	100.0	100.0	

The selection of fabric, colour and fabric pattern aids in the design and manufacturing process of clothing.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	10	34.5	34.5	34.5
	Neutral	1	3.4	3.4	37.9
	Strongly Agree	18	62.1	62.1	100.0
	Total	29	100.0	100.0	

Understanding of fabric handling and selection of final finishing for clothing design.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	10	34.5	34.5	34.5
	Neutral	3	10.3	10.3	44.8
	Strongly Agree	16	55.2	55.2	100.0
	Total	29	100.0	100.0	

In the end, the competitors must enhance the quality of sewing techniques and combine them with new additional sewing skills to stay ahead in the competition. Besides, the competitors have a great understanding and knowledge of aesthetics and good design principles. The success of the clothing product is dependent on the fabric handling and selection of the final finishing. In conclusion, the competitors must constantly strive to improve both their technical skills and creative vision to succeed in the competition.

Conclusion & Recommendation

This study found that training for each module is crucial for enhancing the skills of WSMB participants, particularly in stitching accuracy, creativity, and time management. The main focus of this study is to thoroughly examine the weaknesses among the participants, especially regarding inadequate sewing techniques stemming from insufficient training and guidance from instructors or experts in the field. Additionally, inaccuracies in pattern measurements have been identified as a primary cause of unsatisfactory sewing results. Furthermore, the participants' lack of understanding of various types of fabrics, their properties, and characteristics leads to difficulties in selecting appropriate sewing techniques. Consequently, this study was conducted to assess the extent to which the developed training module can help participants improve these weaknesses and enhance their skill levels and performance in competitions.

The results of the study indicate that knowledge and understanding of sewing techniques are essential for improving sewing skills. A high level of knowledge about various sewing techniques and their functions influences the mastery of these skills among participants.

Continuous practice is necessary to refine sewing techniques and produce neat, competent designs. Understanding how to create pattern designs according to the specifications of the task is crucial to achieving aesthetic results that align with current trends. Moreover, the technique for taking measurements is vital for adjusting individual sizes to the designed pattern, ensuring accurate and perfect clothing. Misunderstandings about the fabrics can be addressed with knowledge of the types of fabrics and materials used in clothing design. This knowledge will assist participants in handling fabrics appropriately and selecting the right finishes for their clothing designs.

To strengthen the success strategy, emphasizing practical training and more structured guidance is important to ensure participants are well-prepared to compete in producing higher quality and more innovative designs. Intensified practical training will allow participants to hone their technical skills while enhancing their creativity and problem-solving abilities. Thus, this approach not only exposes participants to technical aspects but also provides opportunities to develop essential interpersonal and communication skills that are crucial in this industry.

More focused, centralized training can be implemented through intensive sessions with experienced competition experts, particularly those who have proven their success in international competitions. Collaborating with participants from foreign countries who frequently win the WorldSkills Competition (WSC) can offer exposure to the latest techniques and diverse perspectives. Additionally, guidance from experienced individuals can help participants understand the actual competition requirements and build their confidence in facing more challenging tasks.

Participants are also encouraged to engage in international competitions such as friendly matches or regional tournaments designed to assess their readiness for higher levels of competition. Participation in these events will provide a clearer picture of participants' strengths and weaknesses within a global context, as well as valuable experience in interacting with competitors from various backgrounds and cultures. The outcomes of these engagements can serve as an objective assessment tool for improving and enhancing future participations, contributing to their success at higher levels.

Furthermore, creating a more open platform for discussion and knowledge sharing among participants, experts, and coaches will foster a more inclusive learning ecosystem and support continuous skill development. These initiatives are expected to ensure that participants are not only prepared for competition but also able to compete more robustly and successfully in an increasingly competitive industrial landscape.

With the organization of the WorldSkills Malaysia Belia (WSMB) competition, participants have the opportunity to enhance their skill levels through exposure to challenging real competition situations. This competition allows participants to practice the skills they have acquired while sharpening their agility and precision in each module provided. Additionally, it offers participants the chance to improve the quality of their work, as they receive rubric-based evaluations and feedback from experienced judges. Indirectly, this will help participants achieve a higher level of skill, aligning with the goal of producing a competitive skilled workforce at both national and international levels.

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OUTCOME-BASED EDUCATION (OBE) IMPLEMENTATION IN PLANT CONTROL SYSTEMS COURSE (DJL50053)

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Abstract: *In technical education, aligning course delivery with measurable student learning outcomes is essential to ensure graduates are industry-ready. However, determining whether instructional strategies and assessments effectively support student understanding and skill development is a recurring challenge. This study investigates the implementation of Outcome-Based Education (OBE) in the DJL50053 – Plant Control Systems course, specifically focusing on the alignment between students' actual performance and their perceived learning, as gathered from exit surveys. Using data from the Course Outcome Review Report (CORR), various assessments, and student feedback, the study evaluates the attainment of Course Learning Outcomes (CLOs) across four academic sessions. The results indicate strong performance in CLO2 due to hands-on mini projects, steady improvement in CLO1 supported by a structured tutorial handbook, and peak achievement in CLO3 with the integration of AI tools in video presentation tasks. These findings confirm the effectiveness of blended instructional methods but also highlight the need for continuous enhancement. As part of Continuous Quality Improvement (CQI), the study recommends incorporating real-world case studies and interactive simulations to further bridge the gap between theory and application. This approach ensures the course remains relevant, learner-focused, and aligned with industry expectations.*

Keywords: *Outcome-Based Education (OBE), Course Learning Outcomes (CLO), Plant Control Systems, Continuous Quality Improvement (CQI), Technical Education*

Introduction

A student-centered approach to education, outcome-based education (OBE) prioritises reaching certain learning objectives over merely imparting knowledge. OBE is essential to engineering programs because it ensures that graduates have the technical expertise, problem-solving skills, communication talents, and ethical awareness needed in the field. OBE facilitates the connection between academic learning and practical applications by placing a strong emphasis on quantifiable learning objectives. In the Plant Control Systems course (DJL50053), students will learn the fundamentals of control systems, including terminologies, classifications, and fundamental concepts. Instrumentation is a prerequisite for this course, which has a credit value of three and is taught in Semester 5 (Year 3).

It guarantees that students acquire excellent technical and analytical abilities in line with industry requirements by fusing theoretical knowledge with practical applications. Included are the functions of control elements, dynamic behaviour analysis, and system representation using block diagrams. The course introduces a variety of types and modes, including complex control

strategies. Along with manipulating different control elements and applying corrective measures to minimise system defects, students will also learn how to build mathematical models that characterise the behaviours of plant control systems. With an emphasis on design, problem-solving, and sustainable practices, the course gives students the tools they need to control processes and automate industries.

In the evolving landscape of engineering education, it is essential that academic programs not only deliver theoretical knowledge but also cultivate practical skills that align with industry needs. A common issue faced in technical courses is the gap between what is taught and what students internalize and apply. In the DJL50053 – Plant Control Systems course, this concern is particularly relevant due to the technical complexity of the subject and its real-world applications. While the course is designed with structured teaching strategies, hands-on activities, and diverse assessments, there remains uncertainty as to whether these elements effectively support student learning and achievement of Course Learning Outcomes (CLOs).

Therefore, this study was conducted to evaluate the effectiveness of the course delivery in achieving the intended CLOs by examining the correlation between student performance data and feedback from exit surveys. Specifically, it aims to assess whether students' self-perceived learning aligns with their actual academic outcomes as documented in the Course Outcome Review Report (CORR). Additionally, the study identifies areas for pedagogical enhancement through Continuous Quality Improvement (CQI) initiatives. By doing so, it ensures that the course remains student-centered, outcome-focused, and responsive to the expectations of both learners and the engineering industry.

Literature Review

Through organised learning objectives, instructional strategies, and assessments, the Outcome-Based Education (OBE) framework in DJL50053-Plant Control Systems is intended to make certain that students gain critical knowledge as well as abilities. To ensure that students acquire the technical and transferable skills required by the industry, the course content is in line with Course Learning Outcomes (CLOs), which are mapped to Program Learning Outcomes (PLOs). According to BEM (2020, p.3), this course is mapped to three PLOs, which are related to knowledge, design or development of solutions and environment & sustainability issues. We have to accomplish this mapping to meet stakeholder requirements, thus, it must be understood consciously.

Clear criteria that correspond with the learning objective must be established to evaluate CLO 1 successfully. These requirements must outline quantifiable proof of student accomplishment. Saleh M. Altowaijri et.al (2019) mentioned that a variety of theoretical and practical techniques are used to evaluate CLO1, which focuses on differentiating the foundations of control systems and their corresponding characteristics. An introduction to control systems, the various kinds of control systems (closed-loop and open-loop), and common terms used in control systems are all covered in the course. Tests and quizzes are used to gauge students' theoretical knowledge, and assignments and reports mandate that students examine various kinds and their attributes. Final exams are also used to assess conceptual clarity and general knowledge retention.

The use of both theoretical and practical assessments to assess CLO2 is backed by Javier González et al. (2024). They assert that by using this method, it is easier to identify students' strengths and weaknesses in theoretical knowledge and practical application, which can then be used to provide them with more targeted feedback and direction. This involves developing mathematical models and block diagrams to illustrate how plant control systems behave. This course includes block diagram representation, transfer functions, transient response, and stability. Through practical exercises and examples, students use concepts of modelling and system representation. A short project-based evaluation that allows students to verify control system characteristics through hands-on work and real-world applications also allows them to apply mathematical modelling techniques in real-world scenarios.

Practical and performance-based assessments are used to evaluate CLO3, which requires students to work with a variety of control elements, controllers, and intricate procedures to minimise faults in a control system. In addition to controller modes like P, PI, and PID, the syllabus covers the behaviour of control devices such as servo motors, control valves, and actuators. Through practical assessments, students show that they can apply these ideas with AI aids. Students can demonstrate their grasp of various control strategies and their capacity to maximise system performance through group projects and presentations. Environmental and sustainability issues have been integrated into this assessment to ensure graduates are equipped with the knowledge, skills, and values necessary to address environmental and social challenges as mentioned by Zainudin, Md Yunus, Zakaria, & Mohsin, 2021.

A variety of teaching and learning techniques are used to deliver a thorough educational experience to meet the designated CLOs. Through discussions, problem-solving activities, lectures and interactive sessions help students gain a theoretical grasp of control systems. These classes enable active participation and engagement while assisting students in understanding basic concepts. PBL, or Problem-Based Learning, is used to improve students' critical thinking and problem-solving abilities as claimed by Jumhur, A. A. et.al. (2024). Real-world engineering challenges are presented to students, who must use their knowledge to come up with practical solutions. Students may correlate theoretical information to real-world applications using this method, which also encourages critical thinking. Mumun Munawaroh et.al (2022) mentioned that presentations and group projects foster communication and cooperation. Students work collaboratively to develop and assess control systems, presenting their outcomes based on the application of AI. Their technical comprehension and efficient communication of intricate concepts are both improved by this experience.

The assessment structure is designed to measure the attainment of Course Learning Outcomes (CLOs) effectively. Quizzes and assignments (20%) are used to assess students' understanding of fundamental concepts, ensuring they grasp key theoretical principles. Laboratory and practical work (30%) evaluates students' technical skills and problem-solving abilities by allowing them to apply theoretical knowledge in real-world scenarios. Group projects and presentations (20%) test students' communication and teamwork skills while reinforcing their ability to apply learned concepts effectively. Finally, the final examination (30%) serves as a comprehensive assessment of students' overall comprehension and analytical abilities, ensuring they have met the course's learning objectives. Dubois (2022) mentioned balanced approach ensures students develop both theoretical knowledge and practical competencies, preparing them for professional engineering challenges.

A crucial element of OBE implementation in DJL50053 is Continuous Quality Improvement (CQI), which guarantees the course's continued efficacy and relevance. Mechanisms for student feedback and reflection are frequently used to obtain information on learning experiences, enabling modifications to teaching strategies. By reviewing trends in student achievement, performance analysis helps lecturers pinpoint areas that need work and adjust the course material accordingly. Workshops and training sessions are examples of academic departments developing programs that assist lecturers in staying current with the newest instructional techniques and technology developments (Roziah Keria et.al, 2025). CQI promises that students receive a top-notch education that equips them for problems in the real world by consistently enhancing the course design and delivery.

Methodology

The Course Outcome Review Report (CORR), a structured study of student performance across numerous assessments, is a crucial part of this review. Through quizzes, tests, assignments, mini projects, video presentations and final examination, the CORR offers information on how well students have met CLOs. Correlations between students' self-assessments and their actual academic performance are then found by mapping the CORR results to the exit survey responses. This method affirms a thorough review of the course's efficacy and identifies areas for curriculum updates, teaching methodologies, and assessment techniques to be improved.

The exit survey method is used in DJL50053 to evaluate the effectiveness of the course in achieving its intended learning outcomes. This survey is conducted at the end of the semester, collecting feedback from students regarding their understanding of course content, skill development, and overall learning experience. In order to measure students' perceptions of their performance in CLOs and readiness for industry applications, the survey includes quantitative questions with Likert-scale ratings.

Results and Discussion

The DJL50053 course's Course Learning Outcomes (CLOs) achievement distribution is shown in Figure 1 as a percentage for each of the four sessions, from Session II 2022/2023 to Session I 2024/2025. CLO2 continuously performs well, sustaining high achievement percentages throughout all sessions. The most recent session experienced a slight decline from 85% in Session II 2022/2023 and Session I 2023/2024 to 76%. CLO2 is consistent because it allowed students to practically apply the knowledge they acquired through practice through a mini-project. The performance of CLO3 varies; it peaks at 90% in Session II 2022/2023, falls to 64% in Session I 2023/2024, gradually improves to 68% in the following session, and then peaks at 100% in Session I 2024/2025. This peak performance was attained because the assessment required the use of AI resources to create a video presentation; students showed a high level of engagement and satisfaction with the application of AI. Even though CLO1 begins at a comparatively low 49%, it shows a consistent increasing trend, reaching 68% at the end of the session. This steady progress is attributed to the implementation of a tutorial handbook as a means of enhancing students. learning.

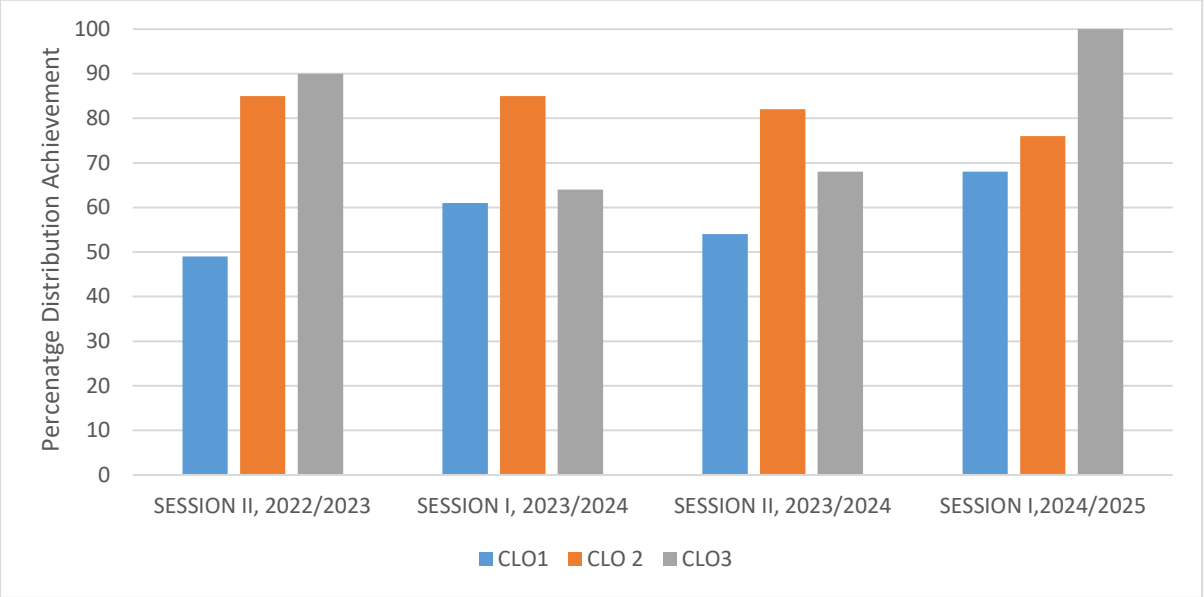


Figure 1. The DJL50053 Course's Course Learning Outcomes (CLOs) Achievement Distribution

Figure 2 illustrates the distribution of 47 responses exit survey collected from four different semesters of study. The largest proportion, accounting for 59.6% of the total responses, corresponds to Semester I of the 2024/2025 academic year, represented in blue. Both Semester II of 2023/2024 and Semester I of 2023/2024 contributed equally, each comprising 17% of the responses, shown in red and orange, respectively. Lastly, Semester II of 2022/2023, marked in green, contributed the smallest share of responses. This data highlights the varying levels of engagement across different academic periods.

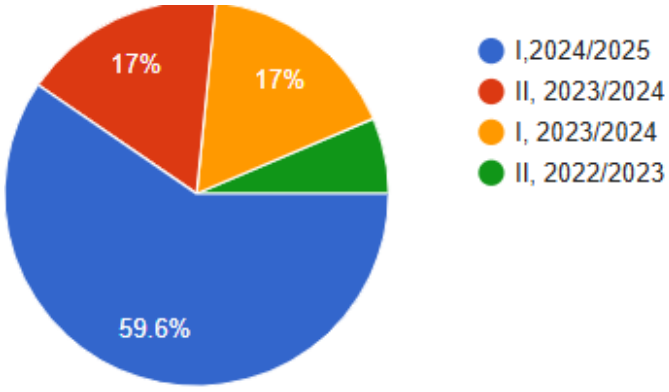
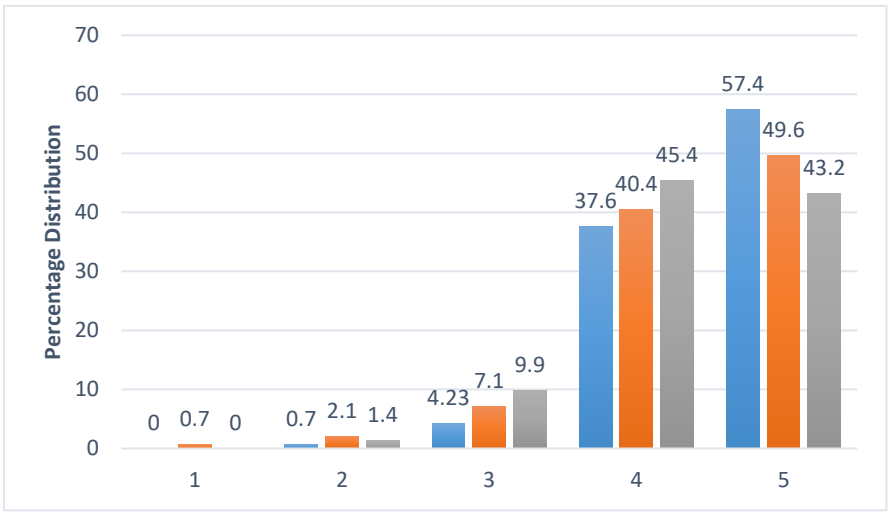


Figure 2. The Distribution Of 47 Responses Collected From Four Different Semesters Of Study

Based on three Course Learning Outcomes (CLOs), the average percentage distribution of DJL50053 course exit survey responses is displayed in Figure 3. The majority of students gave positive answers, with CLO 1 receiving the highest "Strongly Agree" scores (57.4%), followed by CLO 2 (49.6%) and CLO 3 (43.2%). Strong "Agree" answers were also received, particularly for CLO 3 (45.4%). Intermediate and negative responses (scales 1 to 3) were limited, with the highest intermediate rating being 9.9% for CLO 3. Only a small percentage

of students chose "Disagree" or "Strongly Disagree." All things considered, the findings show a high degree of satisfaction and assurance in meeting the learning objectives of the course.



Indicator:
Likert Scale:

1	Strongly Disagree
2	Disagree
3	Intermediate
4	Agree
5	Strongly Agree

	CLO 1
	CLO 2
	CLO 3

Figure 3. Average percentage distribution towards the exit survey for the DJL50053 course

The exit survey results for the DJL50053 – Plant Control Systems course indicate a positive student perception of learning outcomes. For CLO1 (C3, PLO1), students expressed confidence in distinguishing the fundamentals of control systems and their respective characteristics. The Tutorial Handbook was particularly noted as an effective resource in enhancing their understanding of each topic. Furthermore, students reported feeling prepared to answer all assessments, demonstrating that the course materials and instructional methods successfully supported theoretical comprehension.

Regarding CLO2 (P3, PLO3), students acknowledged their ability to construct block diagrams and derive mathematical models to represent plant control system behaviors. Additionally, the Mini Project was highlighted as a valuable learning tool, providing a practical platform to apply theoretical concepts. This suggests that hands-on activities play a crucial role in reinforcing students' problem-solving and analytical skills. However, further improvements in project-based learning could enhance their ability to apply mathematical modelling techniques effectively.

For CLO3 (A3, PLO7), students demonstrated a strong grasp of advanced controller methodologies and their application in minimizing control system errors. They reported confidence in presenting complex control concepts and showed enthusiasm for further learning, particularly during their upcoming internship training. This indicates that the course successfully fosters both technical proficiency and professional readiness.

The results suggest that the combination of structured lectures, tutorials, and practical engagements effectively supports OBE implementation in DJL50053. The positive reception of the **Tutorial Handbook** highlights the importance of well-organized course materials in

student learning. Moreover, the recognition of the **Mini Project** as an essential learning component reinforces the effectiveness of experiential learning. However, further enhancements could be made to strengthen students' engagement in complex mathematical modelling.

While students expressed confidence in their knowledge acquisition, continuous quality improvement (CQI) measures should focus on refining instructional strategies based on student feedback. The **Course Outcome Result Report (CORR),** mapped against the **exit survey,** provides a strong basis for data-driven course enhancements. Future course iterations should incorporate additional case studies and interactive simulations to further bridge the gap between theory and real-world application. By addressing these insights, DJL50053 can continue to improve its **teaching and learning effectiveness,** ensuring students are well-equipped with industry-relevant skills.

Conclusion

The DJL50053-Plant Control Systems course's successful implementation of outcome-based education (OBE) fulfills the objective of the study, which were to analyze the relationship between exit survey feedback and student learning outcomes. The methodology used, which included exit questionnaires, numerous assessments, and an analysis of the Course Outcome Review Report (CORR), successfully illustrated how well students met the desired Course Learning Outcomes (CLOs). This alignment demonstrates that the educational offering satisfies industry and educational requirements and validates the course design.

The integration of AI-driven video presentation tasks and project-based assessments was a significant Continuous Quality Improvement (CQI) measure that not only improved student engagement but also promoted an increased knowledge of complex control concepts. Furthermore, students' fundamental knowledge of was greatly enhanced by using a tutorial handbook, especially in CLO1. According to student feedback and performance patterns, the course will benefit by adding more interactive simulations and real-world case studies in the future. DJL50053 will continue to develop as a dynamic, industry-relevant learning program that develops both theoretical knowledge and practical competence as a result to this proactive CQI approach.

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THE EVOLUTION OF INSTRUCTIONAL SCAFFOLDING: ADAPTING SUPPORT STRATEGIES FOR DIGITAL-AGE LEARNERS

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Abstract: This conceptual paper explores the evolution of instructional scaffolding in response to the profound shifts in educational practices brought about by digital technologies. Rooted in Vygotsky's sociocultural theory and the foundational work of Wood, Bruner, and Ross, scaffolding has traditionally relied on direct, real-time interaction between instructors and learners. However, the rise of online, blended, and hybrid learning environments necessitates a reimagining of scaffolding strategies to suit the needs of digitally native learners. The paper examines how digital scaffolding—defined as the use of technological tools to provide structured, adaptive support—maintains the core principles of contingency, fading, and learner autonomy while leveraging the benefits of accessibility, interactivity, and personalization. Drawing on models such as TPACK, Community of Inquiry, and self-regulated learning, the paper identifies best practices for digital scaffolding design and implementation. It also critically addresses challenges such as digital inequality, cognitive overload, and the risk of overdependence. Finally, the paper outlines future directions involving AI, AR/VR, gamification, and mobile learning, and offers practical implications for educators and institutions. It calls for inclusive, pedagogically sound strategies that ensure digital scaffolding remains a meaningful and equitable tool for 21st-century education.

Keywords: *Digital Scaffolding, Instructional Design, Technology-Enhanced Learning, Learner Autonomy*

Introduction

The landscape of education has undergone significant transformations over the past few decades, driven largely by technological advancements and the shifting needs of modern learners. Among the many instructional strategies that have evolved, scaffolding remains a fundamental approach in facilitating student learning and promoting cognitive development

(Zong & Si, 2020). Traditionally conceptualized through the lens of Vygotsky's Zone of Proximal Development (ZPD) and further elaborated by scholars such as Bruner and Wood, scaffolding was initially rooted in direct, face-to-face interactions between instructors and learners. However, the rise of digital technologies has necessitated a re-examination of how scaffolding is conceptualized and implemented in contemporary educational settings (Richardson et al., 2022). The emergence of online, blended, and hybrid learning environments has introduced both new opportunities and new challenges in providing the timely and adaptive support that scaffolding requires. Learners today, often referred to as digital natives, exhibit different expectations, learning behaviours, and levels of autonomy compared to previous generations, further emphasizing the need for instructional approaches that align with these evolving dynamics (Vitvitskaya et al., 2022).

This paper aims to explore the evolution of instructional scaffolding from its traditional foundations to its adaptation within the digital era. It examines how support strategies have been reimagined in response to technological integration, discusses key features of digital scaffolding, identifies both its potential benefits and limitations, and highlights implications for educators and educational institutions seeking to foster meaningful learning experiences in a digitally connected world.

Literature Review

Understanding Instructional Scaffolding

Instructional scaffolding is a pedagogical approach that provides learners with temporary, structured support to assist them in accomplishing tasks they might not be able to complete independently. The concept finds its roots in the sociocultural theory of learning, particularly Vygotsky's notion of the Zone of Proximal Development (ZPD)—the gap between what a learner can do unaided and what they can achieve with guidance (Vygotsky, 1978). Scaffolding operates within this zone, allowing educators to support learners in gradually developing skills, understanding, and confidence until they can perform tasks independently.

The term "scaffolding" was first introduced by Wood, Bruner, and Ross (1976), who described it as a process in which a teacher or more knowledgeable other supports a learner by structuring learning tasks and interactions to facilitate progress. This support is not permanent but is gradually withdrawn as learners gain mastery, allowing them to take greater responsibility for their own learning. Traditional scaffolding practices often include breaking down complex tasks, modeling processes, providing prompts or cues, offering feedback, and encouraging self-regulation.

Key characteristics of scaffolding include contingency (adapting support based on the learner's current performance), fading (gradual removal of support), and transfer of responsibility (shifting control of the learning process to the learner) (Van de Pol, Volman, & Beishuizen, 2010). These elements are foundational to effective scaffolding across educational contexts, whether in early childhood education, school settings, or higher education. While these principles remain relevant, the increasing use of technology in education requires a reinterpretation of scaffolding strategies to suit the digital era. The following sections explore how scaffolding is being adapted to fit the realities of modern, technology-infused learning environments.

Shifts in Learning Landscapes: The Digital Context

The educational landscape has experienced a profound shift with the integration of digital technologies into teaching and learning processes. Traditional classroom-based instruction, while still relevant, has been supplemented—and in some cases replaced—by online, blended, and hybrid learning models. This shift has not only altered the delivery of content but also transformed the ways in which students engage with knowledge, instructors, and peers (Yang, 2024 and Nurillaev, 2024).

Today's learners, often referred to as digital natives, have grown up in an environment saturated with technology. They are accustomed to instant access to information, interactive media, and personalized digital experiences. These learners tend to exhibit different learning preferences, including a stronger inclination toward visual content, self-paced learning, and collaborative online interaction. As a result, instructional strategies that were effective in traditional classrooms must be reimagined to align with the expectations and cognitive habits of this new generation of learners (Kohli & Arora, 2024). The digital context also presents unique challenges. The absence of physical presence can lead to feelings of isolation, decreased motivation, and difficulties in sustaining engagement. Furthermore, digital inequality—characterized by differences in access to devices, connectivity, and digital literacy—continues to pose barriers to equitable learning experiences. Instructors must therefore be mindful not only of pedagogical strategies but also of technological accessibility and inclusivity when designing instruction (da Costa et al., 2024). These changes call for a reconceptualization of scaffolding practices that are sensitive to the affordances and constraints of digital environments. Scaffolding must now consider how to deliver timely, adaptive support in both synchronous and asynchronous settings, how to leverage digital tools to facilitate learning progression, and how to maintain the human elements of mentorship, feedback, and encouragement in virtual spaces (Liu et al., 2022).

Digital Scaffolding: Definitions and Key Features

As technology becomes increasingly embedded in educational practice, the term digital scaffolding has emerged to describe the adaptation of traditional scaffolding strategies within digital learning environments. Digital scaffolding refers to the use of digital tools, platforms, and resources to provide structured, responsive support that helps learners achieve educational goals they might struggle to reach independently (Setyaningrum et al., 2024). This form of scaffolding is designed to accommodate the affordances of technology while maintaining the core principles of support, gradual release, and learner empowerment.

Digital scaffolding can be delivered through a variety of modalities, including:
Learning Management Systems (LMS) that structure content into sequenced modules,provide automated feedback, and monitor learner progress (Bradley, 2020).

- Interactive media, such as simulations, quizzes, and multimedia tutorials that guide learners through complex concepts (Mamatisakov, 2024).
- Communication tools, such as forums, chat functions, and video conferencing, which facilitate instructor feedback and peer collaboration (Ouariach et al., 2024).

Key features that distinguish digital scaffolding from its traditional counterpart include:

- Automated prompts and cues, such as inline suggestions, guiding questions, or reflective prompts embedded within digital content (Gentner & Seufert, 2020 and Hefter et al., 2023) .
- Asynchronous support: Learners can access scaffolding materials anytime and at their own pace, enhancing flexibility and autonomy (Rabenn & Brandt, 2024).
- Multimodal presentation: Digital scaffolding can incorporate visual, auditory, and interactive elements, catering to diverse learning styles (Al-Jarf, 2024).
- Scalability and consistency: Once designed, digital scaffolds can be used repeatedly across different cohorts with uniform quality (Taylor et al., 2022).
- Personalization: Many digital platforms offer adaptive technologies that tailor scaffolding to individual learner performance in real time (Lim et al., 2023).

Despite these advantages, digital scaffolding must be carefully designed to avoid cognitive overload, ensure relevance, and maintain meaningful interaction. Poorly implemented scaffolding can lead to dependency, disengagement, or confusion—particularly if learners lack the digital literacy skills needed to navigate complex systems.

Models and Frameworks in Digital Scaffolding

To effectively integrate digital scaffolding into teaching practices, educators and instructional designers often rely on theoretical models and frameworks that adapt traditional scaffolding principles to the digital context. These models provide structured approaches to the design, implementation, and evaluation of scaffolding strategies that leverage digital tools while supporting diverse learners across different disciplines and learning environments (Richardson et al. (2022).

One prominent framework is Puntambekar and Hübscher's (2005) integrative model, which highlights the dynamic and distributed nature of scaffolding in technology-rich environments. According to Park (2024), this model emphasizes that scaffolding can be provided through a combination of teacher input, peer collaboration, and tool-based assistance, creating a more holistic and flexible support system. In this view, scaffolding is not a static event but an ongoing process that evolves alongside the learner's needs.

Esposito and R. Monorey (2020) also highlights another useful framework is the TPACK model (Technological Pedagogical Content Knowledge), which guides educators in integrating technology meaningfully into their teaching. When applied to scaffolding, the TPACK model encourages educators to consider not just what support to provide, but how technological tools can be aligned with pedagogical goals and subject matter requirements.

The Community of Inquiry (CoI) framework is also relevant in digital scaffolding, especially in online and blended learning. Swan (2021) notes that it emphasizes the roles of teaching presence, cognitive presence, and social presence in creating effective learning experiences. Digital scaffolding, under this model, is supported through well-designed instructional prompts, active instructor engagement, and collaborative online dialogue.

Additionally, Alvarez et al. (2022) emphasizes that Zimmerman's model of self-regulated learning (SRL) offers insights into how digital scaffolding can support learners in developing metacognitive strategies. By embedding prompts, reflective questions, and goal-setting tools into digital platforms, educators can scaffold the development of autonomy and self-monitoring in learners.

These frameworks collectively inform best practices in digital scaffolding, encouraging a shift from teacher-centered to learner-centered approaches. They also promote the use of technology not as a replacement for human interaction but as a complementary means to enhance learner support, engagement, and progression.

Benefits And Challenges of Digital Scaffolding

The integration of digital scaffolding into modern education has introduced numerous advantages that enhance the learning experience, especially in flexible and technology-driven environments. However, according to Mhlongo, Mbatha, Ramatsetse, and Dlamini (2023), its implementation is not without challenges. A balanced examination of both its potential and its limitations is crucial to ensure its effective application.

Digital scaffolding offers numerous benefits, including increased accessibility and flexibility by allowing learners to access support anytime and anywhere, which is particularly advantageous in asynchronous learning settings or for students with diverse needs. It enhances engagement through the use of multimedia, gamification, and interactive elements that promote motivation and deeper learning (Huang & Soman, 2013; Al-Azawi, Al-Faliti, & Al-Blushi, 2016). Personalized learning is another advantage, as adaptive technologies tailor scaffolding to individual progress and challenges (Aljohani & Davis, 2023; MITR Media, 2024). Furthermore, digital scaffolding promotes scalability and consistency, enabling reuse across courses and cohorts with minimal adjustments, thus reducing instructor workload (Yang, Jiang, & Su, 2022). It also fosters independent learning by encouraging self-paced exploration and reflection (Chen, 2020). However, challenges persist, such as the digital divide that limits access to necessary devices, connectivity, or digital literacy (Shang, 2023), and the risk of cognitive overload from poorly designed interfaces (Câmara et al., 2021). Additionally, the lack of authentic human interaction can affect the quality of support in emotionally complex situations (Gamage, 2022). The design and implementation of effective digital scaffolding demand significant time, expertise, and institutional collaboration (Wei, 2024). Moreover, if scaffolding is not appropriately faded, learners may become overly dependent on these supports and struggle with autonomous problem-solving (George, 2021). Understanding these advantages and limitations is crucial for educators and institutions aiming to integrate digital scaffolding effectively into evolving educational environments (Jarvis & Baloyi, 2020).

Future Directions and Practical Implications

The landscape of education is continuously evolving, with technology playing an increasingly pivotal role in shaping instructional practices. As digital scaffolding continues to adapt and expand, several future directions and practical implications must be considered for its successful implementation and evolution. Research has shown that adaptive instructional designs are becoming increasingly important, especially in fully online courses, as they help technology effectively support and guide learning (Yang, Jiang, & Su, 2022). Moreover,

emerging technologies like artificial intelligence and virtual reality have the potential to reshape education in exciting ways, making learning experiences more personalized and centered around the needs of the learner (Ahmad, Umirzakova, Mujtaba, Amin, & Whangbo, 2023).

Emerging Trends in Digital Scaffolding

Integration of Artificial Intelligence (AI) and Machine Learning

The future of digital scaffolding will likely involve more sophisticated AI-powered tools capable of providing real-time, personalized feedback to students. AI systems can analyze learner behaviors, identify gaps in knowledge, and dynamically adjust scaffolding levels, making learning more tailored and efficient. For instance, Kochmar et al. (2020) demonstrated that automated, data-driven, personalized feedback within an intelligent tutoring system significantly improved student learning outcomes. Additionally, the increasing integration of machine learning algorithms will enhance the adaptability of scaffolding, enabling a more nuanced approach to each learner's unique needs. Maity and Deroy (2024) highlighted the transformative potential of Generative AI in creating more effective, equitable, and engaging educational experiences.

Augmented and Virtual Reality (AR/VR)

Augmented and virtual reality technologies present new opportunities for immersive learning experiences, where scaffolding can be integrated into virtual environments. For example, learners could be guided through complex scenarios in science, history, or language learning through interactive, 3D environments that provide contextual support at each stage. Tan et al. (2022) conducted a systematic review analyzing 82 studies on AR/VR applications in education and training within the Architecture, Engineering, and Construction (AEC) industry, highlighting the potential of AR/VR technologies to enhance learning experiences. Additionally, Piriyasurawong (2020) introduced the Scaffolding Augmented Reality (SC-AR) Model, which integrates AR as a visual tool to create an immersive learning environment that enhances deep reading skills.

Gamification and Interactive Learning

The use of gamified digital tools will continue to rise, offering learners an engaging and motivating framework to practice skills, solve problems, and receive scaffolding in the form of rewards, level-ups, and interactive challenges. Gamification can foster intrinsic motivation, encourage persistence, and allow learners to gradually take ownership of their learning process. Dichev and Dicheva (2017) conducted a systematic mapping study that categorizes various studies on gamification in education, highlighting its application to enhance student engagement and learning outcomes. Additionally, Hamari, Koivisto, and Sarsa (2014) reviewed empirical studies on gamification, finding that it can positively impact user engagement and motivation, though the effects may vary depending on design and implementation.

Mobile Learning Platforms

As mobile devices become ubiquitous, there will be an increased focus on scaffolding through mobile learning apps. These apps will offer just-in-time support, leveraging push notifications, reminders, and interactive content to assist learners on the go, thus promoting continuous learning outside the traditional classroom environment. Evans and Rivera (2024) highlight the effectiveness of push notifications in establishing teacher presence and providing timely support in hybrid and online courses.

Practical Implications for Educators and Institutions

Professional Development for Educators

For digital scaffolding to be effectively implemented, educators must be provided with continuous training in both digital pedagogy and the use of digital tools (Herwanis et al., 2024). Professional development programs should emphasize the design of scaffolding strategies that are both pedagogically sound and technologically feasible. Furthermore, instructors need to be trained to assess students' digital literacy levels and provide support to those who may struggle with navigating digital platforms (Nalaila et al., 2022).

Collaboration between Educators and Instructional Designers

Successful digital scaffolding requires collaboration between educators and instructional designers to ensure that tools and strategies align with learning objectives (Wen et al., 2024). Instructional designers can help tailor digital platforms to suit different content areas and provide insight into creating effective scaffolds. By working together, educators and designers can craft rich learning environments that foster engagement, comprehension, and critical thinking.

Focus on Inclusivity and Accessibility

The digital divide remains a significant challenge, and efforts must be made to ensure that all students have equal access to scaffolding tools. Institutions must prioritize the development of inclusive digital resources that cater to students with varying levels of access to technology, diverse learning preferences, and different abilities (Mastam, 2024). Implementing universal design for learning (UDL) principles can support these efforts by creating flexible learning pathways that accommodate diverse learner needs.

Continuous Evaluation and Iteration

Digital scaffolding should not be static. It is essential to continuously evaluate the effectiveness of digital scaffolds through feedback, assessments, and learner performance data (Zuo et al., 2023). This iterative process will ensure that scaffolding tools remain relevant, responsive, and aligned with both learners' needs and evolving technological advancements.

Conclusion: A Vision for the Future

The evolution of scaffolding in the digital era presents an exciting opportunity to enhance the quality and accessibility of education. As we move toward more flexible, technology-infused learning environments, the principles of scaffolding—support, collaboration, and learner autonomy—must continue to guide the development of digital tools and platforms. By embracing the potential of digital scaffolding and addressing its challenges, educators and institutions can create more engaging, personalized, and inclusive learning experiences for all students. The future of digital scaffolding lies in its ability to adapt to the needs of diverse learners, incorporate emerging technologies, and foster lifelong learning skills that prepare students for an increasingly complex and interconnected world.

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TRAINEE TEACHERS AND TECHNOLOGY INTEGRATION: INSIGHTS INTO PERCEPTIONS, BENEFITS, AND BARRIERS

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Abstract: *Technology integration in classrooms is vital for contemporary teaching, yet many trainee teachers face difficulties in utilising digital resources effectively. This study explores trainee teachers' perceptions, benefits, and challenges related to classroom technology use. Using a mixed-methods approach, data were gathered from 100 trainee teachers at Universiti Selangor. The findings indicate that most trainees have a positive view of educational technology and recognise its role in enhancing classroom management, interactive learning, and student engagement. Frequently used tools include Google Classroom, Quizizz, and Kahoot, which cater to diverse learning needs. However, integration is often hindered by insufficient training, limited resources, and technical issues. Many trainees feel unprepared due to a lack of professional development and institutional support. Addressing these challenges requires improved training, greater access to digital tools, and stronger institutional backing. Enhancing trainee teachers' digital competencies is essential to ensuring successful integration, thereby improving teaching and learning outcomes*

Keywords: *Technology Integration, Trainee Teachers, Digital Tools, Classroom Challenges, Digital Competencies.*

Introduction

The integration of technology into classroom teaching has revolutionised educational practices, offering innovative solutions to persistent pedagogical challenges. For trainee teachers, this development represents both a significant opportunity and a formidable challenge. Modern teacher preparation programmes increasingly emphasise equipping future educators with the skills and confidence to implement technology effectively. This integration blends theoretical knowledge with practical applications to prepare students for the complex demands of 21st-century education.

Technological tools such as computers, tablets, online learning platforms, and interactive applications like Canva, Quizizz, and Kahoot are now integral to promoting personalised, interactive, and student-centred learning. According to Gerardot (2024), these tools enhance student engagement and contribute to improved learning outcomes. Despite the recognised benefits, the effective integration of digital tools remains inconsistent, particularly among trainee teachers. Many still rely heavily on traditional methods and lack familiarity with newer technologies. Although most aspiring educators are optimistic about technology's potential, their ability to utilise it meaningfully is often limited (Abel et al., 2022).

The advantages of technology integration—such as increased student participation, tailored learning experiences, and creative instructional strategies—are frequently offset by challenges. These include inadequate training, limited access to devices, financial constraints, and resistance to pedagogical change. As education systems shift towards more digitally influenced paradigms, trainee teachers encounter systemic barriers that hinder successful integration, particularly in under-resourced schools (Akram et al., 2022). Issues such as insufficient funding, poor infrastructure, and lack of professional development exacerbate educational disparities and compromise learning quality. Unless these systemic challenges are addressed, the transformative potential of technology in education may remain unrealised.

The rationale for this study stems from the increasingly central role of technology in shaping modern education. Digital literacy is now considered a core competency across educational contexts, and trainee teachers must be prepared to integrate technology meaningfully into their teaching. Investigating trainee teachers' perceptions, recognising the benefits of technology, and identifying the challenges they face are essential for evaluating the effectiveness of current teacher training programmes. Basilotta-Gómez-Pablos et al. (2022) argue that positive teacher attitudes toward technology correlate with more creative and engaging teaching methods. However, a lack of digital competence or practical training can undermine these benefits. Therefore, targeted improvements in teacher preparation programmes are necessary—particularly when trainee teachers understand the potential of technology but lack the practical skills to implement it successfully.

***Research Objectives**:*

1. To investigate trainee teachers' perceptions of technology use in the classroom.
2. To identify the benefits of using technology in teaching and learning.
3. To examine the challenges trainee teachers encounter when incorporating technology.

***Research Questions**:*

1. What are trainee teachers' perceptions towards using technology in the classroom?
2. What are the benefits of technology integration in the classroom?
3. What are the challenges trainee teachers face when using technology?

Literature Review

The integration of technology has become foundational to contemporary education. Teacher trainees are expected to acquire essential digital competencies to effectively use educational tools that enhance instruction and enrich student experiences. While technology offers clear benefits, practical implementation presents a range of obstacles, particularly for trainee teachers unfamiliar with digital resources. Numerous studies have explored both the promise of technology in classrooms and the barriers that complicate its adoption. This section reviews the literature on the benefits, challenges, and attitudes of trainee teachers regarding technology integration.

Benefits of Technology Integration in the Classroom

Extensive research supports the benefits of integrating technology into teaching and learning environments. Classroom technologies are recognised for increasing student enthusiasm and promoting active engagement. Gerardot (2024) emphasises that technology-enriched classrooms foster greater interest, participation, and interaction among students, ultimately leading to improved learning experiences.

In addition, technology enables varied instructional methods that cater to different learning styles. According to Shepherd (2020), tools such as interactive exercises, multimedia content, and digital simulations accommodate tactile, visual, and auditory learners. This diversity helps students access materials aligned with their learning preferences, improving comprehension and retention.

Collaboration is another area enhanced by technology. Students can work together on group projects, provide peer feedback, and communicate via digital platforms. These opportunities support the development of communication and teamwork skills, which are essential in both academic and future professional contexts (Oskarita & Arasy, 2024).

Technology also facilitates real-time assessment and feedback. As Abboud & Rogalski (2021) notes, digital tools enable teachers to identify students' difficulties promptly and respond with appropriate interventions. Such timely feedback helps students learn from their mistakes, track their progress, and take ownership of their learning.

Moreover, integrating technology in the classroom fosters digital literacy, preparing students for future employment. In an increasingly digital world, computer literacy is a fundamental requirement across industries. Schools that embed technology into daily instruction help equip students with the skills needed for the modern workplace (Kalyani, 2024).

While these benefits are well-documented, it is important to acknowledge potential drawbacks. Technology may cause distractions or introduce technical challenges, and some educators find it difficult to shift from traditional to digital pedagogies (Gerardot, 2024). However, with proper training and support, these obstacles can be mitigated.

In summary, the advantages of technology integration—enhanced engagement, personalised learning, collaboration, immediate feedback, and future readiness—underscore its relevance in today’s classrooms. These benefits provide strong justification for continued research and implementation efforts.

Challenges Faced by Trainee Teachers in Integrating Technology

Despite its potential, technology integration remains a challenge for many trainee teachers. One significant barrier is a lack of digital proficiency. Basilotta-Gómez-Pablos et al. (2022) found that although many teacher education programmes aim to improve ICT competencies, they often fail to provide sufficient hands-on experience. As a result, many trainees feel underprepared and anxious about using technology in real classroom settings.

Another key challenge stems from second-order barriers—specifically, teachers' beliefs and attitudes. Joseph and Thomas (2022) reported that even when resources and infrastructure are available, teachers may avoid using technology due to fear, unfamiliarity, or scepticism about its effectiveness. Overcoming these psychological barriers requires targeted professional development aimed at improving digital skills and changing mindsets.

The lack of structured and ongoing support also hinders effective integration. Joya, Merchán, & Barrera (2025) highlight inconsistencies in digital training, noting that teacher preparation often lacks a coherent curriculum focused on digital literacy. As a result, new teachers may possess only basic digital skills and struggle to use technology strategically for instruction.
The COVID-19 pandemic further exposed disparities in technology access and readiness. Janssen (2020) observed that the sudden transition to online teaching revealed gaps in infrastructure, digital access, and preparedness among trainee teachers. Many struggled to adapt, reinforcing the need for comprehensive professional development programmes (PDPs) that prepare them for diverse teaching modalities.

Additionally, successful technology integration requires an enabling and collaborative school culture. Hébert, Jenson, and Terzopoulos (2021) argue that beyond having access to tools, teachers need a supportive environment that encourages experimentation and peer collaboration. Mentorship and shared learning communities help boost trainee teachers' confidence and competence in using digital tools effectively.

In conclusion, the challenges trainee teachers face extend beyond technical know-how. They include psychological, institutional, and systemic barriers that require multifaceted solutions. Addressing these challenges through consistent, relevant, and hands-on professional development is key to ensuring future educators are prepared to integrate technology meaningfully.

Perceptions and Attitudes of Trainee Teachers Towards Technology Integration

Trainee teachers' perceptions and attitudes play a significant role in determining their effectiveness with technology. Confidence in their digital skills strongly influences whether they adopt and use technology in the classroom. Fernández-Batanero et al. (2022) found that individuals with greater confidence in their technological abilities are more likely to engage in digital teaching practices.

Attitudes towards the impact of technology also shape usage. Many trainee teachers believe that digital tools can enhance instructional effectiveness and student engagement (Mohebi & Meda, 2021). A positive outlook is often linked to increased motivation and willingness to explore technology-enhanced teaching strategies (Minh, 2024).

However, some educators remain concerned about the potential for technology to distract students or oversimplify content (Hsieh et al., 2022). Such concerns can reduce enthusiasm and limit integration efforts. Building awareness of how to use technology responsibly and effectively is critical to mitigating these concerns.

The influence of school culture and policy also cannot be overlooked. Yavich & Davidovitch (2024) emphasise that supportive school environments and clear guidelines promote effective

technology use. In contrast, vague policies or lack of leadership support can discourage integration (Timotheou et al., 2023).

Leadership plays a critical role in shaping perceptions. Stumbrienė, Jevsikova, & Kontvainė (2024) argue that strong institutional commitment to digital literacy—including opportunities for professional growth—positively influences trainee teachers' views and motivation to adopt new tools.

Overall, trainee teachers' confidence, attitudes, and perceptions—along with the support they receive—form a complex web that influences how and whether technology is used in the classroom. Addressing these factors holistically is essential to fostering confident, competent, and tech-savvy educators.

Methodology

Research Design

This study employed a mixed-methods research design, integrating both quantitative and qualitative approaches to gain comprehensive insights into trainee teachers' perceptions of technology integration. The target population comprised trainee teachers from Universiti Selangor. The researchers chose this design to benefit from the strengths of both numerical and descriptive data, offering a well-rounded understanding of the research problem.

In the quantitative phase, a structured survey was administered to collect statistical data, allowing for correlation and regression analysis to identify relationships between trainee teachers' attitudes and their experiences with technology use. The use of a large, random sample and standardised survey items ensured the generalisability and consistency of findings.

The qualitative component, comprising open-ended survey responses, aimed to explore personal insights, contextual challenges, and deeper reflections that could not be captured through fixed-response formats. Thematic analysis was conducted to identify emerging trends and themes from participants' narratives. This method provided richer interpretations of trainee teachers' lived experiences and revealed complexities in their efforts to integrate technology in varied school contexts.

By combining both approaches, the study offers a comprehensive understanding of how trainee teachers perceive and utilise technology in classroom settings. The integration of quantitative and qualitative data enhances the reliability and validity of the findings, making the results more applicable to educational policy development and teacher training programmes.

Sampling

A mixed-methods sampling approach was employed to support the study's integrative design. A simple random sampling technique was used to select 100 trainee teachers from Universiti Selangor, ensuring that each had an equal chance of inclusion. This method reduces selection bias and increases the representativeness of the sample, thus improving the reliability and generalisability of the findings.

Unlike typical mixed-method studies, where only a subset contributes qualitative data, this study involved all 100 participants in both quantitative and qualitative components. Closed-ended questions captured quantifiable trends, while open-ended items collected in-depth reflections from every respondent.

This dual strategy allowed for greater data richness and depth, offering both statistical patterns and personal insights on technology integration. Quantitative data revealed trends in trainee teachers' attitudes and competencies, while qualitative responses highlighted the contextual and emotional dimensions of their experiences.

By enabling every participant to contribute to both data types, the study ensured comprehensive representation and strengthened the findings' credibility. The data collected through this inclusive sampling strategy helped shape informed and context-sensitive recommendations for teacher preparation and policy reform.

Instruments

Data were collected using a Google Form, a digital survey tool offering accessibility, efficiency, and versatility. Its user-friendly interface allowed participants to access the survey from any device with internet connectivity, reducing barriers to participation. The form included both structured (Likert-scale) and open-ended questions, making it suitable for mixed-method data collection within a single platform.

Google Forms automated the collection and organisation of responses, minimising human error and simplifying data handling. Its built-in data visualisation tools, such as pie and bar charts, allowed researchers to quickly identify response patterns. This platform was particularly effective for managing a large number of responses—100 in total—while ensuring data accuracy and efficiency.

Despite its strengths, researchers remained mindful of the tool's limitations. Complex or highly nuanced questions may require additional support tools or follow-up interviews, and care was taken to ensure that the survey design aligned with the study's analytical needs. Overall, the platform served as a practical and effective means for collecting high-quality data from a large respondent group.

Data Analysis

For the quantitative analysis, responses were gathered using a five-point Likert scale ranging from "strongly disagree" to "strongly agree." This scale allowed participants to express varying degrees of agreement and provided easily measurable data. Each response was assigned a numerical value, facilitating statistical techniques such as frequency analysis and cross-tabulation.

The qualitative responses were analysed thematically. Researchers manually coded the open-ended responses to identify recurring concepts and emergent themes related to attitudes, experiences, and barriers. This process involved reading and re-reading data, grouping similar ideas, and synthesising key categories into broader thematic statements.

Together, the quantitative and qualitative data provided complementary perspectives on the study's core questions, allowing for both measurable outcomes and context-rich narratives to inform the analysis and interpretation.

Findings

Demographic Profile of Respondents

The study involved 100 trainee teachers from Universiti Selangor. In terms of age, the majority (44%) were between 23–24 years old, followed by 28% aged 21–22, 24% aged 25–26, and 4% aged 19–20. Female respondents made up 61% of the sample, while male respondents accounted for 39%.

Participants were drawn from various districts, with representation from Kuala Selangor (27%), Gombak (25%), Klang and Petaling (14% each), Hulu Selangor (7%), Hulu Langat (9%), Sepang (5%), Kuala Langat (3%), and smaller numbers from Sabak Bernam (2%). This broad geographic distribution contributed to the diversity of perspectives captured in the study.
Most respondents taught at the lower secondary level (51%), followed by upper secondary (47%), with only 2% teaching at the primary level.

Trainee Teachers' Perception of Technology Integration

Responses from the 5-point Likert-scale survey revealed strong confidence in technology use among respondents. Specifically:

Confidence in Technology Use: 81% of respondents (13% strongly agree, 68% agree) felt confident using technology to enhance teaching.

Student Engagement: 78% believed technology improves student participation, with only 4% in disagreement.

Frequency of Use: 65% reported regular integration of digital tools during teaching, while 23% expressed infrequent use.

Overall Perception: 79% had a favourable view of technology in teaching, with minimal disagreement (5%).

Classroom Management: 75% felt technology supported classroom control, citing digital attendance and learning management system (LMS) tools as particularly useful.

Teaching-Learning Process: 79% agreed that technology enhances instructional delivery and learning outcomes.

Preparation by Training Programme: 68% believed their teacher training adequately prepared them for integrating technology, although 13% felt unprepared.

Participants frequently mentioned tools such as Google Classroom, Quizizz, Kahoot, Canva, Padlet, YouTube, and interactive whiteboards. These tools were seen as effective in supporting

interactive learning and in blending modern educational platforms with traditional instructional methods.

Perceived Benefits of Technology Use

The findings highlighted several advantages that trainee teachers associated with classroom technology:

Improved Instruction: 81% of respondents agreed that technology improved the quality of teaching.

TESL Enhancement: 80% preferred technology-assisted TESL instruction over traditional methods, citing increased engagement and adaptability.

Effective Tools: 82% found tools like Google Classroom and Duolingo to be effective in enhancing student learning.

Meeting Diverse Needs: 82% reported that technology enabled them to differentiate instruction and cater to various learning styles.

Skill Development: 74% believed digital tools supported critical thinking, collaboration, and creativity.

Enhanced Engagement: 86% agreed that technology promotes higher levels of student motivation and active participation.

Common themes emerging from the data included student engagement, learning outcomes, interactive learning, and multimedia support. Respondents described using games, videos, and collaborative platforms as strategies to motivate students and make lessons more dynamic. While a few mentioned concerns such as distraction or limited access, the overall sentiment strongly favoured the use of educational technology.

Challenges in Technology Integration

Despite the overall positive perception, respondents acknowledged several challenges associated with technology use in classroom settings:

Barriers to Integration: 75% reported facing substantial obstacles when trying to integrate technology effectively.

Technical Issues: 65% cited equipment malfunctions and unreliable internet connectivity as significant disruptions.

Training Quality: 74% were satisfied with their institution's technology training, although some expressed a need for more hands-on practice.

Resource Availability: 71% felt their teaching environments were adequately resourced, yet 47% believed school-level infrastructure was still insufficient.

Device Accessibility: 75% indicated that limited student access to digital devices posed a major barrier.

Student Distraction: 71% identified off-task behaviour and digital misuse by students as recurring concerns.

Additional challenges included a lack of classroom technology such as projectors and laptops, inconsistent access to high-speed internet, and insufficient IT support. Many trainees also reported time constraints and difficulties managing student engagement during technology-based lessons. Furthermore, institutional barriers—such as a lack of administrative encouragement and reluctance among senior staff to adopt digital methods—were seen as impediments to effective implementation.

Despite these concerns, most trainee teachers maintained a positive outlook. They acknowledged the need for improved infrastructure, consistent digital training, and stronger institutional support to help realise the full potential of technology in education.

Discussion

This study examined trainee teachers' perceptions of technology integration, focusing on its influence on teaching quality and student engagement. The findings reveal a generally positive outlook, with many respondents confident in using digital tools. However, several challenges limit full implementation, particularly within under-resourced schools.

A key finding is that 81% of respondents felt capable of using technology to enhance instruction. This aligns with Gerardot (2024), who observed that exposure to digital tools during teacher training significantly improves future teachers' readiness to implement them in classrooms. Tools such as Google Classroom, Kahoot, and Canva were commonly used, indicating their accessibility and effectiveness in promoting interactive teaching and immediate feedback.

Additionally, 78% of respondents believed that technology increased student engagement, supporting Oskarita & Arasy (2024) view that interactive digital environments enhance participation and learning motivation. However, some participants voiced concerns about distraction, echoing Hébert, Jenson, and Terzopoulos (2021), who argued that without effective management strategies, technology may reduce focus rather than enhance it.

Despite optimism, 63% of respondents reported encountering challenges. These included unreliable infrastructure, lack of access to devices, and poor internet connectivity. Akram et al. (2022) similarly found that limited school resources pose significant barriers to successful technology use, particularly in underserved regions.

The study also highlights how technology contributes to classroom management, with 75% of participants acknowledging its value in administrative efficiency and lesson planning. This supports findings by Kohnke, Moorhouse, and Zou (2023), who argue that technology facilitates differentiated instruction and streamlines teaching processes.

Nevertheless, issues such as inadequate professional development and insufficient hands-on training remain unresolved. Kasneci et al. (2023) pointed out that without meaningful opportunities to practise using digital tools, educators often struggle with effective implementation. Moreover, concerns regarding overreliance on AI-generated content reflect a need for better understanding of how to balance traditional teaching approaches with digital innovation.

Overall, the findings underscore a need for teacher education programmes to offer both practical experience and theoretical grounding in digital pedagogy. Enhanced training, better infrastructure, and targeted support systems will be vital in enabling trainee teachers to overcome current barriers and realise the full benefits of technology in teaching and learning.

Conclusion

This study provided valuable insights into trainee teachers' perceptions of technology use in the classroom. While most respondents expressed positive attitudes and reported confidence in using digital tools, several challenges remain that hinder effective implementation. These include limited infrastructure, lack of institutional support, and inadequate professional development. The findings are consistent with previous research indicating that technology can enhance classroom management, foster student engagement, and support differentiated learning.

Confidence in using platforms such as Google Classroom, Kahoot, and Canva reflects a growing acceptance of digital tools. However, mere access to technology is insufficient; targeted training and supportive school environments are crucial for meaningful integration. Without proper guidance, even the most promising digital tools can become ineffective or misused.

The implications for teacher training programmes and education policy are significant. Institutions must prioritise structured, hands-on technology training to prepare future educators for the demands of digital classrooms. Governments and stakeholders should work toward improving ICT infrastructure, particularly in underfunded schools. Instructors must also be encouraged to adopt balanced pedagogical strategies that integrate digital tools without diminishing traditional instructional values or critical thinking skills.

While the study offers relevant findings, its scope was limited to trainee teachers at Universiti Selangor. The use of self-reported data introduces the possibility of response bias. Moreover, the long-term effects of technology integration on student learning and teacher effectiveness were beyond the scope of this study. Future research should explore longitudinal outcomes across diverse educational settings and consider ethical and relational dynamics within digital classrooms.

In conclusion, this research contributes to ongoing discussions about the evolving role of technology in teacher education. By addressing the existing barriers and building on trainee teachers' openness to digital tools, institutions can pave the way for more innovative, inclusive, and effective learning environments.

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SUNDANESE CULINARY NAMES AS CULTURAL ASSETS: A STRATEGIC INTERSECTION OF TOURISM PROMOTION, SOCIAL SCIENCE, AND TECHNOLOGY

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Abstract *: In an era where culture and technology increasingly intersect, the tourism sector is being reshaped by multidisciplinary approaches that blend local identity with digital innovation. This study examines the role of* ***Sundanese culinary names*** *as a strategic asset in promoting tourism in West Java, Indonesia, through a cultural and technological lens. Grounded in cognitive linguistics and semiotics, the research explores how the naming of traditional Sundanese dishes—such as Lotek, Nasi Liwet, and Cimplung—functions as a conduit of cultural meaning, embedding narratives of local identity, environment, and communal values. The study further investigates how these culturally resonant names can be leveraged in tourism marketing, particularly through digital platforms such as social media, tourism apps, and interactive gastronomic maps. By analyzing both linguistic features and promotional strategies, this research underscores the potential of culinary language as both intangible heritage and a scalable tourism asset. The findings advocate for the integration of cultural semantics with technology-driven promotion to support sustainable tourism development and cultural preservation. This paper contributes to the broader discourse on how social science perspectives and technological tools can collaboratively enhance regional branding and cultural economy.*

Keywords: *Sundanese cuisine, tourism promotion, cultural semiotics, digital marketing, interdisciplinary strategy, social science and technology*

1. Introduction

In recent years, the convergence of cultural identity, tourism, and digital technology has opened new pathways for promoting regional heritage in innovative and sustainable ways. Among the many facets of cultural tourism, culinary traditions offer a particularly potent channel for communicating local values, history, and identity. In Indonesia—a country renowned for its rich ethnic diversity and vibrant culinary landscape—the regional cuisines serve not only as a source of nourishment but also as a form of cultural expression. Sundanese cuisine, native to West Java, exemplifies this phenomenon through its distinct flavor profiles and culturally evocative dish names.

The names of traditional Sundanese dishes such as *Nasi Timbel*, *Karedok*, *Lotek*, and *Cimplung* carry more than just gastronomic information; they encapsulate environmental references, historical narratives, and communal lifestyles. These culinary names function as linguistic artifacts that reflect a deep-rooted relationship between language, culture, and place. Yet, in the global competition for tourist attention, such cultural elements are often underutilized or overshadowed by more commercial branding strategies.

This study positions Sundanese culinary names as cultural capital that can be strategically employed in tourism promotion. It explores the intersection of cognitive linguistics, cultural semiotics, and technology to analyze how these names contribute to destination branding. By investigating how traditional food naming practices can be integrated into digital marketing platforms—such as tourism apps, interactive maps, and social media campaigns—this research highlights the relevance of a multidisciplinary approach in reimagining sustainable, culturally grounded tourism strategies. This paper contributes to broader discussions on how social science and technological innovation can work hand-in-hand to valorize local heritage in a global context.

2. Literature Review

2.1 Culinary Naming and Cultural Semiotics

Culinary names are more than linguistic labels; they are cultural signifiers embedded with layers of meaning. According to Barthes (1964), food is a system of communication, and its naming can be read as a text rich with cultural codes. In the Sundanese context, dish names such as *Nasi Liwet* or *Surabi* evoke not only ingredients and preparation methods but also local customs, values, and geographic references. Semiotic approaches to gastronomy (Danesi, 2004; LeBesco & Naccarato, 2008) emphasize how food-related language shapes perceptions of authenticity and belonging—crucial components in cultural tourism.

2.2 Cognitive Linguistics and Place Branding

From a cognitive linguistic perspective, naming is a conceptual act that reflects how people mentally structure their experiences (Lakoff & Johnson, 1980). Culinary names often incorporate metaphors, schemas, and frames that anchor cultural identity in specific landscapes and traditions. These linguistic forms can function as persuasive tools in place branding, where local expressions are used to construct narratives that differentiate destinations in the tourism market (Kavaratzis & Ashworth, 2005). For example, the imagery invoked by “Karedok” not only indicates a raw vegetable salad but also resonates with notions of health, nature, and tradition.

2.3 Tourism Promotion and Digital Integration

The digitalization of tourism has reshaped how destinations communicate with global audiences. Scholars such as Buhalis and Law (2008) have noted the rise of e-tourism platforms, where multimedia content, user-generated reviews, and interactive storytelling enhance the tourist experience. Within this context, local culinary names—if strategically integrated—can serve as SEO-friendly keywords, hashtags, and anchors for digital storytelling. Research on gastronomic tourism (Ellis et al., 2018) emphasizes the importance of authenticity and narrative, both of which can be powerfully supported through culturally meaningful food names.

2.4 Multidisciplinary Perspectives on Cultural Promotion

The intersection of social sciences and technology has enabled more holistic approaches to cultural promotion. Cultural anthropology, linguistics, and marketing now increasingly

collaborate with data science, UX design, and AI to develop culturally informed tourism tools (Richards, 2018). Studies in digital humanities suggest that integrating traditional knowledge with interactive technologies can amplify cultural visibility while respecting local epistemologies. In this vein, the Sundanese culinary lexicon offers fertile ground for interdisciplinary collaboration—bridging tradition and innovation in tourism strategy.

3. Methodology

This study adopts a qualitative, interdisciplinary approach grounded in cultural linguistics and tourism studies, with a focus on how Sundanese culinary names can function as strategic tools for tourism promotion in the digital age. The methodology combines linguistic analysis, semiotic interpretation, and an exploration of digital marketing practices to provide a comprehensive understanding of the cultural and promotional value of culinary names.

3.1 Data Collection

Data were collected from multiple sources to capture both the linguistic and promotional dimensions of Sundanese culinary names. These included:

- **Primary data**: Semi-structured interviews with local food vendors, cultural experts, and tourism officers in West Java, focusing on the meanings, origins, and uses of culinary names in daily and commercial contexts.
- **Secondary data**: Online menus, food blogs, travel websites, and tourism promotion materials where Sundanese food names are featured or described.

Additionally, examples were drawn from social media platforms (e.g., Instagram, TikTok) and local tourism apps to assess how culinary names are used in digital spaces for branding and engagement.

3.2 Analytical Framework

The study uses a **cultural linguistic framework** (Sharifian, 2011) to analyze the conceptual and cultural schemas embedded in culinary names. This is complemented by **semiotic analysis** (following Chandler, 2007) to decode the signs and symbols these names represent in cultural narratives.

To explore the technological aspect, the research employs a **digital ethnography approach** (Pink et al., 2016), analyzing how culinary names appear and function across digital platforms—particularly in user-generated content and official tourism promotions.

3.3 Scope and Limitations

The focus is limited to widely recognized Sundanese dishes that are actively used in tourism promotion or social media engagement. While the study provides insight into language, culture, and tourism strategy, it does not extend to detailed sensory or nutritional analysis of the foods themselves. Future work could expand into broader comparative studies or incorporate quantitative metrics like tourist impressions or engagement rates.

4. Findings And Discussion

4.1 Cultural Meaning in Sundanese Culinary Names

The linguistic analysis revealed that Sundanese culinary names are deeply rooted in local ecology, traditional values, and social practices. Dishes like *Karedok* (raw vegetable salad with peanut sauce) and *Nasi Timbel* (steamed rice wrapped in banana leaves) encode not only ingredients and preparation methods, but also ideologies of simplicity, nature, and communal dining. These names function as cultural signposts—immediately signaling authenticity, place-specific knowledge, and a way of life that resonates with both local pride and tourist curiosity.

For instance, *Lotek* (a vegetable and peanut dressing dish similar to gado-gado) is often associated with homemade preparation and rural aesthetics, while *Surabi* (a traditional pancake) is tied to nostalgia and family rituals. The repetition of natural references (leaves, water, fire, soil) across many names highlights an embedded worldview where food is not separate from nature but part of a living system.

4.2 The Promotional Function of Culinary Names

In tourism promotion, names are not neutral—they frame perception. The use of Sundanese culinary names in digital content (menus, hashtags, videos) demonstrates their role as *narrative devices* that invite deeper cultural engagement. Hashtags like #NasiTimbel or #WisataKulinerSunda are commonly used on Instagram and TikTok to connect users with regional identity. Local tourism boards and culinary influencers often leverage these names to construct culturally grounded stories, emphasizing tradition, local sourcing, and sensory experience.

Yet, there remains an underutilization of these names in formal tourism branding. Promotional materials often prioritize generic or translated terms (e.g., “Sundanese salad” or “Indonesian rice set”) that strip away cultural nuance. This represents a missed opportunity to position culinary names as branding assets that not only attract tourists but educate them in the process.

4.3 Integrating Culinary Names into Digital Strategy

Digital ethnographic analysis indicates that culinary names have high potential for *searchability* and *engagement* when preserved in their original linguistic form. Platforms like Google Maps, TripAdvisor, and Indonesian food delivery apps (e.g., GoFood) show that listings using original names (e.g., *Karedok*, *Cimplung*) are more likely to appear in searches related to traditional cuisine and attract users seeking “authentic experiences.”
Additionally, emerging tourism tech—such as interactive culinary trails, QR code menus with embedded cultural stories, and AI-powered food guides—can benefit from incorporating culinary naming as a core feature. The emotional and symbolic value encoded in these names aligns with the broader trend of experiential tourism, where travellers seek not only to consume but to connect.

4.4 Toward A Multidisciplinary Strategy

The findings suggest a pressing need for collaborative strategies that involve linguists, marketers, technologists, and cultural practitioners. Culinary naming should be recognized not merely as a linguistic concern but as a key component of destination branding, capable of fostering deeper cultural exchange. Through integration with digital tools, Sundanese food names can serve as a bridge between tradition and innovation, between local communities and global travellers.

5. Findings and Discussion

5.1 Cultural Meaning in Sundanese Culinary Names

Sundanese dish names encode environmental and socio-cultural meaning. Many of them include references to natural materials or traditional preparation methods. The following table highlights some examples:

Culinary Name	Literal Meaning / Component	Embedded Cultural Message
Nasi Timbel	Steamed rice wrapped in banana leaves	Simplicity, sustainability, agrarian identity
Karedok	Raw vegetable salad with peanut sauce	Freshness, health, connection to earth
Cimplung	Fried cassava balls	Rural childhood snack, nostalgia, community bonding
Lotek	Mashed vegetables with peanut dressing	Homemade, village-based preparation, maternal care
Surabi	Rice flour pancake, grilled on clay pot	Hearth tradition, family rituals, evening snack culture

These names are not merely functional—they encode whole narratives about local ecology, gender roles, spirituality, and seasonal life cycles.

5.2 The Promotional Function of Culinary Names

To demonstrate how Sundanese culinary names operate in promotional contexts, the following are real-world examples from digital platforms:

- **Instagram Campaigns**: The tag #KaredokSunda has over 7,000 posts, most of which feature rural settings and stories about returning to one's roots. One user captioned, *"Karedok di saung, rasa leutik jeung alam"* ("Karedok in a hut, tasting the smallness and nature"), reinforcing place-based identity.
- **Tourism Website Snapshots**: West Java's tourism website lists *Nasi Timbel* but translates it as "Sundanese Rice Platter," omitting the cultural significance of the *timbel* wrapping method. This translation may be informative but loses the emotive and symbolic depth of the original.

Platform	Usage of Culinary Name	Strategy	Cultural Depth Preserved
Instagram (hashtag)	#KaredokSunda, #SurabiBandung	Storytelling, place identity	High
Tourism brochures	"Sundanese rice platter" (Nasi Timbel)	Simplified for foreign readers	Low
TikTok (travel vlog)	Cooking demo: *Surabi on clay pot*	Experiential engagement	Medium to high

5.3 Integrating Culinary Names into Digital Strategy

Based on a review of food delivery apps and mapping platforms, listings that retain authentic names tend to attract more curiosity, especially from international users who associate indigenous terms with “authenticity.”

For example:

- **GoFood (Indonesia)**: Listings with names like *Lotek Bandung* have more descriptive reviews and higher ratings than those labeled generically as "Vegetable salad with peanut sauce."
- **Google Maps**: Searches for *Surabi Enhaii* (a popular Bandung spot) generate reviews highlighting nostalgia, local pride, and references to traditional cooking methods.

Digital Tool	Example	Result
Google Maps	Search: “Cimplung Ciamis”	Users comment on childhood memories and rural culture
GoFood	“Lotek Ny. Aci”	Higher user engagement for culturally named dishes
Instagram Reels	Sundanese food tours with original names	High share rate, strong emotional resonance

5.4 Toward A Multidisciplinary Strategy

These examples and patterns suggest that retaining culinary names in their original form—accompanied by cultural storytelling—offers dual benefits: preserving local identity and enhancing marketability in digital ecosystems. This approach aligns with the global tourism trend toward **experience-based travel**, where visitors seek not just consumption but immersion.

A multidisciplinary strategy that brings together **cultural linguists, digital marketers, tourism planners, and tech developers** can effectively translate this potential into action—through tools like:

- **Interactive culinary maps** with embedded etymologies and audio pronunciation
- **QR-coded menus** in eateries with cultural background stories
- **AI-powered tour guides** that explain food names in contextual, narrative-driven formats

6. Conclusion

This study has explored the strategic role of Sundanese culinary names as cultural assets within tourism promotion, framed through the lenses of cultural linguistics, semiotics, and digital marketing. The findings clearly indicate that these names are not merely functional labels but powerful cultural signifiers—encoding values, traditions, environmental knowledge, and social memory. They serve as narrative tools that communicate authenticity and locality, attributes increasingly sought after by tourists in the experience-driven travel market.

Yet, despite their cultural richness, these names are often underutilized in formal tourism campaigns and digital ecosystems. Translations, simplifications, or omissions of traditional names risk diminishing their symbolic power and weakening cultural identity in the process. This presents a lost opportunity to integrate linguistic heritage into a broader, more compelling tourism narrative—especially in a digital context where storytelling, searchability, and emotional engagement are key.

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ANALYSING FACTORS IMPACTING CUSTOMER SATISFACTION IN E-HAILING SERVICES: A DART MODEL STUDY IN MALAYSIA

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Abstract: *People travel to destinations using a variety of modes of transportation. Taxi services are one of the most popular modes of transportation among people. In these few years, a new alternative taxi service known as e-Hailing has come up with innovative ways to improve all of the cab's unsatisfactory services. The e-hailing users are more concerned about whether the e-hailing service is capable of meeting their expectations. This study aims to explore and examine the factors influencing customer satisfaction in e-hailing services using the DART model, which comprises four key components: Dialogue, Access, Risk Assessment, and Transparency. The DART model offers a useful theoretical framework to evaluate customer engagement and service value co-creation in the context of e-hailing platforms. To achieve the objectives of this study, a structured questionnaire was developed and distributed through Google Forms to collect data from users with e-hailing service experience. A judgmental non-probability sampling technique was employed, targeting respondents who have utilised e-hailing services at least once. A total of 350 survey forms were distributed online, and 205 were completed by respondents. The research design adopted a quantitative and causal approach, allowing for the identification and analysis of relationships between the variables. Data collected were analysed using the Statistical Package for the Social Sciences (SPSS) version 27. Four key statistical techniques were applied: factor analysis, reliability analysis descriptive statistics, and multiple regression analysis to determine the most significant predictors of customer satisfaction. The findings of this study provide practical insights for e-hailing companies, enabling them to better understand which factors most significantly impact customer satisfaction. By aligning their services with the dimensions outlined in the DART model, companies can improve customer trust, retention, and competitive advantage in the digital transportation landscape.*

Keywords: *DART model, e-hailing, customer satisfaction, Malaysia*

Introduction

The introduction of e-hailing in 2009 through Uber and in 2012 through Lyft led to a transformation in the global transportation industry, allowing e-hailing services to grow and gain popularity among the public. These services initially developed in metropolitan areas, where residents were more exposed to technological advancements and infrastructure development. At present, due to the increasing number of individuals using the internet, e-hailing services have successfully expanded worldwide. E-hailing has become a new trend in the business world, and the growing network of such services has resulted in more intense competition within the e-hailing market (Jenal et al., 2021).

In the past, people travelled to their destinations using a variety of modes of transportation. Taxi services were among the most popular options. However, traditional taxi services were often criticised for issues such as delays, poor vehicle conditions, refusal to fulfil customers' requests, low service quality, and exorbitant fares. In recent years, a new alternative known as e-hailing has emerged, offering innovative solutions to address these shortcomings (Melan et al., 2021). Since the introduction of e-hailing, demand for such services has continued to grow, as they provide customers with a more convenient and reliable travel experience. Customers are particularly drawn to the reasonable pricing and the systematic, user-friendly process of booking a ride. Furthermore, e-hailing services allow customers to be dropped off at their exact destination, adding to the overall convenience and increasing their preference for using these services (Idros et al., 2020). This growing trend is reflected in statistical data, with Malaysia's e-hailing industry projected to generate revenue of US$510 million (RM2.29 billion) by 2025 (Free Malaysia Today, 2025).

Despite the rapid growth and economic potential of Malaysia's e-hailing industry, several challenges continue to undermine its effectiveness and user trust. Firstly, service quality remains a major concern, particularly with regard to driver behaviour and communication barriers. Reports of rude, emotionally unstable, or unprofessional drivers have raised significant safety and satisfaction issues among passengers. Language barriers further complicate interactions, often leading to misunderstandings and disputes (Fu, 2022). Secondly, accessibility issues limit the service's reach, especially among the elderly and rural populations. Many senior citizens are unfamiliar with smartphone technology, while rural users often face poor internet connectivity and limited driver availability in remote areas (Mohadis & Ali, 2014). Thirdly, safety and security concerns are growing. Increasing incidents of crimes such as sexual assault, robbery, and fraud involving e-hailing drivers have been reported, leading to public fear—particularly among women—and reducing user confidence in the service (Malaymail, 2022; Mool, 2022; Riduan, 2022). Lastly, pricing transparency remains insufficient. Fares can fluctuate significantly during peak hours or late at night due to a lack of government regulation, often rendering rides unaffordable. Hidden fees, such as unreasonable cancellation charges, further contribute to user dissatisfaction (Cai, 2022). Collectively, these problems hinder the broader adoption and trust in e-hailing services in Malaysia. Addressing these issues is essential to ensure sustainable industry growth and enhance consumer confidence in digital mobility solutions. With competition intensifying among e-hailing service providers, it is crucial for companies to investigate the factors influencing customer satisfaction and implement appropriate improvements (Nor et al., 2021).

This study contributes to the understanding of customer satisfaction in the e-hailing industry by identifying key influencing factors using the DART model—Dialogue, Access, Risk Assessment, and Transparency—which remains underexplored in recent literature. It offers a timely and updated perspective, addressing a gap in current academic discourse. The findings are valuable for multiple stakeholders. For e-hailing companies, the study provides insights into customer expectations and areas for service improvement, enabling them to enhance user experience, retain existing users, and attract new ones. Improved satisfaction can also lead to increased revenue and a stronger brand reputation through repeat usage and positive word-of-mouth. For policymakers, this study highlights the potential link between rising e-hailing usage and higher corporate tax contributions, which could ultimately support national development and public welfare. Moreover, the research serves as a reference for scholars exploring consumer satisfaction within digital service platforms, particularly those seeking to apply the DART model in service quality studies. By examining customer satisfaction through a structured theoretical lens, this study adds depth to the academic understanding of digital transportation services and offers practical recommendations for enhancing e-hailing service delivery in Malaysia.

Literature Review

Customer Satisfaction towards E-hailing services

Customer satisfaction is one of the key factors that contribute to continued success in terms of increased profits and economic growth (Silalahi, 2017). It refers to customers' attitudes, feelings, and behaviours, which result from their various perceptions. Lee and Loi (2025) published findings on Grab Taxi, the region's most popular third-party taxi app. Their research examined the factors influencing customer satisfaction and how operators use these elements to gauge satisfaction levels. Customers who are satisfied with the service received from a company are likely to respond positively, repurchase, and demonstrate stronger brand loyalty. However, customer satisfaction is measured differently depending on individual expectations and needs, particularly in relation to cognitive criteria and perceived performance. Service providers must adapt their businesses by incorporating technology and improving supply chain efficiency when engaging with customers (Melan et al., 2021).

In Malaysia, e-hailing services have driven industry expansion and are regarded as a complement to the existing public transportation system. Today’s customers have more information and options than ever before (Nor et al., 2021). Therefore, service providers must meet and continually improve their offerings to satisfy a wide range of customers, particularly in the e-hailing sector. Customer satisfaction is a key indicator of a company’s past, present, and future performance. As a result, marketing specialists and researchers have long focused their efforts on this area. Customer satisfaction is defined as a customer’s evaluation of a service or product as satisfactory or unsatisfactory, based on whether it meets or falls short of expectations (Kotler et al., 2024).

Customers will be satisfied when the products or services they purchase meet or exceed their expectations (Bismo et al., 2018). Customer satisfaction refers to the gap between expectations and actual performance and is defined as a customer's perception of the extent to which their needs have been fulfilled. It also represents a consumer's overall evaluation of a company’s performance based on previous experiences. In the service industry, customer satisfaction is a

critical metric for assessing service quality. Consequently, service quality is expected to have a significant impact on customer satisfaction (Nor et al., 2021).

According to Jin and Chen (2020), customer satisfaction is influenced by the interaction of expectations, perceived performance, and disconfirmation, as outlined in the Expectation–Confirmation Theory (ECT). ECT is a process-oriented framework that has been applied across various scientific disciplines. It suggests that customers form an initial expectation of a product or service before making a purchase. During the purchasing process, they develop a perception of the product or service, which they then compare to their initial expectations to determine the extent to which those expectations have been met. Ultimately, this comparison establishes the level of customer satisfaction.

Underlying Theory - DART Model

The underlying theory used in this research is the co-creation value model, also known as the DART model. The DART model serves as the foundation for constructing the e-hailing user satisfaction framework. It comprises four key elements: dialogue, access, risk assessment, and transparency. This model is employed as a framework for assessing and measuring customer satisfaction and engagement between businesses and customers (Jenal et al., 2021). According to Jenal et al. (2021), co-creation value is a theory that involves user participation in the development of services. It refers to the value created by companies in collaboration with users, integrating operations and available resources to evaluate the quality of services provided. The service received by users involves various activities and interactions. Co-creation interactions occur when businesses and users actively generate value, influence each other, and communicate directly through existing technological platforms.

The co-creation value theory originates from two key schools of thought. The first is Prahalad and Ramaswamy's theory, which is grounded in competition theory, and the second is Vargo and Lusch's theory, based on Service-Dominant (S-D) logic (Jin & Chen, 2020). Prahalad and Ramaswamy emphasise the joint creation of customer experiences as the foundation of value creation, with effective interaction being the key to realising this value. In contrast, Vargo and Lusch highlight value-in-use, arguing that customers generate value by integrating and applying resources during consumption. However, Jin and Chen (2020) propose that co-creation value is a combination of both perspectives, where all parties must collaborate to enhance the overall consumer experience.

Dialogue

For both parties, dialogue is a process of communication, deep involvement, and readiness to act. It entails more than just listening to customers—it involves mutual learning and engagement between two equal problem solvers, ultimately resulting in a loyal customer base (Idros et al., 2018). Mohamed et al. (2015) described dialogue as a process of interaction, interactivity, and the ability to act. This component emphasises the method of communication between service providers or system developers and system users. Such interaction enhances knowledge and experience on both sides. According to Jenal et al. (2021), dialogue is characterised by engagement, interactivity, and responsiveness. It involves not only listening to customers but also understanding their needs from emotional, cultural, and societal perspectives. This element highlights how companies and customers communicate.

In the research by Elias et al. (2021), dialogue is defined as interaction and two-way communication between businesses and e-hailing customers to understand their feelings, experiences, and problems, and to work collaboratively to resolve issues using various communication methods. Previous studies support the importance of dialogue in e-hailing services. Jenal et al. (2021) found that the implementation of dialogue within the DART model improved customer satisfaction. Similarly, Idros et al. (2020) emphasised that dialogue, as part of the value co-creation model, significantly influences customer satisfaction. Elias et al. (2021) also confirmed a strong relationship between dialogue and customer satisfaction in the context of e-hailing. Through two-way communication, e-hailing providers can better meet customer needs and expectations, thereby enhancing satisfaction. Based on this, the following hypothesis is proposed:

H1: Dialogue will positively influence customer satisfaction in e-hailing services in Malaysia.

Access

Access begins with knowledge and tools. Through the company's platform, customers are able to access and manage data in the most efficient manner. They can gain access to various experiences tailored to their individual needs (Idros et al., 2020). According to Jenal et al. (2021), access starts with the provision of information and tools that enable customers to retrieve system data. Customers can utilise intermediary devices and appropriate sources to obtain accurate information. This element helps bridge the digital divide by allowing all users equal access to the same information. Similarly, Mohamed et al. (2015) stated that access involves a process beginning with information and equipment that facilitates user interaction with system data. Access is crucial to ensure that all relevant information is delivered through proper channels, and that its accuracy is maintained to support the continuity of user interaction. Furthermore, Elias et al. (2021) defined access as a platform that enables e-hailing consumers to obtain information and services easily, supported by interactive websites or mobile apps that are user-friendly and display essential information.

According to Jenal et al. (2021), the implementation of access within the DART model has improved customer satisfaction in e-hailing services. Idros et al. (2020) also highlighted that access, as part of the value co-creation model, has a significant influence on customer satisfaction. Likewise, Elias et al. (2021) found a strong relationship between access and customer satisfaction in the context of e-hailing. Access plays a crucial role in shaping user satisfaction by ensuring that information and services are readily available and easily accessible. Based on this, the following hypothesis is proposed:

H2: Access will positively influence customer satisfaction in e-hailing services in Malaysia.

Risk Assessment

According to the article by Jenal et al. (2021), risk assessment refers to a user's behaviour and decision-making after being made aware of the potential dangers associated with using the service. While using the service, companies must inform users of any possible risks involved. The user then decides whether to continue using the service despite being aware of these risks. This element ensures users are informed about the hazards they may encounter if they choose

to proceed. Similarly, Elias et al. (2021) explained that consumers must be prepared to accept and manage the risks if they wish to continue using e-hailing services. Companies are responsible for informing users about potential risks before, during, and after the service experience. Idros et al. (2020) also noted that "risk" refers to the possibility of endangering customers. Since customers play an active role in value co-creation, companies must clearly communicate the associated risks, and customers must be willing to manage and tolerate them.

Risk involves the probability of negative outcomes and reflects consumer preparedness to accept those risks. Mohamed et al. (2015) emphasised that users must be aware of the risks involved in using the system, which indirectly promotes its usage, as informed users are more confident and ready to engage.

According to Jenal et al. (2021), the implementation of risk assessment within the DART model has improved customer satisfaction in e-hailing services. Likewise, Idros et al. (2020) found that risk assessment in the value co-creation model significantly influences customer satisfaction. Elias et al. (2021) also confirmed a significant relationship between risk assessment and customer satisfaction in the e-hailing context. When consumers are willing to continue using the service despite being aware of potential risks, risk assessment plays a critical role in shaping satisfaction. Based on this, the following hypothesis is proposed:

H3: Risk assessment will positively influence customer satisfaction in e-hailing services in Malaysia.

Transparency

Transparency refers to the clarity and openness of information provided through the system for users' convenience. It ensures that information is easier to understand, allowing users to utilise the system more effectively. Transparent information is essential to facilitate user engagement with the system (Mohamed et al., 2015). According to Idros et al. (2020), transparency involves the mutual trust developed between customers and businesses. When a company provides accurate and openly accessible information, customers are more likely to trust the service. Elias et al. (2021) stated that trust between consumers and e-hailing firms is built through efforts to protect customer privacy and ensure the delivery of reliable information. Similarly, Jenal et al. (2021) noted that transparency involves a company's strategies and efforts to gain users' trust and confidence. By sharing detailed and accurate information, including pricing, costs, and earnings, companies aim to reassure users of the reliability and comprehensiveness of their services.

Jenal et al. (2021) reported that implementing transparency within the DART model positively affects customer satisfaction in e-hailing services. Idros et al. (2020) identified transparency as a key determinant of customer satisfaction, while Elias et al. (2021) confirmed a significant relationship between transparency and satisfaction in the e-hailing context. Transparency plays a crucial role in influencing customer satisfaction, as e-hailing firms strive to protect users' privacy and ensure service integrity. Based on this, the following hypothesis is proposed:

H4: Transparency will positively influence customer satisfaction in e-hailing services in Malaysia.

This research focuses on exploring the factors that influence customer satisfaction in e-hailing services. Based on previous studies, four key factors are identified as having a positive impact on customer satisfaction: dialogue, access, risk assessment, and transparency. The research model of this study is illustrated in Figure 1.

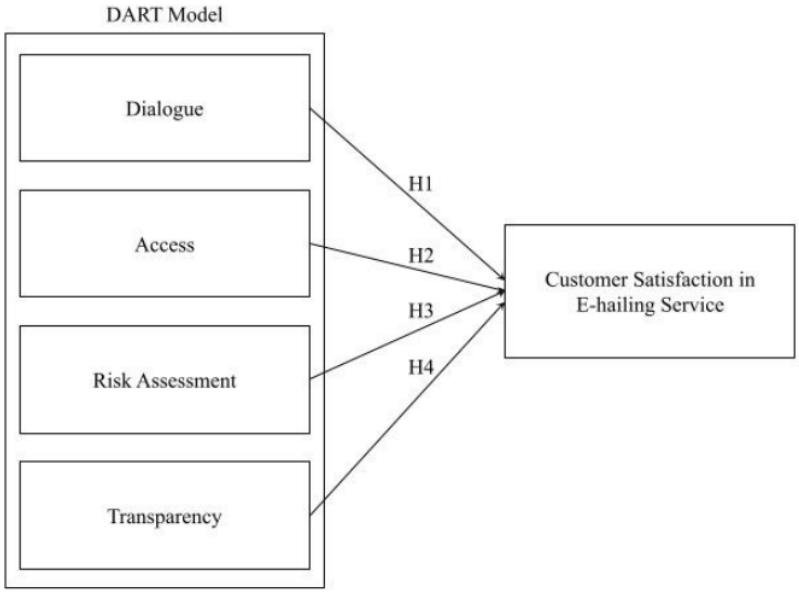


Figure 1: Research Model for dialogue, access, risk assessment, transparency and customer satisfaction in e-hailing service

Source: self-made

Research Methodology

This study adopts a quantitative research methodology, also known as survey research, involving the use of structured questionnaires with predetermined response options to collect data from a large number of respondents. It aims to gather specific information based on a formalised, systematic process using numerical data (Burns & Veeck, 2020). Additionally, causal research is employed to examine cause-and-effect relationships between variables (Sekaran & Bougie, 2016). The target population consists of Malaysian consumers aged 18 and above who have prior experience using e-hailing services. This criterion ensures relevant and reliable responses aligned with the study's focus on customer satisfaction in the e-hailing industry. A non-probability sampling method was used, specifically convenience sampling, due to its cost-effectiveness and ease of data collection (Sekaran & Bougie, 2019; Burns & Veeck, 2020). Respondents were selected based on their availability and willingness to participate. According to Roscoe's (1975) rule of thumb and Sekaran and Bougie's guidelines, the minimum sample size was determined to be at least 50, as the study includes four independent and one dependent variable.

Data were collected using an online survey distributed via Google Forms through platforms such as WhatsApp, Instagram, and Messenger. This method was chosen for its efficiency, accessibility, and real-time data availability. Google Forms was used for its cost-effectiveness and ability to streamline the data collection process. For data analysis, the study applied four statistical techniques: descriptive analysis, factor analysis, reliability analysis, and multiple regression analysis. These analyses were conducted using IBM SPSS version 27, which

allowed for systematic testing of the hypotheses and interpretation of findings. This comprehensive methodology ensures that the research is data-driven, reliable, and well-aligned with its objective to identify key factors influencing customer satisfaction in Malaysia's e-hailing services.

Data Analysis and Result

Statistics of Respondents' Profile

The respondents' demographic data were analysed using descriptive statistics. Table 1 provides an overview of the respondents' demographic information. The data were collected through an online survey conducted via the Google Form platform. The demographic information includes age, nationality, experience with using e-hailing services, gender, ethnicity, and education level. A total of 350 survey forms were distributed online, and 205 completed responses were used for data analysis.

Table 1: Profile Respondents

Demographic Variables		Frequency	Percentage (%)
Age	18-25 years old	158	77.1
	26-41 years old	39	19.0
	42-57 years old	8	3.9
	Total	**205**	**100**
Nationality	Malaysian	205	100
	Total	**205**	**100**
Have you had experience e-hailing service before?	Yes	205	100
	Total	**205**	**100**
Gender	Male	73	35.6
	Female	132	64.4
	Total	**205**	**100**
Ethnicity	Malay	16	7.8
	Chinese	182	88.8
	Indian	7	3.4
	Total	**205**	**100**
Education Level	High school or lower	7	3.4
	Diploma/College level	47	22.9
	Bachelor Degree	147	71.7
	Master Degree	3	1.5
	Doctoral Degree	1	0.5
	Total	**205**	**100**

Source: self-made

Based on Table 1, the majority of respondents were in the 18–25 age group, accounting for 77.1% of the total, while the 26–41 and 42–57 age groups contributed 19.0% and 3.9% respectively. All respondents were Malaysian and had prior experience using e-hailing services. Female respondents made up the majority (64.4%) of the sample, while male respondents accounted for 35.6%. In terms of ethnicity, the majority of respondents were Chinese (88.8%), followed by Malay (7.8%) and Indian (3.4%) participants. Regarding education level, respondents holding a bachelor's degree formed the largest group, representing

71.7% of the total, followed by those with a diploma or college-level education, who made up 22.9% of the sample.

Factor Analysis

Factor analysis involves expressing the values of observed and correlated variables as functions of several underlying factors to identify the most significant ones (Sekaran & Bougie, 2019). There are two main types of factor analysis: Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA). CFA is used when the structure of the variables is based on existing theories or previous research, whereas EFA is employed to uncover the underlying structure without a predetermined number of factors. Since all measurement items in this study are adapted from the underlying theory, the DART model, and established studies, CFA is deemed appropriate for validating the measurement model. The measurement items for the independent variables are adapted from past studies, in which the variables have been clustered into four distinct factors, namely Dialogue (D), Access (A), Risk Assessment (R), and Transparency (T). Meanwhile, the dependent variable, Customer Satisfaction (CS), is also adapted from previous studies and has already been clustered into a single factor.

To conduct factor analysis, the researcher first performed Principal Component Analysis (PCA), a statistical technique that applies an orthogonal transformation to convert a set of potentially correlated variables into a set of linearly uncorrelated variables known as principal components. Following this, Varimax rotation was applied to enhance interpretability (Sekaran & Bougie, 2019). In the principal component extraction and Varimax rotation process, the number of factors was set to four to align with the proposed research framework.

To validate whether the measurement items accurately reflect the intended constructs, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity were applied. The KMO assesses the adequacy of the sample for factor analysis, with values closer to 1 indicating stronger suitability, while Bartlett's Test examines whether the correlation matrix significantly differs from an identity matrix, thereby indicating sufficient correlations among variables (Bartlett, 1954; Kaiser, 1974). In this study, a KMO value of at least 0.6 and a Bartlett's Test significance level below 0.05 were used as benchmarks. All independent variables were tested collectively, while the dependent variable was assessed individually. Tables 2 and 3 present the results of the factor analysis for both the independent and dependent variables.

In Table 2, the factor loading scores for all measurement items exceed 0.4, meeting the minimum cut-off value recommended by Hair et al. (2014), except for Transparency 6 (T6), which was subsequently removed. Hair et al. (2014) advise using a 0.4 cut-off value, provided the average variance extracted (AVE) is greater than 0.5. Only the highest factor loading scores were reported. In addition, Transparency 5 (T5) was removed because it loaded into a different cluster, thereby disrupting the Varimax rotation process. Regarding the KMO and Bartlett's Test of Sphericity, the factor analysis of independent variables yielded a KMO score of 0.840, which is above the acceptable cut-off of 0.6 (Kaiser, 1974). Bartlett's Test result was below 0.05, indicating that the data were appropriate for factor analysis (Bartlett, 1954).

As shown in Table 3, the factor loading scores for all measurement items for the dependent variable also exceeded 0.4, satisfying the minimum threshold recommended by Hair et al.

(2014). The KMO value was 0.718, which is above the acceptable threshold of 0.6 (Kaiser, 1974). Additionally, Bartlett's Test result was below 0.05, further confirming the data's suitability for factor analysis (Bartlett, 1954).

Table 2: Factor Analysis for All Independent Variables

Item	Component			
	1	2	3	4
Dialogue 1 (D1)			0.732	
Dialogue 2 (D2)			0.766	
Dialogue 3 (D3)			0.727	
Dialogue 4 (D4)			0.496	
Dialogue 5 (D5)			0.546	
Dialogue 6 (D6)			0.623	
Access 1 (A1)	0.505			
Access 2 (A2)	0.739			
Access 3 (A3)	0.783			
Access 4 (A4)	0.752			
Access 5 (A5)	0.756			
Access 6 (A6)	0.507			
Access 7 (A7)	0.512			
Risk Assessment 1 (R1)				0.740
Risk Assessment 2 (R2)				0.742
Risk Assessment 3 (R3)				0.646
Risk Assessment 4 (R4)				0.468
Risk Assessment 5 (R5)				0.579
Transparency 1 (T1)		0.401		
Transparency 2 (T2)		0.781		
Transparency 3 (T3)		0.801		
Transparency 4 (T4)		0.838		
Transparency 5 (T5) - deleted	0.414			
Transparency 6 (T6) – deleted	0.391			
Transparency 7 (T7)		0.413		
Transparency 8 (T8)		0.482		
KMO				0.840
Barlett's Test of Sphericity				<0.05

Note: Item T5 and T6 were deleted due to the wrong Varimax rotation process and low factor loading value respectively.
Source: self-made

Table 3: Factor Analysis for Dependent Variable

Item	Component
Customer Satisfaction 1 (CS1)	0.898
Customer Satisfaction 2 (CS2)	0.872
Customer Satisfaction 3 (CS3)	0.851
KMO	**0.718**
Barlett's Test of Sphericity	<0.05

Source: self-made

Based on the result from the factor analysis (see Table 2 and 3), both T5 and T6 were deleted in this study. Table 4 shows the summary of all independent variables, namely Dialogue (D), Access (A), Risk Assessment (R), Transparency (T) and dependent variable namely Customer Satisfaction (CS) and their items were retained.

Table 4 Summary of Independent and Dependent Variables

Independent Variables	Item Retained
Dialogue (D)	D1, D2, D3, D4, D5, D6
Access (A)	A1, A2, A3, A4, A5, A6, A7
Risk Assessment (R)	R1, R2, R3, R4, R5
Transparency (T)	T1, T2, T3, T4, T7, T8
Dependent Variables	**Item Retained**
Customer Satisfaction (CS)	CS1, CS2, CS3

Note: Item T5 and T6 were deleted due to the wrong Varimax rotation process and low loading value respectively.
Source: self-made

Reliability Analysis

In reliability analysis, assessing Cronbach's Alpha value is applied. According to Kline (1999), the Cronbach's Alpha value of all the variables must meet the minimum acceptable limit of 0.7. Based on the reliability test result in Table 5, all the significant variables have Cronbach's Alpha above the cut-off value of 0.7. Hence, the items retained for each of the variables proceed for multiple regression analysis in the next section.

Table 5 Summary of the Reliability Analysis for the Major Variables

Variable	Number of Items	Number of Items Dropped	Number of Items Shifted	Cronbach's Alpha
Dialogue (D)	6	0	0	0.819
Access (A)	7	0	0	0.863
Risk Assessment (R)	5	0	0	0.746
Transparency (T)	6	2	0	0.818
Customer Satisfaction (CS)	3	0	0	0.844

Source: self-made

Multiple Regression Analysis (MRA)

Multiple regression analysis was conducted to test the proposed hypotheses outlined in the earlier section. One regression model was developed to examine the relationship between the dependent and independent variables. As discussed previously, four hypotheses were proposed in this study. Based on the results presented in Table 6, 42.5% ($R^2 = 0.425$) of the variation in Customer Satisfaction (CS) is explained by the four independent variables: Dialogue (D), Access (A), Risk Assessment (R), and Transparency (T). This indicates a weak model fit. According to Hair et al. (2017), a Variance Inflation Factor (VIF) value below 3.33 suggests

that multicollinearity is not a significant concern. In this study, all VIF values were below 3.33, indicating that multicollinearity is not a serious issue.

Regarding the regression results, Dialogue (D) has a beta value of 0.233 and a t-value of 3.197, indicating a significant relationship with Customer Satisfaction (CS). Therefore, Hypothesis 1 is accepted. Similarly, Access (A) has a beta value of 0.176 and a t-value of 2.579, showing a positive and significant relationship with Customer Satisfaction at the 5% significance level, thus supporting Hypothesis 2. Risk Assessment (R) demonstrates a beta value of 0.309 and a t-value of 4.548, indicating a significant relationship at the 1% significance level; hence, Hypothesis 3 is supported. Lastly, Transparency (T) has a beta value of 0.195 and a t-value of 2.586, also indicating a positive and significant relationship with Customer Satisfaction. Therefore, Hypothesis 4 is supported as well.

Table 6 Result of Multiple Regression Analysis

Independent Variables	Dependent Variable – Customer Satisfaction (CS)		VIF Value
	Beta	t-value/p-value	
Dialogue (D)	0.233	3.197***	1.668
Access (A)	0.176	2.579**	1.770
Risk Assessment (R)	0.309	4.548***	1.258
Transparency (T)	0.195	2.586***	1.664
R square		0.425	
R square change		0.421	

Note: *p<0.1, **p<0.05, ***p<0.01
Source: self-made

Findings and Implication

In this study, Hypothesis H1 is supported, indicating that dialogue positively influences customer satisfaction in e-hailing services. This result aligns with the findings of Jenal et al. (2021), who stated that the implementation of dialogue in the DART model within e-hailing services improved customer satisfaction. It is also consistent with Idros et al. (2020), who noted that dialogue in the DART model, also known as the value co-creation model, has a significant impact on customer satisfaction. Furthermore, it supports the findings of Elias et al. (2021), who confirmed a significant relationship between dialogue and customer satisfaction in e-hailing services.

To facilitate communication between users and e-hailing firms, companies should ensure that dialogue is always accessible by offering various communication methods. For example, implementing an Automated Virtual Assistant (AVA) to handle common customer enquiries can improve the efficiency of customer service. Additionally, a simple feedback and rating system should be incorporated, enabling users to easily provide input to the company. Multiple communication channels such as live chat, email, and phone support should also be made available to accommodate different user preferences. Moreover, e-hailing companies should invest in training frontline staff in empathetic communication skills to improve dialogue quality. Clear, respectful, and responsive interactions foster trust and create a more personalised user experience. When users feel heard and understood, their satisfaction levels

increase, leading to higher user retention and more favourable word-of-mouth recommendations. This human-centric approach, combined with digital tools, can enhance the quality of engagement and strengthen long-term customer relationships.

Following that, H2 is also accepted, indicating that access has a positive relationship with customer satisfaction in e-hailing services. This finding aligns with Jenal et al. (2021), who reported that the implementation of access in the DART model improved customer satisfaction in e-hailing services. Similarly, Idros et al. (2020) highlighted that access within the DART model has a significant influence on customer satisfaction, while Elias et al. (2021) also confirmed a strong relationship between access and customer satisfaction in the e-hailing context.

E-hailing firms should ensure that access is consistently available by providing comprehensive and user-friendly information facilities within their platforms. This includes clear navigation, accessible fare estimates, driver details, and real-time tracking. In addition, companies should employ skilled and professional technical staff to promptly address and resolve system malfunctions to avoid disruptions that could negatively affect the user experience. Another implication is the importance of designing mobile apps and websites that are inclusive and accessible to all users, including those with disabilities or limited digital literacy. This may involve features such as multilingual support, larger fonts, voice commands, or simplified user interfaces. Improving digital accessibility not only increases user satisfaction but also broadens the customer base by including previously underserved populations.

Next, H3 is supported, indicating that risk assessment positively influences customer satisfaction in e-hailing services. This finding aligns with Jenal et al. (2021), who stated that the implementation of risk assessment in e-hailing services contributed to improved customer satisfaction. It also corresponds with the findings of Idros et al. (2020) and Elias et al. (2021), who both confirmed a significant relationship between risk assessment and customer satisfaction in the context of e-hailing services.

E-hailing companies must ensure that users are aware of potential risks or consequences associated with using the service. For instance, companies can clearly outline all potential risks in the ‘Terms & Conditions’ section for users to review before proceeding. Additionally, firms should implement proactive strategies such as conducting regular system maintenance and updates to minimise the risk of technical failures, thereby reinforcing user trust and confidence in the platform. Another important implication is the implementation of visible safety measures, such as emergency contact features, ride-sharing with real-time tracking, and verified driver profiles. These tools not only reduce perceived risk but also enhance users’ sense of security during the ride. When customers feel protected, their overall satisfaction with the service increases, leading to greater trust and loyalty.

Finally, H4 is supported, indicating that transparency has a positive impact on customer satisfaction in e-hailing services. This finding is consistent with the study by Jenal et al. (2021), which highlighted that greater transparency in e-hailing services enhances customer satisfaction. Similarly, the results are in line with Idros et al. (2020) and Elias et al. (2021), who both confirmed a significant relationship between transparency and customer satisfaction in the context of e-hailing.

The positive relationship between transparency and customer satisfaction suggests that e-hailing service providers should integrate transparency as a core component of their service strategy. By clearly displaying fare calculations, providing real-time ride tracking, and sharing detailed driver profiles, companies can build customer trust and reduce perceived risks. This increased clarity helps users feel more secure and informed, leading to higher satisfaction levels. When customers feel that the service is honest and open, they are more likely to remain loyal and recommend the platform to others. Therefore, transparency can serve as a competitive advantage in a crowded e-hailing market. The strong association between transparency and customer satisfaction also highlights the need for regulatory bodies and industry stakeholders to develop formal guidelines and standards promoting transparency in e-hailing services. These could include mandatory disclosures on fare structures, safety protocols, and complaint resolution mechanisms. Establishing such standards would not only protect consumer interests but also create a level playing field for service providers. Clear, enforceable policies can ensure that all platforms operate with accountability and customer-focused practices. Ultimately, these efforts would strengthen public confidence in e-hailing services and support the sustainable growth of the industry.

Recommendation and Conclusion

Based on the limitations faced in this study, three key recommendations are proposed for future research. Firstly, researchers are encouraged to extend the data collection period beyond three months. A longer duration would allow for broader outreach and engagement, resulting in a larger and more diverse sample size. This would, in turn, enhance the accuracy and generalisability of the research findings. Secondly, future researchers should consider seeking sponsorship, particularly from relevant industry players such as e-hailing companies like Grab. With sponsorship, more resources can be allocated for logistics, outreach, and possibly incentives for respondents. In return, sponsors can gain valuable insights from the findings to improve their services. Lastly, to address the issue of non-responsiveness due to unfamiliarity with digital forms, it is recommended to prepare a short tutorial video. This video should demonstrate how to access, navigate, and complete the questionnaire using platforms such as Google Forms. Sending the video along with the questionnaire link may increase participation rates, especially among less tech-savvy respondents. Collectively, these strategies aim to improve data quality, enhance participation, and promote industry-research collaboration in future studies on e-hailing services.

The purpose of this study is to determine the factors affecting the customer satisfaction in e-hailing service. The underlying theory used for this study is the DART model. Online surveys are used for data collection in this research. Online surveys are employed in this study since they can improve productivity and save time. The information gathered through online surveys is immediately accessible and is simply transferable to software for data analysis. A Google Form is used to generate an online survey, and the link is delivered to responders via social media channels including WhatsApp, Instagram, and Messenger. By determining the customer satisfaction, ehailing companies can also locate areas for improvement. In this regard, this study can serve as a resource for e-hailing companies in order to keep up with the growth of the transport sector in Malaysia.

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FROM STRESS TO STRENGTH: A CONCEPTUAL FRAMEWORK FOR BUILDING LECTURER RESILIENCE AGAINST BURNOUT AND PROMOTING WELL-BEING

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Abstract: *The growing prevalence of burnout among lecturers in higher education institutions has raised urgent concerns about staff well-being, professional sustainability, and institutional performance. This conceptual paper proposes a comprehensive framework for fostering lecturer resilience by integrating psychological, institutional, and professional dimensions. Drawing on recent literature (2020–2025), the framework highlights the interplay between emotional intelligence, mindfulness, stress management, institutional culture, mentorship, workload clarity, and reflective practices. It emphasises that resilience is not an isolated trait but a dynamic construct shaped by supportive environments, self-care routines, and professional development opportunities. The paper further outlines the role of higher education institutions in embedding mental health policies, promoting flexible work arrangements, and fostering inclusive organisational cultures. Through a mixed-methods lens, it also suggests strategies for evaluating and refining the framework. By shifting from reactive stress management to proactive resilience-building, this paper offers a timely guide for educational leaders seeking to enhance lecturer well-being and career longevity in a rapidly evolving academic landscape.*

Keywords: *Lecturer Resilience, Burnout Prevention, Higher Education Well-being, Institutional Support Strategies*

Introduction

In recent years, stress and burnout among academics have increased, raising serious concerns in higher education. Heavy teaching loads, administrative duties, research pressures, and the effects of post-pandemic academic life have all contributed to higher stress levels among lecturers. Burnout symptoms—such as emotional exhaustion, reduced personal achievement, and depersonalisation—negatively impact lecturers' performance and mental health (Gao, 2023). Research highlights a strong link between academic stress and poor mental well-being in both students and academic staff. Barbayannis et al. (2022) found that academic stress significantly affects students' psychological health, especially during and after the COVID-19 pandemic. These pressures also affect lecturers, who must meet high expectations

in demanding work environments. Certain groups, such as women and non-binary individuals, are more vulnerable, emphasising the need for targeted support. Lecturers' mental well-being directly affects teaching quality, student engagement, and institutional success. Ghafar (2024) found that lecturers with better psychological health demonstrate greater teaching effectiveness, autonomy, and positive interactions with students. Supporting lecturer well-being is therefore not just a personal matter, but a key institutional goal. This paper proposes a conceptual framework to strengthen lecturers' resilience against stress and burnout. It explores key factors that support well-being, aiming to improve mental health, professional performance, and long-term career growth. The framework is theory-based and designed to guide policies and development programmes that promote the mental health of academic staff.

Literature Review

Understanding Burnout in Academia

Burnout among lecturers is a growing concern in academia, commonly conceptualised through the Maslach Burnout Inventory (MBI), which includes emotional exhaustion, depersonalisation, and reduced personal achievement (Pozo-Rico et al., 2023), and the Job Demands-Resources (JD-R) Model, which highlights the imbalance between high demands and insufficient resources (Cao et al., 2024; Pozo-Rico et al., 2023). Burnout manifests in chronic fatigue, irritability, detachment from work, and diminished job satisfaction (Kovalkova & Malkova, 2021), with key causes including excessive workload (Hammoudi Halat et al., 2023), lack of social and institutional support (Cao et al., 2024), and emotional exhaustion (Kovalkova & Malkova, 2021).

Lecturer resilience, essential for maintaining professional effectiveness and psychological health, is shaped by personal factors like emotional intelligence and self-efficacy, and contextual elements such as collegial support and institutional resources (Crompton et al., 2023; Hascher et al., 2021). Resilience is not static but develops through dynamic interactions between individual and environmental factors (Hascher, Beltman & Mansfield, 2021), and can be fostered through interventions such as peer networks and professional development (Crompton et al., 2023). Models like the Social Ecological Technology Integration (SETI) framework provide a multi-layered view of resilience.

Additionally, Ryff's Six Factor Model of Psychological Well-Being—comprising self-acceptance, autonomy, personal growth, purpose in life, environmental mastery, and positive relationships—provides a valuable lens to understand how lecturers can maintain life satisfaction and career balance (Ryff & Singer, 2008; Shahzadi et al., 2022). Supportive relationships and flexibility in work arrangements further enhance resilience by promoting autonomy and reducing conflict between personal and professional roles (Piñeiro-Cossio et al., 2023; Shahzadi et al., 2022). Overall, fostering resilience in academia requires a systemic approach that integrates both individual competencies and supportive institutional environments.

The Conceptual Framework for Building Lecturer Resilience

Emotional intelligence, defined as the ability to understand and manage emotions, is essential for lecturers to navigate academic demands effectively. Those with high emotional intelligence handle conflicts better, engage more meaningfully with students, and manage stress with

greater composure (Trigueros et al., 2020; Stracke & Machado, 2022). Mindfulness complements emotional intelligence by offering simple yet powerful practices—like breathing exercises or journaling—that enhance emotional regulation. Studies show mindfulness reduces stress and burnout while boosting well-being (de Bruin et al., 2021; Yusoff et al., 2020). Stress management techniques such as cognitive restructuring also help lecturers adopt healthier mindsets (Le Blanc et al., 2020), while attending workshops has been linked to improved satisfaction and reduced stress-related health issues (Stanojevic & Vukovic, 2022). Additionally, mentorship and peer support provide crucial emotional and professional backing, especially for early-career lecturers. Mentors guide and normalise academic challenges (Lindsay et al., 2020), and peer networks reduce isolation and promote resilience, particularly during crises like the COVID-19 pandemic (Anderson & Lu, 2022).

Institutional culture and support are equally critical. Supportive environments that value collaboration, inclusivity, and shared leadership strengthen both individual and organisational resilience (Tang & Ferguson, 2021; Johnson et al., 2021). Institutions that foster fair treatment and align with lecturers' values lower burnout rates and promote job satisfaction (Maslach & Leiter, 2021; Roxå et al., 2021). Clarifying workload and promoting autonomy further help reduce emotional strain (Hall et al., 2020), while practical supports like wellness initiatives and flexible work arrangements buffer against psychological distress (Babic et al., 2022; Makhbul & Alip, 2021; Zhou & Yuen, 2022). Personal practices such as self-care, mindfulness, and reflection enhance emotional balance and professional identity (Pereira et al., 2020; van der Rijst et al., 2020). Moreover, opportunities for recognition and continuous learning significantly boost motivation and connectedness (Bostancı & Erdem, 2021; Hiltunen et al., 2022). Ultimately, lecturer resilience is shaped by a dynamic interplay of emotional competencies, reflective habits, institutional culture, and community-based support systems.

Implications of the Framework for Higher Education Institutions

Universities and colleges have a responsibility that extends well beyond teaching and research—they also play a crucial role in supporting the mental and emotional well-being of their staff. The academic world often brings high-pressure conditions: tight deadlines, mounting research demands, administrative responsibilities, and, for many, the uncertainty of job security. When left unaddressed, these stressors can accumulate and lead to burnout. As Kinman and Wray (2021) argue, higher education institutions (HEIs) must take a more systemic approach—moving past isolated interventions and embedding mental health support into the very fabric of institutional culture. This means establishing clear mental health policies, ensuring accessible psychological services, and cultivating an environment where reaching out for help is welcomed—not judged. Institutions that invest in proactive strategies—such as mental health first aid training, regular well-being check-ins by managers, and mental health leave policies—create stronger, more resilient academic communities. These measures become even more critical during times of upheaval, such as the COVID-19 pandemic, which exposed and intensified existing vulnerabilities among staff.

A cornerstone of well-being in academia is thoughtful workload management. Many lecturers experience stress from unclear role expectations, excessive multitasking, and a general lack of boundaries between job responsibilities. Tham et al. (2021) found that HEIs with transparent workload models, fair task distribution, and regular performance reviews saw greater staff satisfaction and significantly lower burnout rates. Simple institutional norms—such as limiting

after-hours emails and trimming down unnecessary meetings—go a long way in creating a healthier work-life rhythm. Support also means ensuring that job roles are realistically aligned with resources. This includes sufficient administrative assistance, protected time for research, and ongoing reviews to assess whether expectations are sustainable. Equally important is fostering a culture where everyone feels respected, included, and valued. When leadership actively promotes diversity, equity, and fairness, staff are more likely to feel a sense of belonging and commitment. Gale et al. (2021) underscore how inclusive environments strongly correlate with trust in leadership and overall morale. Beyond policies, day-to-day experiences shape how staff perceive their workplaces. Opportunities for professional development, access to mentoring, and recognition of achievements help lecturers grow and feel appreciated. Even the physical campus has a role—comfortable workspaces, access to green areas, and wellness facilities contribute to better mental and physical health. Some universities are going even further by embedding wellness into strategic planning. Bashir and Gani (2022) highlight institutions that take a holistic approach—integrating physical, emotional, social, and environmental well-being—often report more sustainable, engaged workforces. One of the biggest contributors to burnout remains chronic overwork, especially when professional boundaries are unclear. Lecturers frequently juggle teaching, supervision, research, and admin, often with little clarity or balance. Tham et al. (2021) found that clear workload allocation frameworks—with transparent criteria and regular reviews—can prevent this overload. Simple steps like protecting time for research, rotating committee duties, and discouraging late-night communication can meaningfully reduce staff stress.

At the same time, access to mental health services must be more than a box-ticking exercise. Offering professional counselling, peer support systems, and mental health awareness training creates a culture of care. Importantly, institutions must take active steps to reduce stigma. As Kinman and Wray (2021) point out, staff who perceive genuine mental health support from their organisation are more likely to remain engaged and resilient. Embedding well-being into everyday practice—not just policy—is the way forward. Regular wellness campaigns, built-in support mechanisms, and a leadership culture that values well-being are essential for creating lasting change. The shift to remote work during the pandemic demonstrated that flexibility isn't just feasible—it's beneficial. Flexible work arrangements helped staff take control of their time, reduce commute stress, and better manage personal commitments. Zhou and Yuen (2022) found that such flexibility significantly reduced burnout during remote teaching. Moving forward, universities that retain elements of flexible scheduling—remote options, asynchronous teaching, and research autonomy—are more likely to attract and retain satisfied, balanced staff.

Leadership, of course, is critical. The best policies mean little without leaders who model and promote healthy behaviour. Leaders need to be visible champions of well-being, advocate realistic expectations, and practice transparency—especially during times of change. Gale et al. (2021) suggest that empathetic and inclusive leadership plays a protective role against burnout. Training leaders in emotional intelligence, supportive supervision, and fair workload planning can amplify this positive influence. Professional development (PD) is another valuable channel for building resilience. Integrating emotional intelligence (EI) and mindfulness into PD gives staff concrete tools to manage stress and strengthen interpersonal relationships. Trigueros et al. (2020) found a strong link between high EI and greater academic resilience, while de Bruin et al. (2021) showed that mindfulness training helped staff better regulate emotions and maintain well-being. Institutions can offer workshops, retreats, or online

modules to embed these strategies in everyday academic life. Peer learning environments also help foster resilience. When lecturers come together to share experiences, reflect on challenges, and problem-solve collaboratively, they develop a stronger emotional foundation. Hiltunen et al. (2022) found that professional learning communities built around shared reflection not only increased job satisfaction but also created a more emotionally supportive workplace. Facilitated discussions, reflective case reviews, and regular group debriefs can all be built into PD calendars. Importantly, resilience should not be framed as a reaction to crisis, but as a long-term professional competency. PD programmes should tackle practical topics—boundary-setting, workload prioritisation, and managing change. Bostancı and Erdem (2021) emphasise that staff morale improves when development is tied to both career growth and personal well-being. When resilience is seen as part of leadership development, participation and impact improve. Flexible delivery formats are key. Self-paced courses, recorded webinars, and online resources allow staff to engage when it works best for them. Anderson and Lu (2022) showed that virtual peer networks were a lifeline during the pandemic, helping staff sustain emotional strength. Institutions can build on this by offering digital spaces for dialogue, wellness tracking, and virtual check-ins.

To validate and strengthen a resilience framework, researchers need a comprehensive, mixed-method approach. Quantitative tools like the Connor-Davidson Resilience Scale (CD-RISC) or Brief Resilience Scale (BRS) can measure constructs such as EI, self-care, and institutional support (Nguyen et al., 2021). Using statistical models such as Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SEM) allows for the testing of theoretical relationships and the refinement of frameworks (Streiner, 2020). Initial insights can come from cross-sectional surveys, while longitudinal studies provide a deeper understanding of how resilience develops over time and in response to change. Qualitative methods—interviews, focus groups, reflective journals—add essential context. They reveal how staff experience resilience day-to-day and how institutional culture shapes that experience. Braun and Clarke's (2021) thematic analysis or grounded theory approaches can surface insights that lead to framework adjustments. Case studies further illuminate how specific universities implement and sustain resilience-building strategies. Blending both quantitative and qualitative approaches allows for a richer, more actionable evaluation. For example, a sequential explanatory design can begin with surveys and follow up with interviews, while a concurrent design collects both types of data at once. Dewaele et al. (2021) advocate for this approach, noting that mixed methods are ideal for capturing the full complexity of resilience in education.

Ultimately, creating and evaluating a resilience framework in higher education requires more than theory. It needs thoughtful design, grounded in evidence and shaped by the voices of those it's meant to support. When institutions combine clear policies, proactive leadership, flexible working, and authentic dialogue, they create environments where staff not only cope—but thrive.

Strengths and Limitations of the Framework

The proposed conceptual framework is comprehensive and integrative, capturing the multifaceted nature of resilience in academic settings. It thoughtfully combines individual-level strategies (e.g., emotional intelligence, mindfulness, self-care) with systemic and institutional components (e.g., organisational culture, mentorship, workload management). This dual emphasis makes the framework highly applicable across varying institutional

contexts and academic disciplines. One of its key strengths lies in its adaptability. The framework is not prescriptive but allows for contextual customisation, making it relevant to both research-intensive universities and teaching-focused institutions. Furthermore, the inclusion of contemporary theories and recent empirical findings (2020–2025) enhances its theoretical robustness and real-world applicability. Additionally, the framework bridges the gap between theory and practice by offering actionable recommendations for institutions, such as integrating resilience training into professional development and embedding mental health policies into organisational culture.

Despite its strengths, the framework faces several limitations. First, its successful implementation relies heavily on institutional commitment and leadership support. In resource-constrained or rigidly hierarchical environments, some components—such as flexible work arrangements or reflective practices—may be challenging to operationalise. Second, while the framework acknowledges cultural differences, its core elements are largely based on Western psychological models of resilience and well-being. The applicability of such models may vary across cultures, particularly in collectivist or high-context academic settings, where institutional dynamics and personal coping strategies differ significantly. Lastly, the framework assumes a certain level of individual agency among lecturers to initiate self-care and reflection. However, systemic constraints such as job insecurity, excessive workloads, and lack of autonomy may limit an individual's capacity to engage with these strategies effectively.

Future Research Directions

To further validate and refine this conceptual framework, future research should adopt a mixed-methods approach. Longitudinal studies are especially needed to track how resilience-building interventions influence burnout levels, job satisfaction, and lecturer retention over time. Such studies can help establish causal relationships between specific components of the framework and well-being outcomes. Cross-cultural investigations would also provide valuable insights into how different academic environments influence the uptake and impact of resilience strategies. Comparative studies between institutions in different countries or regions can help determine the cultural adaptability of the framework and identify best practices in various contexts. Moreover, future research could explore the role of digital technologies—such as virtual peer support networks or AI-based mental health tools—in enhancing lecturer resilience. Investigating how these tools can be integrated into existing professional development and institutional support systems may offer new pathways for scalable and accessible interventions. Finally, empirical evaluation of institutional policy shifts (e.g., reduced teaching loads, flexible schedules) as resilience-promoting strategies could shed light on structural levers for systemic change.

Proposed Conceptual Framework

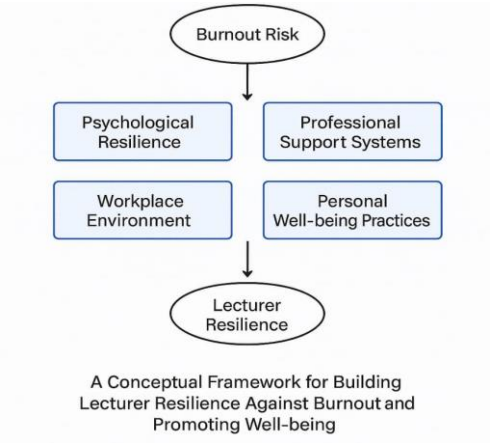


Figure 1: Proposed Conceptual Framework by the researchers

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THE ROLE OF AI AND ADAPTIVE LEARNING SYSTEMS IN SUPPORTING ZPD IN DIGITAL EDUCATION

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Abstract: This conceptual paper explores the intersection of Vygotsky's Zone of Proximal Development (ZPD), Artificial Intelligence (AI), and adaptive learning systems within the context of digital education. With AI-driven platforms and adaptive technologies reshaping the learning experience, the paper examines how these tools can serve as digital scaffolds, dynamically adjusting instructional content and strategies to align with learners' cognitive readiness. The paper underscores the role of AI in mediating personalised support, fostering learner autonomy, and facilitating real-time feedback to ensure students remain within their ZPD for optimal development. Examples of intelligent tutoring systems and adaptive platforms, such as Carnegie Learning and DreamBox, demonstrate the practical application of these concepts. Despite the promising potential, the paper also addresses critical challenges, including equity and access, teacher readiness, ethical concerns around data use, and risks of cognitive overload. The discussion concludes with a call for intentional design, teacher professional development, and policy considerations to maximise the benefits of AI-supported ZPD in education while mitigating its limitations.

Keywords: *Zone of Proximal Development, Artificial Intelligence, Adaptive Learning Systems, Scaffolding, Digital Education*

Introduction

The educational landscape is rapidly evolving, with digital technologies becoming increasingly central to how learning occurs. One of the most significant changes is the integration of Artificial Intelligence (AI) and adaptive learning systems, which offer personalized learning experiences that adapt to students' needs and readiness levels. At the core of effective learning is the concept of the Zone of Proximal Development (ZPD), introduced by Vygotsky in his Sociocultural Theory (McLeod, 2024). ZPD represents the

gap between what a learner can do independently and what they can achieve with guidance. This support, known as "scaffolding," typically comes from a teacher, peer, or, in modern settings, digital tools. Traditionally, ZPD has been applied in face-to-face classrooms, where teachers provide real-time, tailored support. With the rise of AI and adaptive learning technologies, this dynamic has expanded, allowing for personalized and scalable scaffolding that supports students' cognitive growth in digital environments (Vorobyeva et al, 2025). This paper aims to explore how AI and adaptive learning systems can support the ZPD in digital education environments. By integrating these technologies, educators have new opportunities to tailor the learning experience to the unique needs of each student, ensuring that learners are constantly working within their ZPD for optimal development. The use of AI-driven systems offers not only immediate feedback and individualized content delivery but also the potential for real-time adjustments based on learner performance and progress. Through this lens, the role of AI and adaptive learning systems becomes crucial in fostering environments that support learners' growth through the scaffolding of their cognitive development (Akavova et al, 2023).

Literature Review

Vygotsky's ZPD in the Context of Modern Education

The Zone of Proximal Development (ZPD), introduced by Lev Vygotsky, refers to the space between what a learner can do on their own and what they can achieve with help. Vygotsky believed that learners can reach higher levels of understanding with support from more knowledgeable individuals, like teachers, peers, or even technology (Sætra, 2025). This support, called scaffolding, helps learners to complete tasks they can't do alone. As they improve, the support is gradually reduced, fostering independence and growth. In traditional classrooms, teachers provide scaffolding by identifying each student's level of understanding and offering just the right amount of help to challenge them (Grájeda et al. 2024). This approach ensures that students are working just beyond their current abilities. As education moves toward more student-centered learning, personalizing instruction within the ZPD becomes key to improving learning outcomes. With the rise of digital education, ZPD can be applied in virtual and hybrid classrooms through AI and adaptive learning systems (Maulidiya, et al. 2024). These technologies can personalize learning by adjusting the difficulty, offering real-time feedback, and even predicting future learning needs based on student progress—aligning perfectly with the principles of ZPD.

Introduction to AI and Adaptive Learning Systems

Artificial Intelligence (AI) in education refers to the use of intelligent systems that simulate human cognition, enabling machines to perform tasks that would typically require human intervention (Sadiku et al., 2021). AI technologies, such as natural language processing, machine learning, and deep learning, allow for the automation of personalized learning experiences. AI-driven tools can track student progress, identify learning gaps, and offer immediate feedback, ensuring that learning experiences are continuously adjusted based on students' evolving needs (Kaledio et al., 2024; Madhu et al., 2024).

Adaptive learning systems are educational technologies designed to tailor content, assessments, and instructional strategies to the unique needs of each learner (Gupta, 2024; Capuano & Caballé, 2020). These systems use algorithms and data analytics to monitor students' progress

in real-time, making adjustments to the learning experience based on performance. Adaptive learning systems can offer personalized learning paths, ensuring that content is appropriately challenging, thus keeping students within their ZPD (Er-Radi et al., 2023). For example, an adaptive system may provide easier tasks when a learner struggles and present more complex tasks when the learner demonstrates mastery, thus promoting optimal learning conditions.

Intersection of ZPD, AI, and Adaptive Learning

The intersection of ZPD, AI, and adaptive learning systems offers a powerful conceptual framework for enhancing digital education. AI and adaptive systems bring the principles of ZPD to life in the digital realm by providing personalized scaffolding that continuously adapts to the learner's current capabilities. Just as traditional ZPD-based scaffolding requires teachers to assess students' readiness for new challenges (Priyo & Teguh, 2021), AI and adaptive learning systems assess learner performance in real-time, dynamically adjusting content to ensure learners stay within their ZPD (Gupta, 2024; Akavova et al., 2023).
AI-driven tools can provide ongoing support and challenge through mechanisms such as:

- Personalized learning paths: AI algorithms assess learner progress and adjust the difficulty level accordingly, ensuring that tasks are neither too easy nor too difficult (Gupta, 2024; Joshi, 2023).
- Real-time feedback: Unlike traditional classroom settings, where feedback may be delayed, AI-powered tools provide instant feedback, enabling students to immediately understand their mistakes and correct them (Jegede, 2024).
- Continuous monitoring and data analytics: AI systems track learner progress, identifying areas where additional scaffolding may be necessary and ensuring that the learner remains within their ZPD (Warden & Chen, 2020).

The Role of AI In Supporting ZPD

One of the most significant benefits of AI in education is its ability to personalize the learning experience for each student. Personalization refers to the customization of content, pacing, and learning strategies to meet the individual needs of learners (Ayeni, et.al 2024). In traditional classrooms, this personalization is often limited due to time constraints and the difficulty of tailoring instruction to each student's ZPD. AI-powered systems, however, can dynamically adapt to learners' progress, providing a tailored educational experience that keeps students engaged and challenged within their ZPD. AI can personalize learning paths based on various data inputs such as student performance, preferences, and learning styles(Yamijala et al., 2023). By analyzing data from students' interactions with learning materials, AI systems can identify when a student is ready for more challenging tasks or when additional support is needed. This personalization ensures that students consistently work within their ZPD, facing tasks that are neither too easy nor too difficult, thus optimizing their learning potential. For example, an AI-powered tutoring system may provide a learner with additional practice on a concept that they struggle with, while also offering more advanced material when the learner shows readiness.
AI plays a crucial role in mediating scaffolding in digital education. Scaffolding, a core element of ZPD, involves providing support to learners in a way that enables them to perform tasks they could not do independently. AI can mediate this scaffolding by offering timely feedback, hints, and prompts that help learners progress through tasks without overwhelming them (Umutlu & Gursoy, 2022).

AI-powered systems can monitor a student's performance in real-time and provide scaffolded support at just the right moment. For instance, if a student is struggling with a particular concept, the system may provide additional explanations, hints, or prompts to guide the learner toward the correct answer. As the learner demonstrates mastery, the system gradually reduces the level of support, allowing the learner to gain independence. This dynamic and continuous support mirrors the concept of dynamic scaffolding, which emphasizes the need for educators or systems to adjust the level of assistance based on the learner's evolving abilities (Janson, Söllner, & Leimeister, 2020). Moreover, Looi and Jia (2025) stated that AI tutors can simulate real-time interaction and serve as a form of "more knowledgeable other" within the digital context. These intelligent systems can model cognitive strategies, explain complex concepts, and give students the opportunity to practice in a low-risk environment. This type of AI support within the ZPD helps bridge the gap between what learners can do independently and what they can achieve with guidance.

A key aspect of the ZPD is the gradual transfer of responsibility from the teacher or more knowledgeable to the learner. The goal is to promote learner autonomy, where students are able to apply the skills they have acquired through scaffolding independently. AI systems are uniquely positioned to foster this autonomy by providing learners with continuous, personalized feedback and the opportunity to engage in self-directed learning (Mohebbi, 2024). AI-powered tools encourage learners to take charge of their learning process by giving them the tools to track their own progress, set learning goals, and engage with materials at their own pace (Huang, Lu, & Yang, 2023). Adaptive learning systems, for example, provide learners with opportunities to make choices about the content they engage with, allowing them to follow their own learning path while still being supported within their ZPD. This fosters a sense of ownership over the learning process, empowering students to actively participate in their cognitive development. Additionally, Mohebbi (2024) mentioned that AI systems can promote autonomy by helping learners build metacognitive skills, which are essential for self-regulation. Through continuous interaction with AI-powered platforms, students can develop strategies for managing their learning, such as setting goals, reflecting on their progress, and adjusting their approach to tasks. This aligns with the ultimate goal of ZPD, which is to move learners toward independence while ensuring they are constantly challenged and supported within their zone.

Several examples illustrate how AI supports learners' ZPD through personalized scaffolding and autonomy promotion:

i. Intelligent Tutoring Systems (ITS): Systems like Carnegie Learning and DreamBox use AI to provide personalized math tutoring. These systems track a student's progress in real-time, adapt the difficulty level of tasks, and offer targeted interventions when the learner is struggling. The AI adjusts the pace of learning, ensuring that students work within their ZPD and receive the appropriate amount of support at each stage (Rajput, 2025).

ii. AI-Powered Writing Assistants: Radin, Mustapha, and Adam (2024) indicate that tools such as Grammarly and Quillbot help learners improve their writing skills by providing real-time feedback on grammar, sentence structure, and clarity. These tools scaffold learning by offering suggestions and explanations, helping students refine their writing skills within their ZPD. As students demonstrate mastery, the system offers more advanced feedback to encourage further growth.

iii. Language Learning Platforms: AI-driven platforms like Duolingo use adaptive learning algorithms to tailor language lessons based on a learner's proficiency. The system adjusts the difficulty of exercises, offers vocabulary reviews, and provides instant feedback on pronunciation, ensuring that students are continually challenged within their ZPD. The AI monitors learner progress and adapts lessons to address specific areas of weakness.

These examples highlight the diverse applications of AI in digital education, all of which are centered around providing learners with personalized support and ensuring that they are always working within their ZPD.

Adaptive Learning Systems And ZPD

Dynamic Adjustment of Learning Content

Adaptive learning systems are designed to adjust content dynamically based on individual learner needs, ensuring instruction aligns with the Zone of Proximal Development (ZPD) (Ferguson et al., 2022). These systems track student progress and modify content difficulty, pacing, and presentation in real time (Gupta, T. et al., 2024). By using algorithms and learner interaction data, they assess understanding and adapt learning paths—advancing learners who show mastery and offering support to those who struggle (Sayed et al., 2024). This ongoing adjustment maintains an optimal balance of challenge and support, consistent with Vygotsky's scaffolding principles (Akavova et al., 2023).

Aligning Instruction with Learner Needs

Adaptive learning systems align instruction with individual learner needs, offering personalized experiences that support meaningful learning within the ZPD (Xiao & Hew, 2024). They employ strategies such as personalized learning pathways to match content with proficiency levels (Hicham Er-Radi et al., 2023), formative assessments to tailor instruction based on learner understanding (Wilkinson, 2024), and adaptive content delivery to suit different learning styles (Jdidou, Aammou & Er-Radi, 2023). These features ensure instruction remains appropriately challenging and supportive throughout the learning process.

Collaborative Learning in Adaptive Systems

Adaptive learning systems increasingly integrate collaborative features that align with Vygotsky's emphasis on social interaction and shared problem-solving within the ZPD (Gao et al., 2024; Sharma, 2024). These platforms support collaboration through peer interactions, group challenges, and real-time communication tools, enabling learners to scaffold each other's understanding and engage in co-constructed knowledge building. Such features not only enrich the ZPD experience but also cultivate skills essential for real-world collaborative problem-solving (Cai et al., 2024).

Example of Adaptive Learning Systems in Action (Dutta et al., 2024);

1. Carnegie Learning offers a blended learning solution primarily focused on mathematics education. The platform combines AI-powered tutoring with classroom instruction, helping

students to learn at their own pace. It provides real-time feedback and adapts the difficulty of tasks based on the learner's progress. The AI-driven platform helps students develop problem-solving skills, offering personalized guidance and support. (Sharma, 2024).

AI Integration: Carnegie Learning's AI platform analyzes student responses and adjusts the learning path accordingly. It identifies when students struggle with particular concepts and offers targeted interventions.

Impact on ZPD: By continuously adjusting the difficulty of math problems and providing scaffolded support, the system ensures that students stay within their ZPD, gradually moving from guided assistance to independent problem-solving.

2. DreamBox Learning provides an adaptive math program for students in kindergarten through eighth grade. It uses real-time data to adjust the difficulty and pacing of math lessons, offering personalized instruction based on the learner's individual needs.

AI Integration: DreamBox's AI tracks students' learning behavior and adjusts the learning path to keep students engaged at the appropriate level of difficulty. The platform can identify learning gaps and provide immediate, targeted practice.

Impact on ZPD: DreamBox supports ZPD by offering personalized lessons that are appropriately challenging. It provides instant feedback and intervention, ensuring students receive just the right amount of support and guidance.

3. Smart Sparrow is a platform that offers adaptive learning for higher education. It allows educators to design personalized, interactive learning experiences, particularly in fields like science and engineering. Smart Sparrow's adaptive learning engine adjusts course content based on student performance, ensuring that students are consistently challenged without feeling overwhelmed. AI Integration: Smart Sparrow's system tracks student responses and uses predictive analytics to suggest the most effective next steps in the learning process. It can also offer detailed data insights for instructors, helping them understand how students are engaging with the material.

Impact on ZPD: Smart Sparrow's adaptive technology ensures that students remain within their ZPD by tailoring the complexity of content and providing scaffolding when needed. It also encourages deeper learning by gradually increasing the challenge level.

4. Knewton is an adaptive learning platform that personalizes digital course content for learners in various subjects, such as math, science, and language arts (Wiley, 2025). It uses AI to deliver customized lessons, assessments, and learning materials based on real-time data from student interactions. AI Integration: Knewton's AI engine analyzes data from student interactions to predict the next best learning activity for each individual. The platform can tailor content to fit the learner's pace and proficiency level, ensuring that the student receives content that is neither too easy nor too difficult.

Impact on ZPD: By dynamically adjusting content to meet the needs of each student, Knewton helps ensure that learners remain within their ZPD. It offers targeted support and personalized challenges that foster both skill development and independence.

Future Directions and Practical Implications

As education evolves, technology—particularly digital scaffolding—plays a vital role in transforming instructional practices. Adaptive instructional designs are especially crucial in online learning environments, enhancing how technology supports learners (Yang, Jiang, & Su, 2022). Additionally, innovations like artificial intelligence and virtual reality offer promising opportunities to further personalize education and tailor it to individual learner needs (Ahmad, Umirzakova, Mujtaba, Amin, & Whangbo, 2023).

Challenges and Limitations

Adopting AI and adaptive learning systems presents several key challenges. Equity remains a major concern, as students in under-resourced areas often lack the necessary infrastructure and devices, limiting access to personalized learning and increasing educational inequality (Lata, 2024; Pawar & Khose, 2024; Joshi, Khatiwada & Pokhrel, 2024). Teacher readiness is another critical issue—many educators lack the training and confidence to effectively integrate AI tools or interpret student data for ZPD-based instruction (Bowman et al., 2022; Dogan, Dogan & Celik, 2021; Arnado & Aviles, 2023; Stringer et al., 2022; Redmond et al., 2021; Cohn et al., 2025; Salas-Pilco, Xiao & Hu, 2022; Tammets & Ley, 2023). Ethical concerns also arise regarding student data privacy, algorithmic bias, and potential misuse of information collected by AI systems (Akavova, Temirkhanova & Lorsanova, 2023; Weber, 2020; Aquino, 2023). Lastly, if not carefully managed, adaptive systems can lead to cognitive overload by presenting challenges too rapidly, failing to respond to learners' emotional cues, and increasing frustration (Akavova, Temirkhanova & Lorsanova, 2023; Ferguson et al., 2022; Wan Ismail, Awang & Mohd Pauzi, 2021; Lazarides & Chevalère, 2021).

Conclusion

In reimagining Vygotsky's Zone of Proximal Development within the context of 21st-century digital education, this paper has highlighted the transformative potential of AI-driven adaptive learning systems as dynamic, responsive scaffolds. These technologies can function as intelligent mediators that personalize instruction, offer timely feedback, and adjust to each learner's unique developmental trajectory. By aligning with the core principles of the ZPD, AI does not merely automate education—it augments it, fostering deeper learning, learner autonomy, and greater equity. However, this integration also demands critical reflection on issues of access, teacher readiness, ethical AI use, and the preservation of human-centered pedagogy. As we move forward, the challenge lies in designing adaptive systems that are not only technically sophisticated but also pedagogically sound and socially just—tools that empower learners, support educators, and extend the boundaries of what is possible in meaningful, scaffolded learning.

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EVALUATING LONG-TERM PUBLIC HEALTH AND ENVIRONMENTAL SAFETY IN THE INSTITUTIONAL CONTROL PHASE OF A RADIOACTIVE WASTE REPOSITORY

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Abstract: *This study assesses the long-term public health and environmental safety of Malaysia's first near-surface disposal facility for Naturally Occurring Radioactive Material (NORM) waste, located in Perak, during its Institutional Control phase. Data from 2020 to 2024 were analysed, including environmental monitoring records, radiation dose assessments, stakeholder surveys, and institutional risk evaluations. Radiological measurements for soil, water, air, and vegetation remained within regulatory limits throughout the period, with one deviation in vegetation in 2023 resolved through corrective actions. Radiation dose assessments confirmed that public exposure levels remained well below the 1 mSv/year regulatory threshold. Survey findings indicated moderate awareness among nearby residents and highlighted the need for improved communication on radiation safety and emergency preparedness. Risk assessments using the Hazard Identification, Risk Assessment and Risk Control method classified all identified site activities as low or moderate risk, with no critical hazards. Overall, the findings support that the Repository operates safely under current oversight mechanisms. To strengthen long-term stewardship, the study recommends improving public engagement, maintaining robust monitoring procedures, and preserving institutional memory. These findings offer useful guidance for the continued safe management of radioactive waste facilities both in Malaysia and internationally.*

Keywords: *Radioactive Waste Management, Institutional Control, Environmental Monitoring, Public Health Safety, Risk Assessment*

Introduction

The long-term management of radioactive waste remains a pressing concern in environmental health and safety policy, particularly during the post-closure phase of disposal facilities (Kuzmin et al., 2022). In Malaysia, the Repository located in Mukim Belanja, Perak, is the first

engineered near-surface disposal facility designated for Naturally Occurring Radioactive Material (NORM) waste. Developed to handle residues from industrial processes involving thorium and uranium, the facility has entered its Institutional Control phase, during which long-term monitoring and regulatory oversight are required to ensure continued safety. This phase is scheduled to last for three centuries, during which Malaysia's ability to manage radiological risk and maintain environmental protection will be thoroughly tested (MB Inc., 2024).

Malaysia's regulatory approach is grounded in the Atomic Energy Licensing Act 1984 (Act 304), overseen by the Atomic Energy Licensing Board (AELB). The country has adopted international standards developed by the International Atomic Energy Agency (IAEA), including principles that guide long-term environmental monitoring, radiation protection programmes, and risk control frameworks (IAEA, 2014). The Repository in Perak contains long-lived radionuclides such as Uranium-238 and Thorium-232, which require careful containment and constant oversight due to their environmental persistence and potential radiological impact (Zhao, 2023). While engineering controls and regular monitoring have shown strong compliance with national standards, the post-closure phase introduces broader concerns, particularly the need to maintain public trust and institutional continuity over centuries.

The core problem addressed in this study is the limited availability of public research evaluating Malaysia's effectiveness in maintaining radiological safety during the Institutional Control phase of a completed radioactive waste facility. Although existing inspection and monitoring reports suggest compliance with legal standards, these alone may not provide a complete picture of risk control or public awareness. There is a lack of integrated analysis that combines environmental data, radiation exposure levels, stakeholder engagement, and institutional risk assessments. Furthermore, gaps in public awareness, particularly among local residents and vulnerable groups, raise concerns about the adequacy of communication and engagement efforts. The long-term nature of the control phase also introduces uncertainty regarding institutional memory, funding continuity, and the robustness of monitoring infrastructure over time.

This study aims to evaluate the long-term environmental and public health safety of the Repository at Mukim Belanja during its Institutional Control phase. The primary objective is to assess the potential risks associated with radiation exposure at the facility and to identify areas where safety and regulatory compliance can be enhanced. The second objective is to evaluate public safety within a five-kilometre radius of the repository by examining environmental monitoring data and estimating radiation exposure to nearby populations. The third objective is to determine the extent to which the repository adheres to national radiation safety standards and regulatory requirements, drawing from documented inspection outcomes and radiological safety assessments conducted during the monitoring period.

By combining technical assessment with social and regulatory dimensions, this article provides a comprehensive evaluation of post-closure radioactive waste management in Malaysia. The findings will support efforts to strengthen existing policies, inform future planning for similar facilities, and build public trust in long-term stewardship measures.

Literature Review

The management of radioactive waste requires the integration of scientific, regulatory, and social frameworks to ensure safety across all phases of its lifecycle. In Malaysia, the classification of radioactive waste is based on guidelines from the IAEA, which differentiate between exempt waste, very low-level waste, low-level waste, and intermediate-level waste depending on the level of radioactivity and containment requirements (IAEA, 2018; Aziman et al., 2023). These classifications support the development of appropriate disposal strategies, such as near-surface containment for low-level waste, which is the approach adopted at the Repository in Mukim Belanja, Perak.

NORM are common in industrial by-products, especially from activities such as mining, rare earth processing, and oil and gas extraction (Janković et al., 2024, Puertas et al., 2021 and Borbet et al., 2023). In Malaysia, the widespread generation of NORM waste has necessitated the establishment of dedicated disposal facilities that align with international best practices. Challenges in managing NORM include the persistence of long-lived radionuclides such as Uranium-238 and Thorium-232, both of which require prolonged containment and monitoring due to their potential to contaminate soil, air, and water resources over time (Awuah et al., 2024).

Radiation protection and safety measures are critical in minimising the risks associated with radioactive waste (Kumar et al., 2024). These measures are founded on the principles of justification, optimisation, and dose limitation, as outlined by the International Commission on Radiological Protection (ICRP, 2007). The Radiation Protection Program (RPP) is a core element of facility safety management and includes personal monitoring, engineering controls, and safety training for workers (Frane & Bitterman, 2021). Ensuring public safety also involves emergency planning and environmental surveillance, especially for populations living near disposal sites (Giacobbo et al., 2021 and Adelodun & Anyanwu, 2024).

Radiological Impact Assessment (RIA) serves as a tool to evaluate potential exposures and health consequences resulting from radioactive waste disposal. It involves quantifying radiation doses to individuals, identifying exposure pathways, and proposing mitigation strategies (Karam, 2021). For near-surface facilities like the Repository, these assessments are critical during both operational and post-closure phases. In Malaysia, RIAs are regulated under Act 304 and monitored by the Atomic Energy Licensing Board to ensure compliance and transparency.

Risk assessment and management are also essential in long-term waste governance. The Hazard Identification, Risk Assessment and Risk Control (HIRARC) framework provides a structured process for identifying hazards, estimating the likelihood and consequences of adverse events, and implementing controls (Mustafa et al., 2021). At the Repository, the application of HIRARC supports routine decision-making and informs safety practices during the Institutional Control phase.

Equally important is public perception and communication. Studies have shown that the success of radioactive waste management programmes often depends on public trust in regulatory authorities and facility operators (Kasperski, 2022). Negative perceptions may stem from limited information, past incidents, or poor communication. Effective risk

communication requires accessible language, stakeholder engagement, and continuous dialogue with affected communities (Ledford et al., 2024).

Despite significant progress in radioactive waste management, several gaps remain. These include limitations in long-term monitoring technologies, the potential loss of institutional knowledge over time, and insufficient research on the socio-economic impacts of waste facilities (Hietala & Geysmans, 2020). Addressing these issues is essential for improving safety outcomes and ensuring sustainable management of radioactive materials across generations.

Methodology

This study employed a case study design to assess the long-term environmental and public health safety of the radioactive waste Repository located in Mukim Belanja, Perak. The case study approach allowed for a detailed examination of radiation protection practices, environmental monitoring outcomes, stakeholder perceptions, and institutional risk controls during the facility's Institutional Control phase. The selection of the Repository was based on its unique status as Malaysia's first engineered near-surface disposal facility for Naturally Occurring Radioactive Material (NORM) waste, making it a representative model for national waste management practices.

Data collection relied on both quantitative and qualitative sources, using a mixed-methods framework to strengthen the reliability and validity of the findings. Primary data were obtained through official documents, including the Radiation Protection Program (RPP), Radiological Environmental Monitoring Program (REMP), Radiological Safety Analysis Report (RSAR), and hazard risk assessments provided by the facility operator. These documents offered comprehensive records on radiation levels, regulatory inspections, environmental monitoring activities, and safety protocol implementations between the years 2020 and 2024.

Supplementary qualitative data were collected through stakeholder surveys and structured interviews. Respondents included facility workers, local residents within a five-kilometre radius, safety personnel, and site management staff. The survey instruments captured information on general awareness of radiation risks, perceptions of public safety, confidence in institutional control measures, and communication effectiveness.

To systematically identify and assess risks, the study applied the Hazard Identification, Risk Assessment and Risk Control (HIRARC) framework. This process involved four key steps: identifying work activities and associated hazards; estimating the likelihood and consequence of potential incidents; evaluating the severity of identified risks; and proposing appropriate control measures. The framework was used to categorise risks as low, moderate, or high, and to determine the adequacy of current mitigation strategies.

For data analysis, content analysis was used to extract themes from policy documents, monitoring reports, and stakeholder responses. Thematic analysis was applied to qualitative data from interviews, focusing on recurring issues related to trust, risk perception, and satisfaction with facility oversight. Comparative benchmarking was also conducted against international standards, particularly those outlined by the International Atomic Energy Agency (IAEA), to evaluate the extent of Malaysia's alignment with global safety practices.

To ensure ethical standards were maintained, all personal data collected through surveys and interviews were anonymised. Participation was voluntary, and informed consent was obtained. Sensitive operational documents were accessed with official permission through the designated Radiation Protection Officer, and all findings were presented in aggregate form to protect confidentiality.

The RPP, REMP and SAR contain detailed, sensitive data that is protected under confidentiality agreements. As such, full datasets from these documents will not be included in this chapter. Instead, a summary of key findings, which highlights the compliance, effectiveness and safety performance of the Repository, is presented. This approach ensures that the study respects privacy while providing an in-depth analysis of the Repository's operational safety and regulatory adherence. This integrated methodological approach enabled a comprehensive assessment of environmental and public health safety performance at the Repository, while also highlighting areas for improvement in communication, risk management, and institutional continuity during the post-closure phase.

Results and Discussion

This section presents key findings from the assessment of the radioactive waste Repository in Mukim Belanja, Perak, during its Institutional Control phase. The analysis focuses on three main areas: environmental monitoring results, public awareness and stakeholder feedback, and institutional risk assessment practices. All results are interpreted in the context of Malaysia's regulatory requirements and international guidelines.

Environmental Monitoring and Compliance

REMP forms a key part of the radiation safety system at the Repository, with its primary role being to assess the facility's impact on the surrounding environment. Implemented in line with the standards set by Atom Malaysia, the REMP involves regular sampling and analysis of environmental media such as water, soil, sediment, vegetation, and air (MB Inc., January 2023; March 2023; July 2023; October 2023). The purpose of this programme is to confirm that the facility remains within permitted regulatory levels and does not contribute to additional radiological risks in the surrounding area.

Monitoring activities are concentrated within a five-kilometre radius of the Repository, which has been identified as the priority zone for evaluating environmental and public health impacts (Jovanović & Dragičević, 2024). This boundary was established through the Radiological Impact Assessment (RIA), which outlined potential routes for radiation exposure (MB Inc., January 2023; March 2023; July 2023; October 2023). These exposure pathways include several critical environmental vectors.

In 2023, REMP activities were documented through quarterly reports prepared by MB Inc., with technical implementation carried out by the Malaysian Nuclear Agency (Nuklear Malaysia), acting as the appointed consultant (MB Inc., January 2023; March 2023; July 2023; October 2023). These reports compile field monitoring outcomes and laboratory analysis, and they serve as the primary reference for determining the Repository's compliance with national environmental safety regulations.

The REMP conducted from 2020 to 2024 confirmed that radiation levels across environmental media remained well within Malaysian regulatory limits (refer Table 1). Samples were taken from soil, groundwater, surface water, ambient air, and vegetation surrounding the Repository. These were analysed to detect the presence of radiological contaminants and to verify the effectiveness of containment infrastructure.

Table 1: Summary of Environmental Monitoring Results (2020–2024)

Medium	Regulatory Limit	Observed Range	Status
Soil	Less than 1 Bq/g	0.17 – 0.55 Bq/g	Within Limits
Groundwater	Less than 0.1 Bq/L	0.02 – 0.06 Bq/L	Within Limits
Surface Water	Less than 0.1 Bq/L	0.01 – 0.05 Bq/L	Within Limits
Ambient Air (Dust)	Less than 1.0 mSv/y	0.18 – 0.44 mSv/y	Within Limits
Vegetation	Less than 1 Bq/g	0.12 – 0.96 Bq/g	Within Limits (deviation in 2023)

A notable deviation was observed in the 2023 REMP, specifically in the vegetation samples collected near the Repository. This anomaly was the only significant deviation identified throughout the monitoring period. In response, additional root zone sampling was carried out, and corrective measures were implemented to confirm that the anomaly did not indicate a wider environmental concern. The results of the follow-up assessment showed that surrounding vegetation remained within permissible radiological limits, and no extended impact was detected (MB Inc., October 2023).

Complementing the REMP, the RSAR provided further assurance that radiation levels at the Repository site remained below the annual effective dose limit of 1 mSv/year for public exposure. The RSAR confirmed that the repository's radiation levels have remained consistently below the national dose constraints, both for public exposure and occupational safety. Airborne dose rates within the Exclusion Zone did not exceed 0.47 mSv/year, and the highest soil activity recorded was 0.55 Bq/g, which remains well under regulatory thresholds. These values were significantly lower than the maximum annual effective dose of 1 mSv/year recommended by both Malaysian authorities and the International Commission on Radiological Protection (ICRP).

The RSAR also demonstrated spatial consistency in radiological measurements across multiple monitoring locations, indicating stable containment performance of the engineered disposal cells. No evidence of radionuclide migration beyond the site boundary was detected during the assessment period. The data collectively affirm that containment integrity is preserved and that environmental exposures remain within acceptable bounds.

The findings confirm that the Repository’s containment systems continue to function effectively and that the engineered cells are successfully isolating radioactive materials. Overall, the environmental monitoring results and safety analysis demonstrate that the Repository operates in compliance with national and international radiological safety standards and does not pose additional risks to the surrounding environment.

Stakeholder Awareness and Public Perception

An evaluation of stakeholder awareness and perception was conducted through a structured survey involving 95 respondents. These included community members residing within a 5-kilometre radius of the Repository, facility personnel, and representatives from nearby institutions. The aim was to assess their understanding of radiation risks, familiarity with the facility, and confidence in existing safety measures.

Figure 1 of the survey revealed that most respondents were aware of the Repository's presence, with 86% stating that they had heard about the facility. However, only 64% could correctly identify its purpose. Awareness of radiation risks stood at 59%, while understanding of implemented safety measures was limited to 42%. Only 38% of participants reported that they knew the appropriate actions to take in the event of a radiation-related emergency.

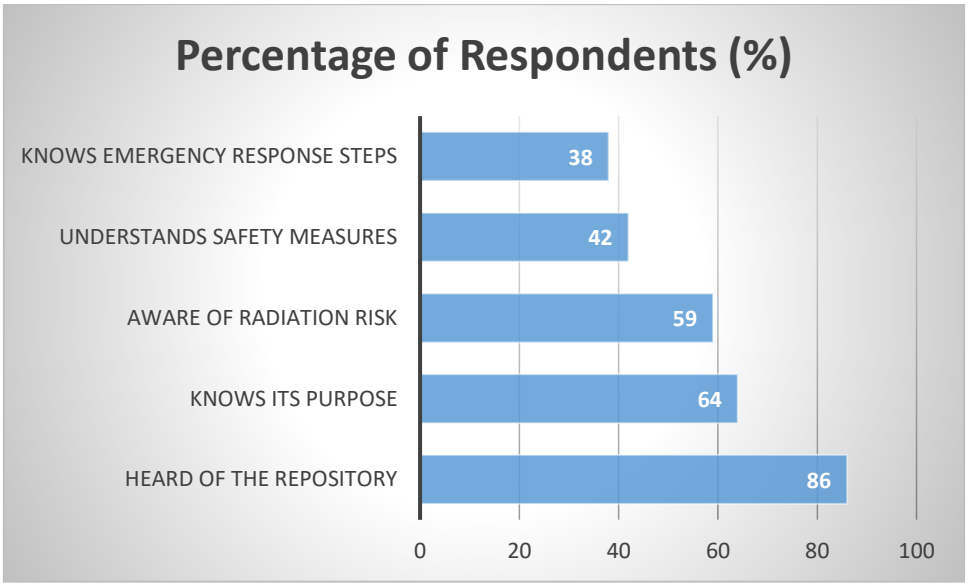


Figure 1: Summary of Public Awareness and Perception

The survey findings indicate that although general awareness exists, knowledge of specific safety practices and emergency response procedures remains limited. Respondents from older age groups and those with lower educational attainment displayed the lowest levels of understanding. This suggests that targeted outreach and educational initiatives are needed to address knowledge gaps among vulnerable population groups.

Confidence in the management of the Repository varied. While many respondents believed that the site is operated safely, a considerable number expressed uncertainty regarding the long-term effectiveness of its oversight. Some community members raised concerns about the lack of direct communication or updates from facility authorities.

These findings suggest that the existing public engagement approach should be strengthened. Current efforts appear insufficient in reaching all demographic groups, particularly those less familiar with technical terminology. Recommendations from the survey analysis include the use of simplified educational materials, greater involvement of community representatives, and regular public briefings that explain ongoing monitoring results and safety procedures.

Effective communication and stakeholder involvement are essential components of long-term radioactive waste management. Building trust requires more than regulatory compliance; it involves continuous dialogue, transparency in operations, and the inclusion of community voices in safety planning (Perko et al., 2020). The data from this survey reinforce the need to expand and improve public engagement strategies to support the overall credibility and social acceptance of the Repository.

Institutional Risk Assessment and Control Measures

The study employed the HIRARC method to evaluate operational safety practices at the repository. Fourteen work activities were reviewed, including environmental sampling, inspection rounds, vegetation management, and security operations. Hazards were categorised based on likelihood and consequence, and control measures were documented (Table 2).

Table 2: HIRARC Summary for Repository Activities

Work Activity	Hazard	Existing Risk Control	Recommended Controls	Risk Level
Radiological monitoring	Potential radiation exposure	Dosimeter, survey meter usage	Regular monitoring and adherence to RPP	Low
Driving on the site	accidents	safety training	Defensive driving courses, vehicle maintenance	Moderate
Repository inspection (security)	Unauthorized access	Access controls, barriers	Enhanced security procedures	Low
Maintenance work (grass cutting, repair fence)	Physical injuries (cuts, falls)	PPE, proper tools	Regular equipment maintenance	Low
Escorting/ monitor contractors and visitors	Exposure to unauthorized areas	Buddy system	Training and controlled access	Low
Groundwater sampling	Radiation exposure during sampling	Standard sampling procedures	Training and buddy system	Low
Airborne particulate sampling	Inhalation of particulates	Respiratory PPE	Enhanced air filtration and PPE	Low
Vegetation sampling at monitoring points	Slip, trip and fall during sampling	Training and buddy system	Standy first-aider	Low
Monthly radiological area monitoring	Exposure to ambient radiation	Monthly dose checks	Real-time radiation monitoring	Low
Emergency drill participation	Stress or injury during drills	Pre-drill briefings	Improved training and rest breaks	Low

Findings showed that most activities presented low to moderate risks. For example, inhalation of airborne particles during vegetation trimming and minor slips during manual inspections

were common but well-controlled risks. No critical or high-level hazards were identified. The application of engineering and administrative controls, such as the use of personal protective equipment, designated walkways, and routine safety drills, contributed to the overall low-risk classification. However, the assessment also identified areas for improvement, including enhanced documentation, periodic reassessment of risk categories, and increased staff training to maintain institutional knowledge throughout the 300-year control period.

The HIRARC findings validate the Repository's effectiveness in managing radiation and occupational safety risks. The proactive approach in identifying and mitigating hazards, coupled with the implementation of administrative and PPE measures, ensures a robust safety framework. These findings align with the Repository's objectives of adhering to national and international safety standards while maintaining a safe and secure environment for workers and the surrounding community.

Conclusion

This study evaluated the public health and environmental safety performance of the radioactive waste Repository in Mukim Belanja, Perak, during its period of institutional control. The analysis incorporated environmental monitoring data, radiological assessments, stakeholder feedback, and safety management records to determine whether the facility meets regulatory expectations and continues to protect surrounding communities and the environment.

The environmental monitoring conducted between 2020 and 2024 confirmed that radiation levels in soil, water, air, and vegetation were within the limits established by Malaysian regulations. A single deviation was identified in the 2023 vegetation samples, but this was addressed through additional sampling and corrective actions. No widespread contamination or containment failure was observed. The performance of the engineered cells remains stable, and the structural integrity of the Repository continues to be maintained.

Stakeholder surveys showed that while many residents were aware of the Repository's presence, understanding of radiation risks and safety procedures was generally limited. A lack of communication and public engagement was reported as a contributing factor to this knowledge gap. Respondents expressed interest in more frequent updates, easier access to information, and the opportunity to interact with facility representatives through community-based platforms.

The risk evaluation carried out using the Hazard Identification, Risk Assessment and Risk Control method found that routine activities at the site involve low to moderate risk. Existing control measures were effective and consistently applied. However, the study highlighted the importance of maintaining institutional capacity, documentation, and staff expertise to ensure safe and informed oversight throughout the extended control period.

In summary, the findings support the conclusion that the Repository is operating safely and in compliance with national standards. Continued environmental safety and public reassurance will depend on sustained efforts in monitoring, communication, and institutional preparedness. Greater community involvement and clearer information sharing will help strengthen confidence in the management of radioactive waste over time.

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INTEGRATION OF ARTIFICIAL INTELLIGENCE (AI) IN SHAPING USER INTERFACE (UI) AND USER EXPERIENCE (UX) IN MOBILE PACKAGING DESIGN: IDPAC APPS

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Abstract: *Intelligence Digital Packaging (iDPAC) is the incorporation of artificial intelligence (AI) in the user interface (UI) and user experience (UX) mobile applications (apps) packaging design modules digitally, newly transformed from traditional design processes in packaging design. The lack of educational resources and samples in the context of packaging design has led to ineffective communication between learners and educators. This gap results in learners producing unrealistic designs due to a lack of understanding of visual constraints and principles. Integrating AI into the creative design process, particularly in packaging design, presents opportunities and challenges. The primary study domains of AI integration are AI in UI and UX mobile apps prototypes and AI in the packaging design process, which have been thoroughly explored to optimize the advantages of AI in the creative design industry. Developing the UI and UX in the mobile apps packaging design module that integrates AI could serve as a solution and strategy to increase the effectiveness of the existing standard learning system across a wider variety of services and for more users. The qualitative methodology has involved observation and interviews with nine samples of educators, learners, and industry experts to gather insights into current potential improvements in AI integration in UI and UX mobile apps. This study employs a systematic approach called Design Developmental Research (DDR) along with the Design Thinking (DT) framework to discover what users want and need, design and create a prototype, and then test it with real users to determine whether the AI integration enhances the user experience and evaluate the usefulness of the mobile app. DDR-employed DT framework has effectively facilitated the development of mobile apps that meet user satisfaction in the packaging design process more efficiently and effectively. This emphasises visual communication in mobile app design development and highlights the potential for AI to revolutionise the way designers approach user experience. As technology advances, incorporating AI into design processes will become essential for remaining competitive in the creative industry.*

Keywords:
AI, Design Developmental Research, Design Thinking, UI and UX Mobile App, Packaging Design

Introduction

AI is opening new possibilities for creative expression despite the inherent challenges. However, the AI approach in the ideation design process lacks the simulation of the sense of creativity and diminishes human capabilities in solving design challenges (Ardhianto and Nababan, 2023). In the realm of design, AI can generate novel concepts based on existing designs or recognise new combinations of materials and technologies by aiding designers in

simulating ideation and concepts to swiftly identify and refine the most promising ideas (Hughes, 2021). Nevertheless, the potential benefits and applications of AI in the early stages of the creative process remain largely unexplored (Stoimenova and Price, 2020). Therefore, Sandesara, Bodkhe, Tanwar, Alshehri, Sharma, Neagu, Grigoras, and Raboaca (2022) note that developers struggle to meet user expectations and engage users effectively due to poor UI design choices. Furthermore, inadequate UX can result in user frustration and low retention rates (Bothma, 2023). Consequently, it is vital for developers to prioritise user-centred design principles to create successful mobile applications. When users become confused and frustrated with an app, it can lead to a negative overall experience (Yablonski, 2024). By focusing on intuitive navigation, clear visual hierarchies, and seamless interactions, developers can significantly enhance the usability and appeal of their mobile apps, ultimately resulting in higher user satisfaction and increased retention rates. This research focuses on a packaging design module as a reference sample for developing mobile prototype design. Due to insufficient time for students to complete the packaging design and frequently inappropriate guidelines in conventional teaching and learning, communication breakdowns between students and educators occur during the explanation of the packaging design process (Zaryabi and Abeddoost, 2022). This is particularly challenging as learners are frequently new to the field and may not grasp the constraints of visual elements in packaging design, such as functionality, cost-effectiveness, and sustainability. Hence, the potential of AI could assist educators and learners in understanding the basic principles of packaging design or in testing their designs with real users to obtain feedback on usability and functionality (Sellier, 2022). AI can support designers in generating new and innovative ideas, and it can also aid in refining their designs to enhance visual appeal (Milosevic, 2023), allowing users to quickly sample concepts that could be viable. The advantage of AI lies in its capability as a powerful tool for creating packaging designs that are both creative and effective for designers, educators, manufacturers, and consumers (Ijaz, 2023).

In connection with this research, the aim is to develop a mobile app prototype design for packaging design modules, leveraging AI concepts as supportive tools to improve and enhance the quality of teaching and learning through mobile learning experiences, fostering better understanding both within and outside the classroom. The Design Development Research (DDR) is a systematic approach to creating mobile apps in educational settings, focusing on iterative design and user feedback. It involves collaboration between designers, developers, and end users to create engaging and user-friendly apps. The DDR framework incorporates elements of instructional design to ensure the app meets learning objectives. Combining DDR with the Design for Teaching (DT) framework can lead to more user-friendly and engaging applications. This method accelerates the development process and is suitable for diverse learning situations, both offline and online. The DDR-employed DT approach improves user experience and functionality, leading to increased satisfaction and engagement. Emerging and adapting best practices of AI technology in educational systems and design presents numerous future opportunities for exploration. The integration of AI in developing UI prototype design within mobile learning apps is crucial for fostering innovative interactions and enriching lifelong learning experiences in education, as it is readily transferable and accessible anytime, anywhere (Kiranjeet Kaur, 2021). AI can serve as a resource for assisting learners and designers in creating UI and UX mobile app prototype designs that are visually appealing, user-friendly, and engaging for users (Xing, Cao, Shi, Si, and Zhao, 2022). The advantages of AI in UI prototype design should be viewed as a new adaptation in the packaging design process that can enhance the quality of teaching and learning both in the classroom and independently for

learners and educators (Seo, Tang, Roll, Fels, and Yoon, 2021). Nowadays, mobile learning apps generate new concepts and content, fostering engagement in learning within communities. The significance of this study is its potential to make a substantial impact on user interface and experience opportunities for educators and students in higher education, as well as for manufacturers and consumers. Figure 1 represents the integration of AI in DDR-employed DT in developing UI and UX mobile app in packaging design module as a solution to packaging design from traditional to digital.

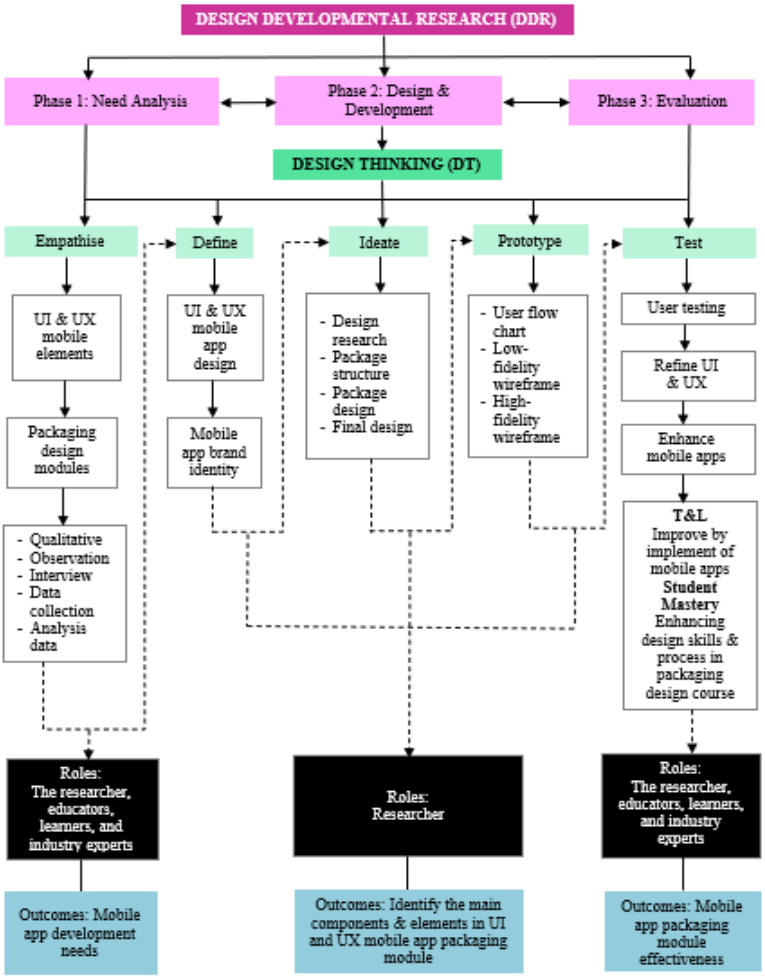


Figure 1: Adaptation Conceptual Framework in DDR combined DT Approaches from Padzil Mohd Ridzuan, Aidah Abdul Karim and Hazrati Husnin (2021)

Literature

In terms of UI and UX for mobile apps, key characteristics that facilitate this include drag-and-drop interfaces, device-specific templates, interactive gestures, real-time collaboration, and the ability to simulate application interactions (Clark, 2024). Moreover, Myre and Stevens (2023) stated that the various potential AI components and their interconnected relationships, such as machine learning algorithms, natural language processing, and computer vision, can work together to enhance the UI and UX design process. Therefore, UI and UX design elements also

refer to the systematic approach designers use to create visually appealing and aesthetically pleasing interfaces in software or digital devices (S. Astuti, A. Fitriana, Wan Ahmad, Ratna Ermawati, and Hasan, 2021). In addition, to emphasise the mobile app packaging design module, a product can be positively portrayed and attract attention with visually appealing elements such as typography, colour, and imagery (Rosene, 2022). According to Chitturi, Londoño, and Henriquez (2021), Fishes (2019), and Li (2019), this visual element consists of colour, graphics, the size and shape of the packaging, and the pattern composition. Ultimately, Srivastava, Ramakanth, Akhila, and Gaikwad (2022) indicated that the visual elements aspect can be categorised into two categories: verbal aspects (product details, brand name, manufacturer, and country of origin) and visual elements (colour, graphics, size and form, and typography). The DDR methodology is utilised for its flexibility and adaptability, enabling modifications during the development process (Hadi Hassan & Muhammad Zuhair Zainal, 2024). DDR participants implemented DT, and emphasising the skills and knowledge involved in the design process will better equip students to tackle today's challenges (Mohd Ridzuan Padzil, Aidah Abd Karim, Hazrati Husnin, 2021).

Research Methodology

This research employs a qualitative methodology that proposes a design model to address the challenge of creating packaging modules in UI and UX mobile applications. The model outlines steps for data collection and analysis, including ethical considerations. AI is recognised as a potential tool for developing prototypes, with the design process and packaging design module factors treated as independent variables. The DDR-employed DT framework has proven effective in guiding the design process and ensuring that ethical considerations are prioritized. Furthermore, the research suggests that incorporating AI into the design process can result in more efficient and innovative solutions for packaging modules in mobile applications. Figure 2 shows the details of research conceptual frameworks and how they can be integrated for optimal app development outcomes. By utilising both DDR and DT frameworks, developers can create apps that meet the learning objectives but also provide a seamless and enjoyable user experience. This approach is essential for ensuring that apps are effective tools for education and training in various settings.

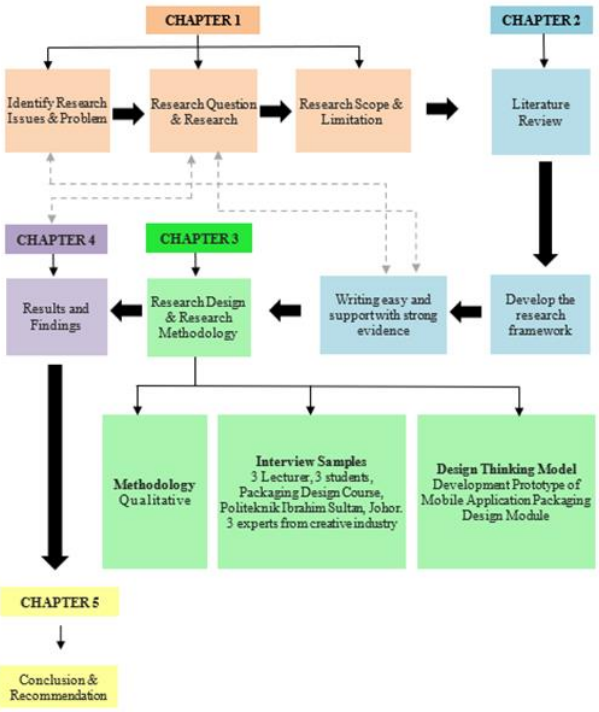


Figure 2: Research Design in Developing UI and UX Prototype Mobile App Packaging Design Modul

Results and Discussion

The five phases in the Design Thinking results are empathise, define, ideate, prototype, and test. These stages facilitate the design process by emphasising the comprehension of user requirements, delineating issues, developing concepts, formulating solutions, and evaluating their efficacy. By following these procedures, designers may guarantee that the finished product aligns with user expectations and operates well. This systematic method facilitates a comprehensive comprehension of customer requirements and ensures the product is customised to satisfy their expectations appropriately. The iterative nature of the approach enables continuous improvement based on user feedback, resulting in a more user-friendly and efficient finished product.

DDR Phase 1: Needs Analysis – DT Stage 1: Empathize

In this stage, nine individuals, including lecturers, students, and creative experts in the UI, UX, and design industry, were interviewed. The demographics included females and males. The lecturers, aged 30-40, have a mix of education and experience. The students, aged 20-25, are studying graphic design. The experts, aged 25-40, have experience in software engineering and graphic design. Artificial intelligence (AI) is being used in education to educate students on current developments, promote understanding of creative technology, and improve engagement and learning results. Generation Z is using AI to speed instruction, accelerate learning, and bridge the gap between traditional teaching methods and the digital age. AI tools like ChatGPT, Adobe Firefly, Midjourney, Ideogram, Suno, and Runway revolutionize student interaction with educational content, providing personalized feedback and support. This

integration caters to individual learning styles and abilities, leading to more effective learning outcomes. The creative industry is also adapting to AI tools, enhancing creativity and collaboration. Therefore, this framework serves as a tool that educators utilise to integrate AI technology into educational practices, enhancing teaching strategies and preparing students for the future workforce. It manages the design process by identifying opportunities for AI integration and guiding designers in creating engaging content for their target demographic. By adapting to this framework, educators can intentionally implement AI technologies, benefiting both teachers and students, and ensuring that AI integration is meaningful and purposeful, leading to improved student learning outcomes. Furthermore, recognising this, packaging design is vital for visual communication and brand identity, as it represents the first point of contact with consumers. Imagery conveys emotions, connects with consumers, and distinguishes products. Moreover, typography enhances brand identity, clarity, and visual appeal, setting the tone and aiding customers in understanding product information.

DDR Phase 1: Needs Analysis – DT Stage 2: Define

The researcher identifies a specific problem based on user needs and insights from interviews. These insights are then analysed to target the issue, which could relate to packaging design. Potential solutions are brainstormed and evaluated for feasibility and effectiveness. The packaging design process involves creating recommendations and solutions. The design process for packaging design consists of creating recommendations and problem solutions as stated below:

1) A User Login for The Mobile Packaging Design Module.
2) A Design Process for The Mobile Packaging Design Module
3) A Verify Me Section Page
4) A Contact Me Section Page
5) A User Profile Section Page
6) Brand Identity of Mobile Packaging Design Module (Logo, rational and typography of iDPAC app)

DDR Phase 2: Design and Development – Stage 3: Ideate

In this stage, the ideas involved that will be utilised in the mobile application are organised and managed to identify solutions for the problems recognised in the second stage. Upon completing the solution ideas, they will be categorised according to essential criteria such as feasibility, cost-effectiveness, and user impact. This process ensures that the final product addresses the needs and expectations of the target audience while being practical and efficient. As illustrated in Figure 3, the researcher ranked the ideas and supervised the four categories of the design process for the mobile packaging design module. Firstly, design research encompasses eight categories: design brief, SWOT analysis, target audience, concept and idea, image application, visual package reference, die line references, mood board, package structure (die line diagram), package design (label design), and final package (packaging design mock-ups). Finally, the researcher conducted user testing and collected feedback to implement any necessary adjustments before finalising the mobile packaging design. This iterative process allows for continuous improvement and ensures a high-quality product that resonates with the end user.

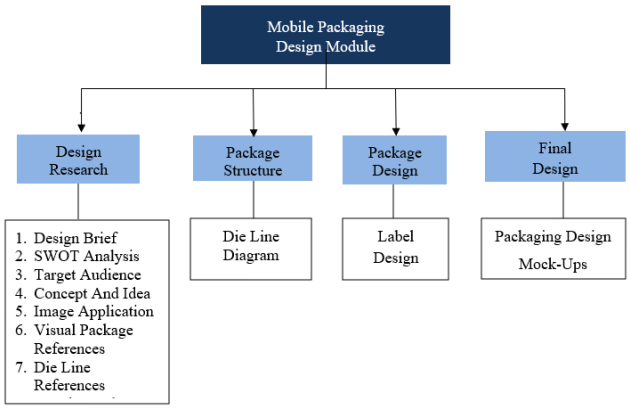


Figure 3: Categories of Design Process in iDPAC app

Application Style of iDPAC App

The UI and UX design are contained in the application style. It involves essential designs such as the colour scheme, font, buttons, and text style defaults for the iDPAC application. This will help create a cohesive and visually appealing user interface that enhances the overall user experience. Additionally, focusing on accessibility features and responsive design will ensure that the iDPAC applications are user-friendly across different devices and platforms. The UI and UX design enhance the user experience and ensure easy navigation within the iDPAC application. It needs to be visually appealing, user-friendly, and consistent with the overall brand image of the iDPAC application. The results are shown in Figure 4 in the detailed description.

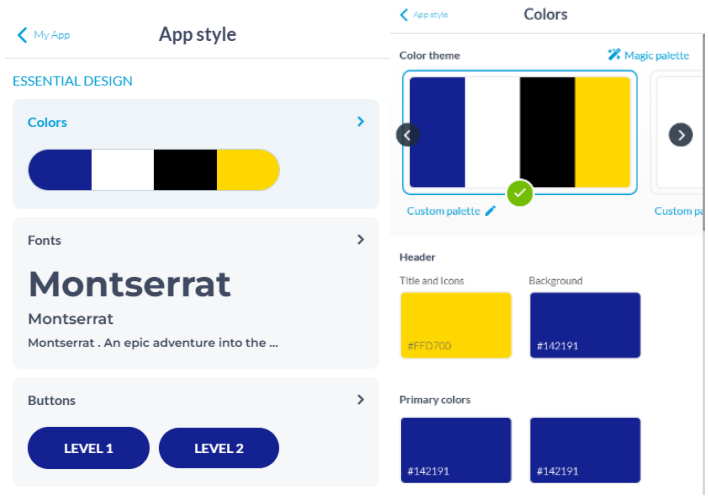


Figure 4: Application Style Default For iDPAC Application Structure Design Style

DDR Phase 2: Design and Development - Stage 4: Prototype

The prototype plays a vital role in user flow design, allowing for hands-on testing and assessment of packaging design prior to the final development of the application. It offers a tangible representation of the final application, supporting decision-making and the refinement

of user interface design elements. Testing with actual users helps pinpoint areas for improvement. The user flow is illustrated in Figure 5, depicting a sequential series of steps that a user will follow when interacting with the mobile application.



Figure 5: User Flow in iDPAC App

Wireframe

Wireframing in mobile application development is an essential step that allows developers to visualize the layout and functionality of the app before coding begins. It helps ensure that the user interface design meets the needs and expectations of users, ultimately leading to a more successful application launch. This wireframe is divided into two categories: low-fidelity wireframes, which focus on basic layout and structure, and high-fidelity wireframes, which include more detailed design elements such as colour, fonts, and images. These wireframes serve as a blueprint for the final design of the iDPAC application, guiding developers in creating a cohesive and user-friendly interface.

Low-fidelity Wireframe

The low-fidelity UI and UX mobile app design, developed using Figma, allows users to customize their own packaging designs and receive feedback from industry professionals. The app includes tutorials and resources to help users understand packaging design principles. Figure 6 shows the section page for each section inside the iDPAC application. The wireframe design allows for quick visualization of the module's layout before high-fidelity prototypes are created.

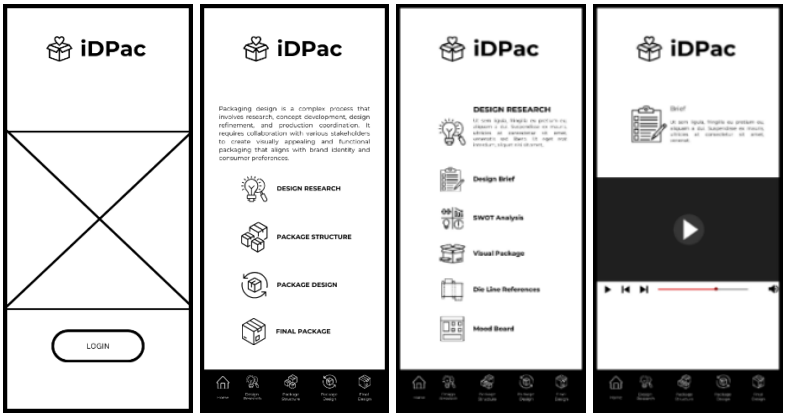


Figure 6: UI and UX Design for iDPAC App in Low Fidelity Development

High-fidelity Wireframe

After developing the low-fidelity UI and UX mobile app design, the researcher crafted the final design with various graphical elements, including icons, layouts, grids, colours, sans-serif typography, and button navigation. This process ensures that the final product is user-friendly and visually appealing. By incorporating these design elements, the researcher creates a seamless and intuitive experience for users interacting with the iDPAC application. The high-fidelity design provides a more realistic representation of the final product, making it easier to identify any potential issues prior to development. Furthermore, user testing can be conducted on the high-fidelity prototype to gather valuable feedback for further enhancements. Figure 7 illustrates the next stage in the design process, showcasing the detailed visual elements incorporated into the final product. This stage permits a more realistic depiction of the user interface and overall user experience. By employing high-fidelity UI and UX mobile app prototypes, designers can obtain more accurate feedback from users and stakeholders, resulting in a more refined final product. This stage also facilitates the fine-tuning of UI and UX mobile app design elements before proceeding to development, thereby saving time and resources in the long run.



Figure 7: UI And UX Design Idpac Display of the High-Fidelity Prototype in Figma.Com

Source: https://www.figma.com/proto/vl5NBpG9hOuYFp7ZuLVKKt/iDPac-04_USER-TESTING?node-id=2057-134&node-type=canvas&t=aHYuyKy9awzUkibu-1&scaling=scale-down&content-scaling=fixed&page-id=0%3A1.

DDR Phase 3: Evaluation – DT Stage 5: Test

User testing for iDPAC has concluded, ensuring the final product meets consumer expectations and identifies potential usability issues. A final prototype has been developed, which will undergo a final round of testing to address any issues before launch. Feedback from this testing phase will be crucial in final adjustments to the iDPAC application, ensuring the best user experience. The application is divided into four main sections: main section page, packaging design process, user profile authentication, and packaging design submission. Each section aims to provide a seamless user experience and intuitive navigation, aiming to simplify the packaging design process for all users. Figure 8 shows the final iDPAC app interface, highlighting the clean design and user-friendly layout. The development team is confident that the app will meet the needs of users and provide a valuable tool for packaging design.

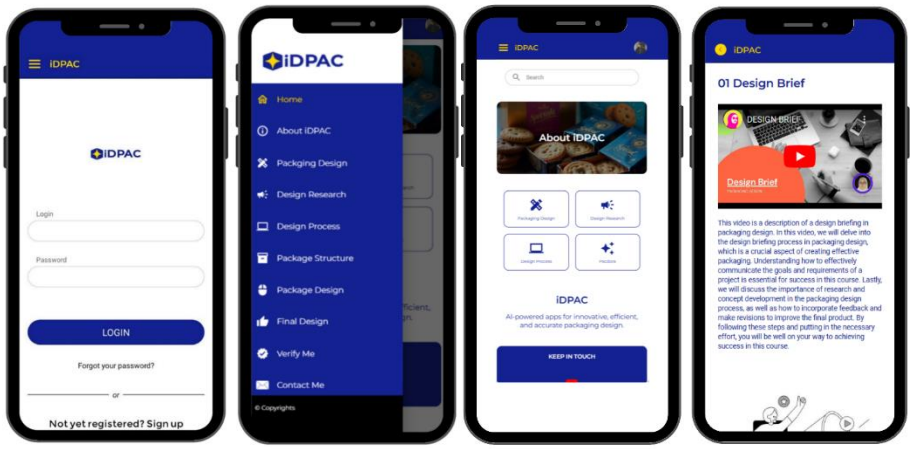


Figure 8: iDPAC App AI-powered for Packaging Design Solution

Conclusion

Therefore, the iDPAC application has been registered in Google Console as a published application on the Play Store for Android users. Meanwhile, Apple users can download the iDPAC app in the App Store for the iOS platform (Figure 9). This ensures that the app is easily accessible to a wide range of users, regardless of their device preferences. Moreover, iDPAC mobile applications have been registered with the Intellectual Property Corporation of Malaysia (myIPO) for copyright in notification number; CRAR2025J00267, and all contents are reserved for consent. Additionally, regularly updating the application and addressing user concerns will help maintain a positive reputation and keep users engaged. Protecting the intellectual property rights of the iDPAC application ensures that all content remains secure and exclusive to the developers. This innovative use of technology enhances the learning experience and equips students with valuable skills that are in high demand in the rapidly evolving field of packaging design, independently outside the classroom, as a supporting tool for continuous learning and professional development. The iDPAC mobile application also provides real-time feedback and personalised recommendations based on individual progress, further optimising the educational experience for students. The iDPAC mobile app provides a valuable platform for learners to explore design possibilities, understand visual constraints, and refine their designs based on AI-powered feedback and suggestions. This interactive platform

allows students to enhance their critical thinking and problem-solving abilities, ultimately preparing them for success in the competitive job market. This approach will also foster a culture of innovation and creativity within the industry, driving further advancements in AI integration. Overall, incorporating a dynamic and industry-focused curriculum will better equip students to navigate the rapidly evolving field of packaging design and stay ahead of the curve. This proactive approach will ensure that graduates are well-prepared to meet the demands of an ever-changing market and contribute to the continued growth and development of the industry.

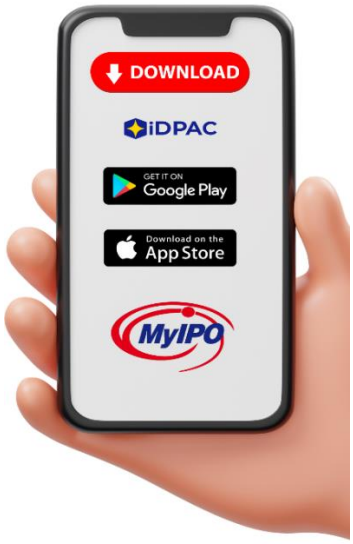


Figure 9: iDPAC App in Google Play and App Store

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DESIGN, ANALYSIS AND FABRICATION OF AUTOMATIC PLASTIC PRODUCT SEPARATION

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Abstract: *This research focuses on developing an automated plastic product separation system aimed at improving productivity and reducing manual labor in manufacturing environments. Based on studies conducted at Rosti IMS Sdn. Bhd., the existing manual separation process for plastic injection molded parts was time consuming and resource intensive. An automated separator was designed, fabricated, and tested, demonstrating a 35% increase in productivity and significant cost savings. The results suggest that automation in product separation can enhance efficiency, safety, and sustainability in manufacturing. Implementation of this automated system is expected to increase the separation rate while reducing time and labor costs. However, further improvements in safety features are recommended for optimal operation.*

Keywords: *Injection Molding, Plastic Separation, Plastic, Automatic*

1. Introduction

With the rapid advancement of Industry 4.0, integrating automated technologies into industrial processes has become essential in achieving operational efficiency (International Federation of Robotics, 2021). In the context of plastic manufacturing, automation can significantly enhance productivity and consistency, particularly in repetitive tasks such as product separation (Groover,2016).

The aim of this project is to revolutionize the existing manual separation process by introducing an automated solution. This innovation not only ensures more consistent and accurate results but also enables the workforce to concentrate on higher value tasks, ultimately leading to improved operational performance and cost efficiency (Ali, Ismail & Ahmad,2020).

In today's global manufacturing environment, efficiency, accuracy, and scalability are vital for competitive success. Automation is a cornerstone of Industry 4.0 and has transformed many production lines by significantly enhancing throughput and minimizing human errors. This research stems from a real-world problem identified at Rosti IMS Sdn. Bhd., where plastic products and their runners from injection molding processes are manually separated. This manual method not only consumes substantial labor and time but also introduces inconsistencies in quality and throughput. Thus, the implementation of an automated separation system offers a promising solution to enhance operational efficiency. The motivation behind this project is aligned with current industry practices aimed at smart automation, reduced operational costs, and lean manufacturing principles. The manufacturing industry has continuously evolved with the integration of automation technologies that enhance productivity, reduce operational costs, and ensure consistent product quality. In the context of plastic injection molding, separation of product components such as runners and usable parts

is a vital post molding process. Failure to optimize this step may result in delays, increased labor costs, and diminished throughput.

The shift toward smart factories under Industry 4.0 emphasizes the need for efficient, semi-autonomous systems in even the most fundamental processes. By focusing on an automated separation machine, this study contributes to the broader discourse on sustainable and intelligent manufacturing practices by reducing human dependency on repetitive tasks and reallocating manpower to value-added operations.

1.1 Objectives of the Project

The objectives of this project are:

i. To design and develop an automatic separation machine that increases productivity in the plastic product separation process at Rosti IMS Sdn. Bhd
ii. To reduce the time required for separating plastic products from runners
iii. To minimize reliance on manual labor and reduce operational costs

1.2 Scope

Scope of the Project This project is focused on the development of an automated machine with the following specifications and limitations. **Machine Dimensions** with Length 0.53 m, Height 0.50 m, and Width 0.45 m. **Materials used** are Mild Steel Rubber Nitrile, AC Motor Voltage Regulator, Acrylic Plastic, Self-Drilling Screws, Drive Chain and Sprocket.

1.3 Product Specifications:

The machine is designed to separate plastic bottle caps with a product diameter of more than 28mm. The runner component must be smaller than 28mm.The machine is limited to processing plastic materials only.

1.4 Importance of the Project

The primary significance of this project lies in its potential to reduce labor costs by automating the plastic product separation process. Traditionally, this task is performed manually, requiring additional manpower. By implementing an automated system, the company can reduce dependency on manual labor, thereby lowering operational expenses (Ali et al.,2020). In addition, automation can enhance the consistency, speed and safety of the process, contributing to overall production efficiency (Kalpakjian & Schmid,2014).

2. Literature Review

According to research by Sahoo and Setiawan (2021), integrating automated systems in plastic sorting processes has led to 15-25% efficiency improvements in manufacturing industries. Furthermore, studies such as Fang et al. (2018) highlight the growing adoption of machine vision and low-cost automation to perform routine tasks previously done by humans. These methods include mechanical sortation using rollers, gates, and motorized drives, similar to the methodology proposed in this project. Additionally, the concept of using mechanical automation for post-molding processes is supported by guidelines from the Society of Plastics Engineers (SPE), which recommends integration of modular automation tools to optimize assembly and separation tasks. This paper builds upon these principles by designing and

evaluating an accessible, cost effective separator tailored for small and medium plastic manufacturing environments.

In a study by Ma et al. (2020), it was demonstrated that implementing automated handling systems in post molding processes led to a 20% reduction in downtime. Other research by Lee and Nakamura (2019) highlighted the effectiveness of simple mechanical separation mechanisms, especially in environments where camera-based vision systems are either too costly or unnecessary for basic geometrical sorting. According to data from the International Journal of Advanced Manufacturing Technology (IJAMT), many small- and medium-sized enterprises (SMEs) have reported positive ROI within the first year of implementing partial automation, particularly in material handling and sorting tasks. These studies emphasize that even basic motor-driven mechanisms can significantly improve consistency, speed, and worker safety in repetitive separation operations.

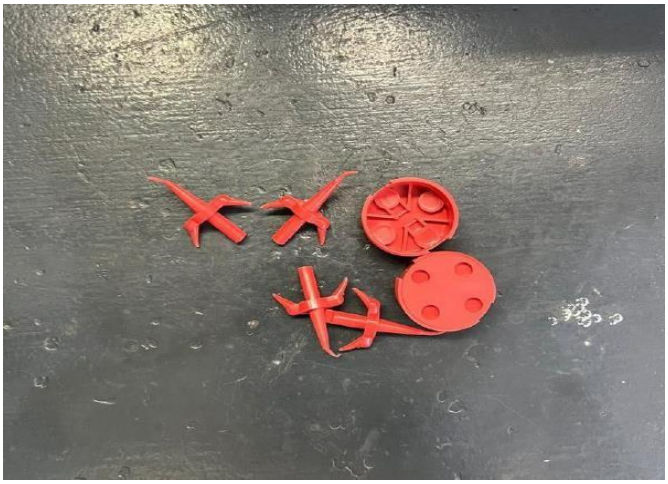


Figure 1: Product and Runner

3. Methodology

The methodology followed a systematic engineering design process beginning with site visits and problem identification at the production site. A detailed needs analysis and requirements definition phase led to the selection of appropriate components based on cost, durability, and local availability. Design iterations were carried out using Autodesk Inventor for 3D visualization, while the prototype was fabricated using conventional tools such as MIG welders, cut-off saws, and drilling machines. The mechanical drive system was implemented using an AC motor coupled with a sprocket and chain mechanism. Key features include adjustable rollers wrapped in rubber nitrile, a mild steel frame, and a simple voltage regulator for speed control. The machine was then tested under controlled conditions to compare its performance with manual separation processes over identical durations. The experimental setup included a batch of mixed products and runners, a stopwatch, and measuring containers for quantifying output. Parameters such as number of products separated, time taken, energy usage, and labor cost were recorded for analysis. To ensure precision in mechanical alignment and balance during operation, a leveling procedure was implemented using a spirit level and adjustable feet. Post-fabrication, a three-phase testing approach was conducted which is a dry run testing to assess roller motion and chain tension, load testing with mixed parts to simulate

real operating conditions, and endurance testing to evaluate system reliability over prolonged use. Furthermore, data collection protocols were standardized using a stopwatch, manual counters, and energy meters to quantify outputs and energy consumption. A baseline manual method was established using consistent personnel and workflow to ensure fair comparison with the automated system. All fabrication processes adhered to basic safety SOPs, and prototype evaluations were documented with photographic and operational logs to ensure reproducibility.

This speed was deemed sufficient to separate plastic components without excessive vibration or damage. In order to minimize rod vibration during operation, we recommend using dual bearing supports on each end of the roller for better load distribution. A rubber damper between the motor and the mounting frame to absorb shock also good to prevent vibration with proper alignment during assembly to prevent lateral wobble. Also, a balance testing to detect and correct uneven weight distribution. These additions will help maintain smooth motion, reduce wear on components, and ensure longer system life.

3.1 Process Flow Chart

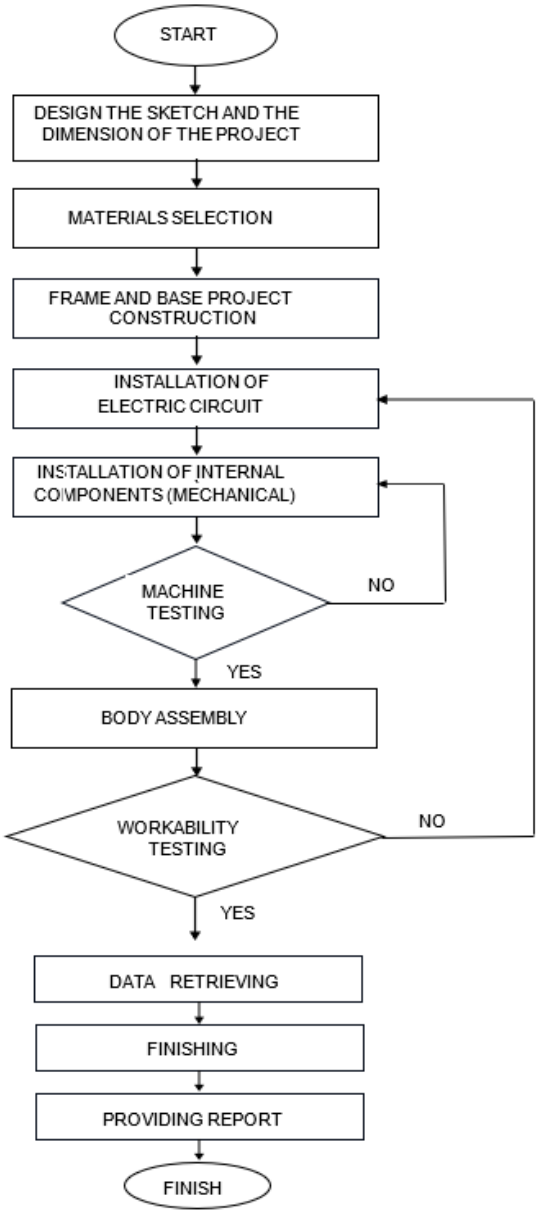


Figure 2: Process Flow Chart

3.2 Project Design

On the early phase of the project, the early design of the project was sketched based on the idea. The sketching is done both by hand sketching and using Autodesk Inventor Software.

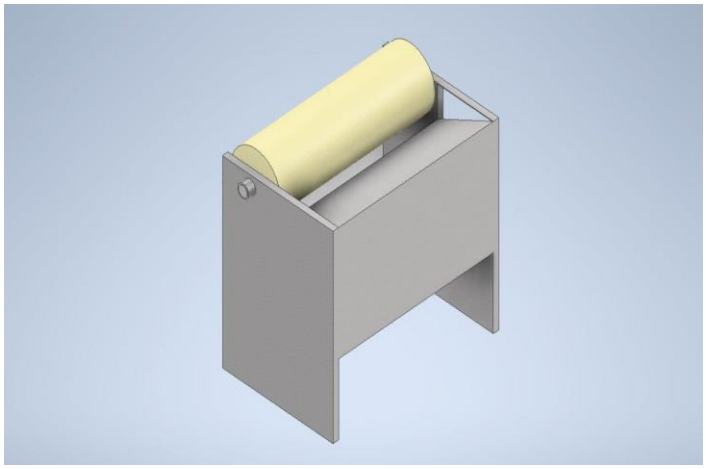


Figure 3: Early Design

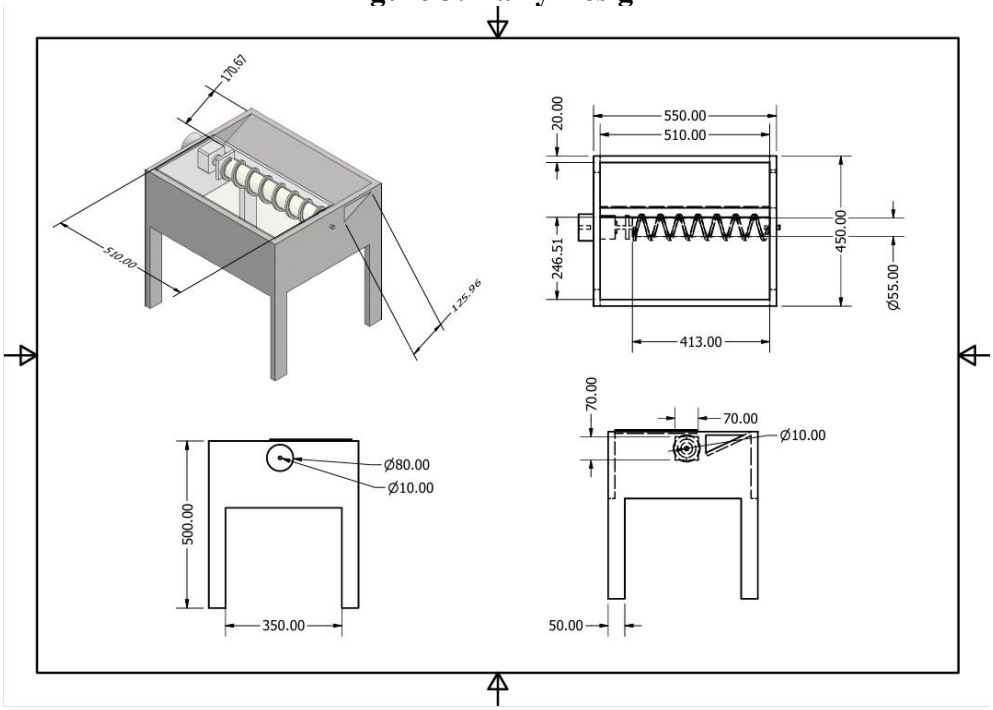


Figure 4: Finalized Technical Drawing of The Project Design with Dimensions

3.3 Fabrication Process

The welding process were started by weld the base's legs and the frame base. Then, supporting beam to the frame base are welded. The supporting beam is important for supporting the weight of the rod. Automatic Plastic Product Separator machine mainly works by mechanical mechanism. The installation of mechanical components is the most necessary part to be done. Figure 5 below shows the square flanged bearing that was installed on both side of the machine. This bearing works to hold the mild steel rod.



Figure 5: Installation Process of The Flanged Bearing

After the bearing's installation process are done, the rod between the flanged bearing is installed. The process of installing the mild steel rod on the machine. This rod is the main part of the mechanical mechanism as the rod works by spinning. After all the process of installing the mechanical and electrical components are done, the finishing process are done to complete the fabrication process. The operational proses started by switch on the power button. Then, the switch on the regulator needs to be turn on to supply the electric current. For the startup speed of the roller, the roller needs to be set on high speed to create kinetic energy for the roller. When the roller is spinning, the speed of the roller needs to be lower. The indicator on the regulator should not exceed 11 and lower than 10. Then, mixture of some products and runner will fall into the machine. The runner will fall through the gap between the plate and the roller, and it will then go inside a box placed below the machine. while the product will be drag to the side of the machine by the thread on the roller. The product will then fall through the spaces on the side of the machine and then go inside another box that placed beside the machine. After the box is full, the operator will just collect the runner and products and bring it to another process section. After the operator finished using the machine, machine need to be turn off by lowering the regulator power until it shows "0" on the indicator. Then, operator needs to switch off the power button. Lastly, operator needs to make sure the roller is stop spinning before the machine is stored.

4. Data and Discussion

The two main parameters in the project's objectives that which is the basis for the design of Automatic Plastic Product Separator machine are increase the productivity and reducing time taken on the separation process. The data taken from the experiments conducted to see the optimal method of separating the plastic products. Table 1 below shows the data of the total of

products separated by both automatic and manual method. The total time taken for each experiment is 30 minutes. This experiment is done four times.

Table 1: Data Collected from the Experiment

	Products separated (Units)		
Time Taken (Minutes)	**Manual Separation**	**Automatic Separation**	**Differences between Manual and Automatic**
30	118	159	41
60	115	156	41
90	115	158	43
120	114	155	41

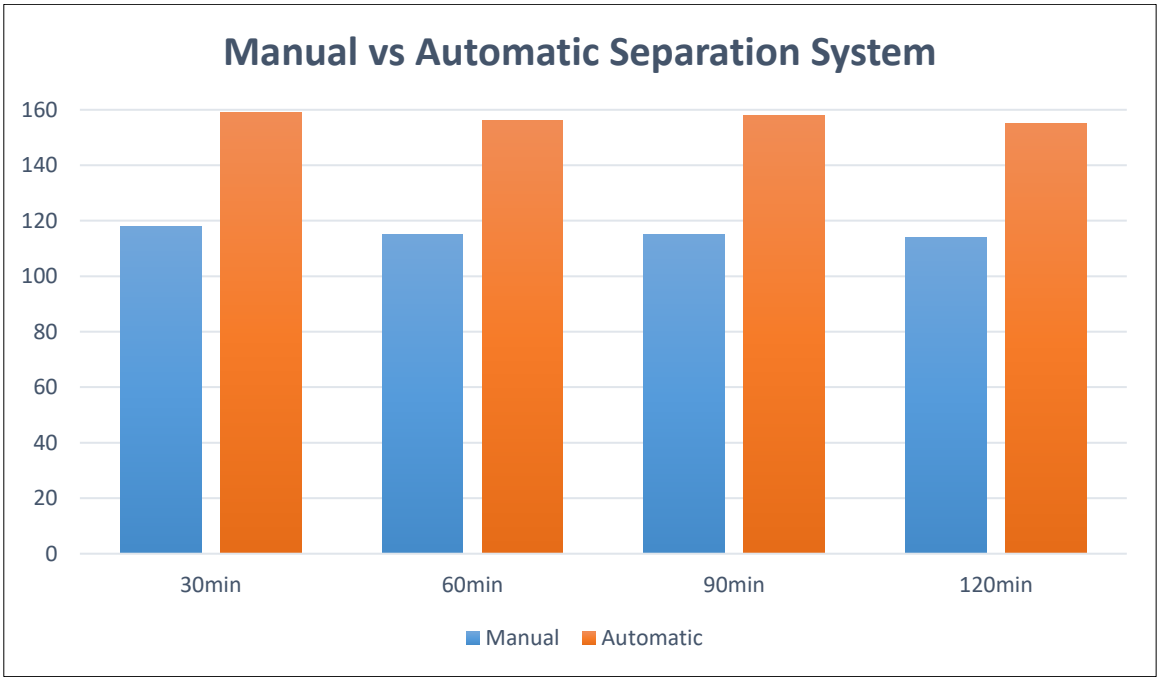


Figure 6: Manual vs Automatic Separation System Against Time

Figure 6 provides a comparative view of manual versus automatic separation performance across four 30 minutes intervals. The automatic system consistently outperformed manual labor, with a peak difference of 43 units at the 90 and continuous 41 units differences at 30, 60 and 120minutes marks. This trend illustrates how even marginal improvements can scale into significant productivity gains over time for more than 34%. The automatic system maintains a steady lead in units separated across increasing durations, indicating enhanced time efficiency and operational reliability.

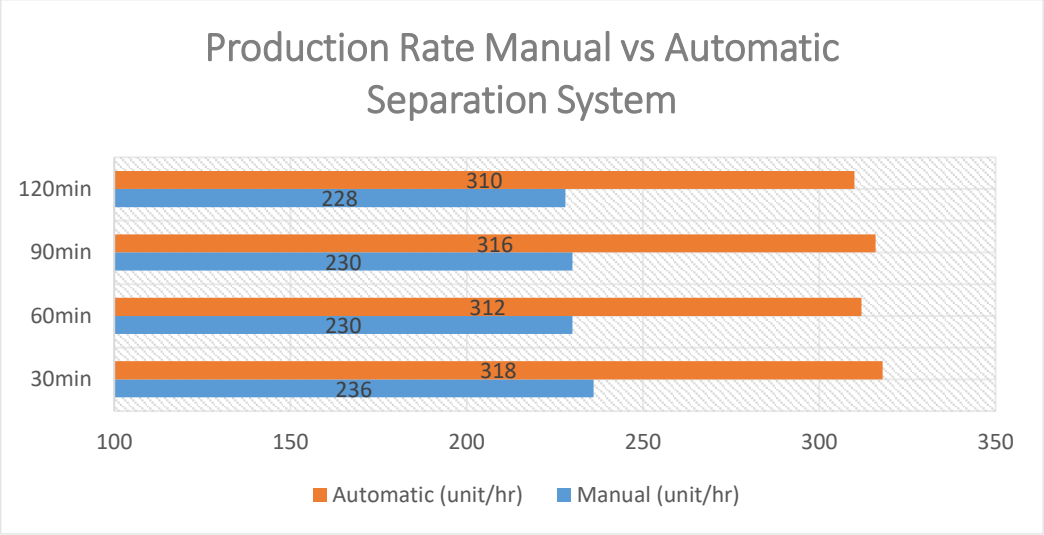


Figure 7: Production Rate Manual vs Automatic Separation System Against Time

Production rate between manual and automatic system shows consistently outperforms the manual system at every time interval. The highest production rate is automatic method with 318 unit per hour compared to the lowest rate 228 unit per hour for manual method. This shows improvement over 35% of production rate over time. Overall, the automatic separation method shows significantly higher productivity across all measured durations, indicating improved efficiency to manual separation method.

Table 2: Cumulative Cost Over Time

Month	Manual Cost (RM)	Automatic Cost (RM)	Savings (RM)
Month 1	1500	700	800
Month 2	1500	200	1300
Month 3	1500	200	1300
Month 4	1500	200	1300
Month 5	1500	200	1300
Month 6	1500	200	1300

Table 2 illustrates the cost saving benefit of the automated system whereas each month company will save more than RM1300. By the end of six months, total savings reach RM7,800, making the system highly cost effective despite initial investment. Overall, the automatic demonstrates substantial financial benefits with a notable initial saving followed by consistently high monthly cost reduction, emphasizing its economic advantage over manual operations. The automatic system, despite being motorized, consumes 29% less energy hourly due to optimized motor control via voltage regulation.

5. Conclusions

As a conclusion, the automated plastic product separation system showed consistent improvements over manual methods across all key performance indicators. With a 35% gain in productivity and 29% lower energy consumption, the system proves not only efficient but also sustainable. Moreover, over a simulated six-month period, cumulative cost savings of RM7,800 were realized, well beyond the initial setup cost. These results align with modern

manufacturing goals such as lean operations, energy conservation, and smart automation. The initial investment of RM700 is recovered in less than one month, resulting in a rapid return on investment (ROI). Over a simulated 6 months period, cost savings accumulate to RM7,800, illustrating the system's economic viability and practical benefit to SMEs in the manufacturing sector.

From a sustainability perspective, the system consumes less energy and reduces reliance on human labor, aligning with industry, innovation & infrastructure by promoting cleaner and more resilient production methods. Additionally, automated separation improves process consistency and minimizes human error, which is critical for maintaining quality control in high volume environments such as injection molding plants. The design's simplicity and modularity support repeatability and scalability. This allows manufacturers to replicate or scale up the system for other production lines with minimal customization, thereby increasing its commercial potential.

Despite these benefits, the current system has limitations. It is tailored to parts of 28 mm diameter and may require redesigning components or mechanisms to handle a wider range of product sizes, shapes, or materials. Future research should explore the adaptability of the system across diverse applications. The development of the Automatic Plastic Product Separation system demonstrates the value of integrating automation into manual processes. It improves productivity, reduces cost, and minimizes human error. Recommendations for future work include enhancing the system with an industrial grade motor, adding safety features such as emergency stop buttons, and expanding the system to accommodate different plastic sizes and materials.

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DESIGN AND DEVELOPMENT OF A FULLY AUTOMATIC COCONUT MILK EXTRACTION MACHINE FOR SME APPLICATIONS

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Abstract: *Coconut milk is a staple in Southeast Asian cooking, but traditional methods of extraction manual squeezing or blending are inefficient, unhygienic, and inconsistent. This project introduces a fully automatic coconut milk extractor tailored for SMEs, designed to be compact, energy-efficient, and hygienic. Using a 24V power window motor, a screw-press mechanism, and food-grade materials, the prototype was developed and tested using grated coconut in various batch sizes. The automatic machine demonstrated significant time savings and high extraction efficiency of up to 95%. Compared to manual and blender methods, it offered better hygiene, consistency, and productivity, proving suitable for small-scale food producers.*

Keywords: *Coconut milk, Automatic extractor, SME Technology, Food Safety, Low Voltage Motor, Screw Press, Productivity Enhancement*

1.0 Introduction

Coconut milk is essential in many Southeast Asian recipes. Traditionally, it is extracted by squeezing grated coconut with water using cloth strainers or bare hands. This manual method is labour intensive, inconsistent, and often unhygienic. A slightly improved approach involves using a blender followed by hand straining, but this too requires significant manual intervention. Small and medium enterprises (SMEs) that rely on coconut milk in their production processes struggle with time efficiency and product consistency. Most industrial-grade coconut milk extractors are bulky, expensive, and unsuitable for SMEs due to their size, power requirements, and complexity. There is a growing need for a compact, hygienic, and cost-effective solution tailored to the specific constraints of SMEs. This project presents the design, development, and testing of a fully automatic coconut milk extractor that addresses these needs using a 24V motor, screw-based extraction system, and food-safe materials.

The Fully Automatic Coconut Extractor we have developed aims to eliminate these limitations by providing a fully automated solution. This machine operates without the need for manual pressure application, making it easier and safer for users, especially housewives and small businesses. Moreover, it is designed to be compact, lightweight, and mobile, with wheels that allow for easy relocation. The machine uses a low-voltage motor (24V) and operates with minimal electricity consumption, making it cost-effective and energy-efficient. The goal of this project is to provide a practical solution for small-scale coconut milk producers, improving both productivity and product quality.

1.1 Objectives of the Project

The objectives of this project are:

iv. To develop a fully automatic coconut milk extractor that enhances extraction efficiency while improving product quality.
v. To ensure the safety and hygiene of the extraction process, preventing contamination and minimizing human error.

1.2 Scope

The scope of this project is focused on the design and construction of a coconut milk extractor that requires only one operator for its operation. Materials used such as Aluminium Composite Panel (ACP), which is durable, corrosion-resistant, and suitable for food processing with Features a 24V Power Window Motor and a 12V battery, ensuring low energy consumption and optimal performance. It has a compact design (300mm x 300mm x 400mm) and is portable for easy movement. This machine affordable for small scale entrepreneurs and household use.

1.3 Problem Statement:

Existing coconut milk extractors are often large, cumbersome, and expensive, making them unsuitable for small-scale use. These machines typically require multiple operators for handling and are not designed with safety or hygiene in mind. Additionally, many current machines do not maximize the yield of coconut milk, often extracting only 70%-80% of the milk from the coconut. Our project aims to address these issues by designing a fully automated, compact, and energy efficient machine that guarantees a higher extraction yield (80%-95%) while ensuring cleanliness and safety.

2.0 Literature Review

Manual coconut milk extraction typically yields between 60–75% efficiency and exposes the product to contamination through direct hand contact. Blender-assisted methods can increase yield to 75–85% but still involve post-blending manual straining. These methods are not scalable for SME operations. According to Anim Agro Technology (2011), traditional methods are suitable for home use but are unsanitary and inefficient in commercial applications. Majalah Keluarga (2014) emphasized the inconsistency in milk concentration and the physical effort involved. Rian Sarawani (2017) documented a semi-automatic system for home industry use, but the size and power requirements limited its feasibility for SMEs.

ACP (Aluminium Composite Panels) are recognized as lightweight, durable, and corrosion-resistant, making them suitable for hygienic food equipment. The use of 24V power window motors, as discussed in Rahman et al. (2022), provides a reliable, low-cost, and energy-efficient drive system suitable for continuous-duty operations. The WHO (2021) outlines the importance of sealed and enclosed food processing systems in preventing contamination and supporting food safety compliance for small producers.



Figure 1: Manual Method and Coconut Milk Extractor

3.0 Methodology

The methodology included conceptual design, CAD modelling, fabrication, and performance testing. The machine frame was built using mild steel and enclosed with ACP panels. A screw-based pressing mechanism was mounted and driven by a 24V power window motor. Transparent acrylic shields were installed to prevent contamination. Fabrication steps included welding, drilling, and panel mounting, followed by wiring and switch installation.

Performance testing was conducted using 1 kg to 2 kg of grated coconut. Three extraction methods manuals, blender, and automatic were compared in terms of processing time, yield, and residue dryness. Each test was conducted five times per batch size to ensure consistency. Figure 1 below illustrates the conceptual design of the machine.

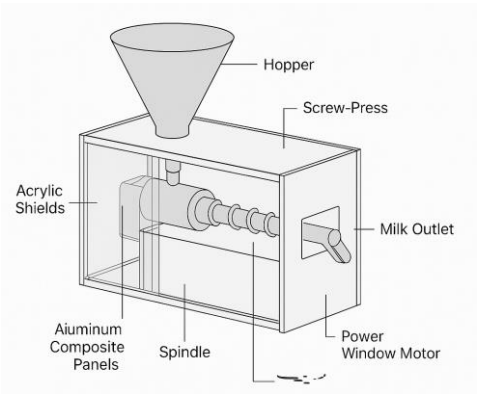


Figure 2: Conceptual Design of the Coconut Milk Extractor

The development of the **Fully Automatic Coconut Milk Extractor** involved several key stages of **conceptual design**, **CAD modelling**, **fabrication**, and **performance testing**.

3.1 Conceptual Design and CAD Modelling

The **conceptual design** of the extractor was created to meet the requirements for efficient coconut milk extraction with minimal manual intervention. The design focused on ease of use,

structural stability, and maximizing milk yield. **CAD modelling** was performed to create a detailed visualization of the machine, ensuring that all components were accurately specified and aligned for the fabrication process.

3.2 Fabrication

The **machine frame** was constructed using **mild steel** for strength and durability. To provide protection and a polished appearance, the frame was enclosed with **ACP (Aluminium Composite Panels)**. A **screw-based pressing mechanism** was installed as the core component for milk extraction. This mechanism was powered by a **24V power window motor**, which was selected for its reliable force output required for pressing the coconut meat. **Acrylic shields** were incorporated around the extraction area to prevent contamination, ensuring hygiene during operation. The fabrication process involved **welding** to join key parts, **drilling** to attach mounting components, and **panel installation** for the casing. The electrical components, including **wiring** and **switch installation**, were also completed to ensure safe and functional operation of the machine.

3.3 Performance Testing

The performance of the coconut milk extractor was evaluated using **1 kg to 2 kg of grated coconut** for each test. Three different extraction methods were compared which is **manual extraction**, **blender extraction**, **Automatic extraction** (using the developed extractor). For each method, the following parameters were measured such as **processing time**. The total time required to extract the milk, **milk yield** and the amount of milk extracted from the coconut. The **residue dryness** of the remaining coconut after extraction. Each method was tested **five times per batch size** to ensure consistency and reliable data.

3.4 Flow Chart

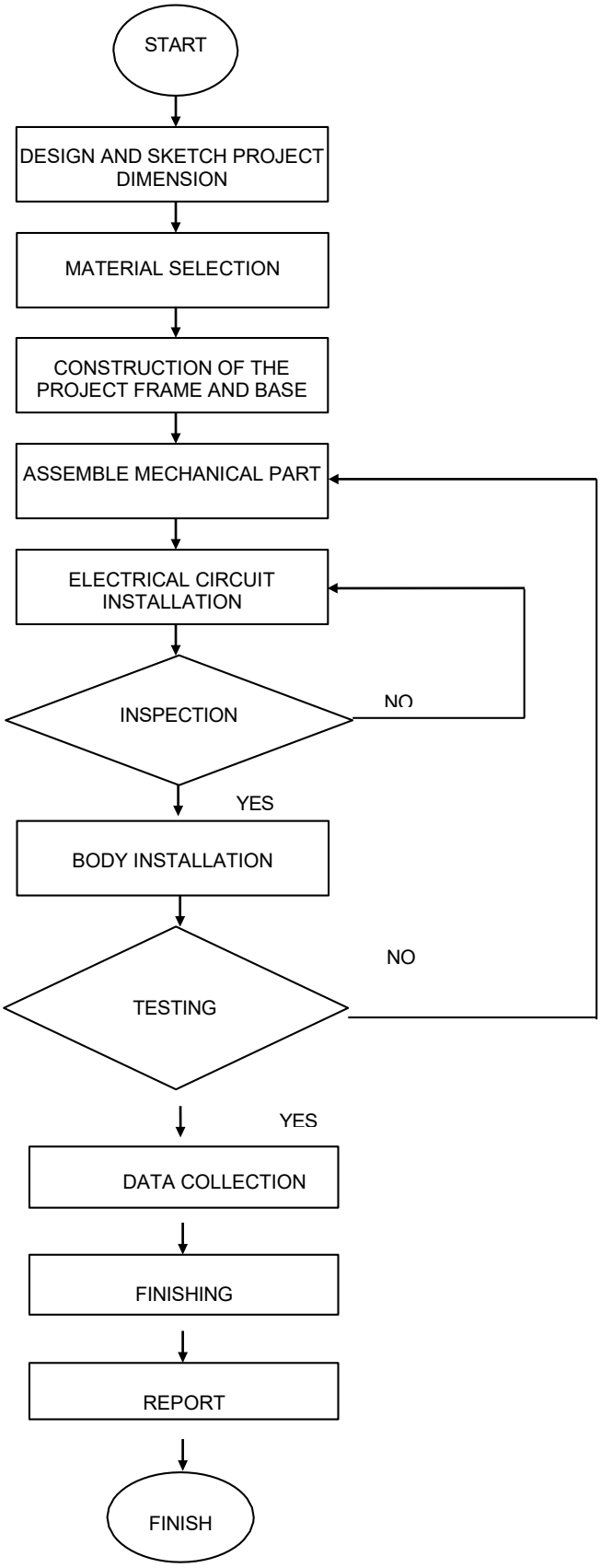


Figure 3: Flow Chart Process

4.0 Results and Analysis

This section presents the performance results for three different extraction methods: manual pressing, blender-assisted, and the fully automatic machine. Each method was tested across various batch sizes (1kg to 2kg), and the results were compared based on extraction time, yield volume, and productivity rate (ml/min).

Table 1: Average Yield and Time per Method

Batch Size (kg)	Method	Avg. Time(min)	Avg. Yield (ml)	Yield/min (ml)
1kg	Manual	17.05	510	29.91
	Blender	16.79	1190	70.88
	Automatic	12.51	1210	96.72
1.5kg	Manual	22.05	580	26.30
	Blender	18.80	1210	64.36
	Automatic	13.11	1480	112.89
1.8kg	Manual	24.9	810	32.53
	Blender	20.61	1650	80.05
	Automatic	14.5	2100	144.83
2kg	Manual	27.6	880	31.88
	Blender	23.49	2010	85.57
	Automatic	14.66	2300	156.89

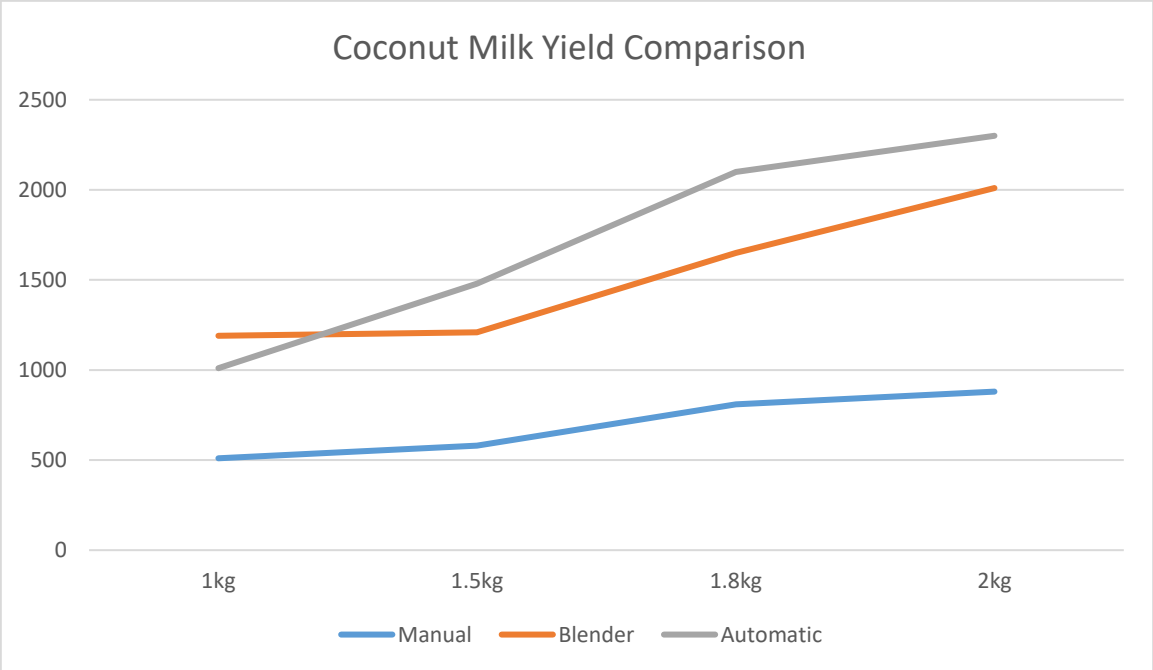


Figure 4: Coconut Milk Average Yield Comparison

The graph above shows the total milk yield obtained for each method at different batch sizes. The automatic method consistently outperforms the manual and blender method in both yield and speed, with the automatic method achieving the highest productivity rate. The Automatic extractor is approximately 30% faster than manual method and 27% faster than the blender method for 1kg of grated coconut. For 2 kg, the time difference becomes even more significant. While the automatic extractor yielded 1000ml of coconut milk from 1kg grated coconut, the blender method achieved a slightly higher yield of 1150ml. However, the significant time savings achieved by the automatic extractor makes it a more attractive option for users who prioritize efficiency. The blender method while yielding slightly more milk required substantially more time to complete the extraction process, making it less efficient overall. The fully enclosed design also ensures the purity and quality of the milk, preventing contamination from the external factors. Moreover, it eliminates the human error present in manual and blender extraction methods. For safety and user friendliness aspect, the automatic extractor is safer and easier to use, reducing the risk of injury compared to the manual and blender methods. The automatic extractor also more cost effective in the long run due to its faster processing time and higher yield, despite the initial higher cost.

4.1 Production Rate of the Automatic Extractor

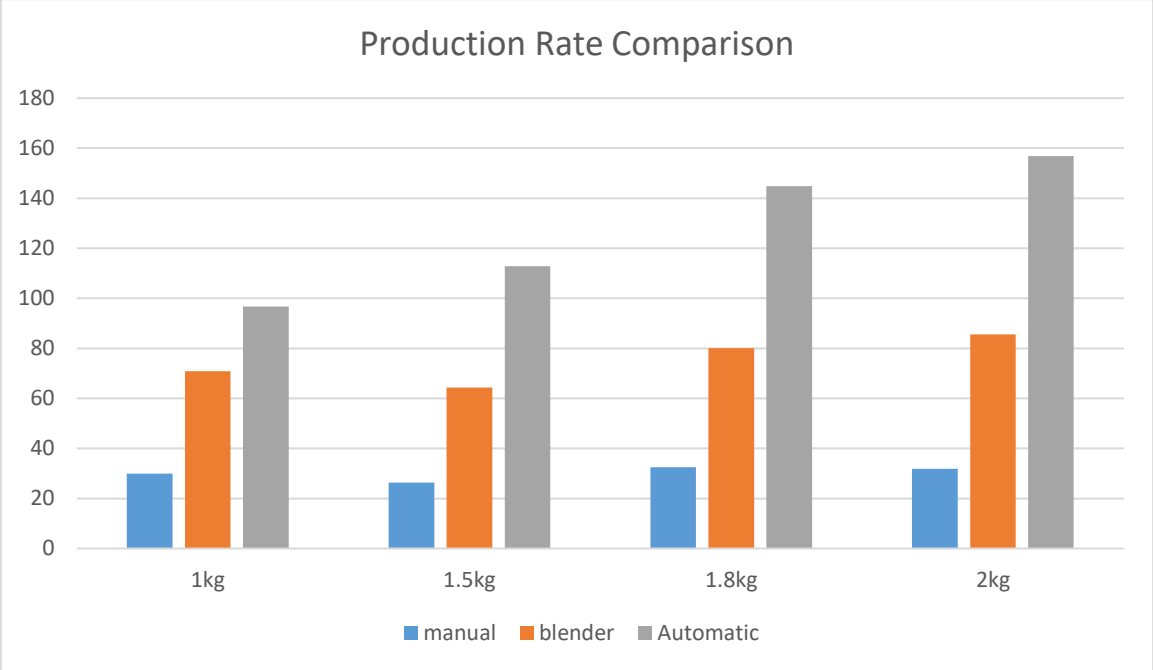


Figure 5: Production Rate Comparison

The production rate is a critical metric for evaluating the efficiency of any extraction system, particularly for small scale business or households. It represents the amount of coconut milk produced within a given period, providing a direct measure of the machine's productivity.

The fully automatic extractor has demonstrated a significant improvement in terms of both extraction efficiency and production rate making it more viable option compared to traditional manual and blender methods.

The automatic extractor is designed to maximize the throughput while maintaining the quality of the coconut milk. Based on the data collected during testing, for 1kg grated coconut the machine extracted 1000ml of coconut milk on average with an extraction time of 12.31 minutes. This shows approximately 81.3ml per minute. For 2kg of grated coconut, the machines extracted 2000ml of coconut milk on average, with a processing time of 16.68 minutes, giving a production rate of 12oml per minute.

This consistent production rate demonstrates that Fully Automatic Extractor can maintain efficiency even as the quantity of coconut processed increases. The production rate is a key factor for small scale coconut milk producers as it directly influences their ability to meet demand while minimizing the time required for extraction.

Several factors also influence to the production rate such as grating efficiency. The quality and consistency of the coconut grating can affect the extraction rate if the coconut grated too fine or too coarse it could impact the amount of milk extracted. Fine grating typically may result in lower milk yield but a faster extractor time.

The type of pressing mechanism integrated into the machine also plays a role in the production rate. A more efficient press that can uniformly apply pressure across the coconut pulp will result in a faster and higher yield. Optimizing the pressing force without damaging the pulp is key to increasing the production rate. Maintenance and cleanliness also effect the operation efficiency. Machines that are poorly maintained or contain excess residue from previous extraction may experience slow processing times and lower production rates. Regular cleaning and servicing are essential to maintaining a high production rate over time.

5.0 Improvements and Recommendations

To optimize the Fully Automatic Extractor several enhancements are recommend such as increasing extraction yield. By adding an additional pressing mechanism could help increase the extraction yield, bringing it closer to 100% efficiency. A dual motor system could be implemented to increase the extraction speed, particularly for larger quantities.

For durability aspect, replacing some components with stainless steel and more wear resistant materials could increase the machine’s lifespan and reduce maintenance costs. Adding Bluetooth connectivity or smart control system could provide users with remote monitoring and allow for more extraction process. A modular design could allow user to start with a basis model and upgrade as needed, making the machine more accessible to a wider audience.

6.0 Conclusion

The Fully Automatic Coconut Extractor offers significant advantages over manual and blender methods in terms of efficiency, yield, quality and safety. The machine’s fully automated system ensures faster extraction times, more consistent yields and superior coconut milk quality, making it an excellent choice for small scale coconut milk producers household users and small businesses. The proposed improvements including increased yield, enhanced durability and the addition of smart features will further optimize its performance and broaden its applicability, making it a valuable tool in the coconut milk production industry.

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TO PRODUCE MARKER INK FROM FOOD WASTE

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Abstract: *In developed nations, food waste poses significant environmental and economic challenges with fruit and vegetable by-products such as peels, pomace, rind, and seeds are often discarded as non-edible waste (DeConinck, P., 2017), (Kumar, H., 2020). This research explores the potential of repurposing such food waste, specifically banana peels, tapioca peels, and potato peels, for sustainable ink production. In response to the growing interest in volatile organic compound (VOC) free or low VOC inks, the study adopts a green chemistry approach by utilizing plant-based pigments derived from food waste. The pigments are produced via carbonization, a thermal decomposition process in limited oxygen conditions that yields carbon rich residues like charcoal or carbon black. These residues serve as natural pigments in the formulation of biodegradable ink. The study aims to identify the most effective food waste source among the selected peels as an alternative to synthetic marker ink and to analyse the physical properties of the resulting plant-based pigments. Findings indicate that banana-derived pigment exhibits a near to neutral pH, aligning with commercial ink standards. Furthermore, the pigment from banana peels produces darker ink with increased carbon concentration, unlike tapioca and potato-based inks, which lighten as carbon concentration increases. These properties suggest that banana peels offer superior performance in pigment quality and compatibility with existing ink formulations. In conclusion, banana peels are a promising sustainable alternative for industrial ink production, offering environmental benefits and meeting standard performance criteria, thereby supporting the shift toward eco-friendly manufacturing practices.*

Keywords: *Food Waste, Sustainable Ink, Carbonization, Plant-Based Pigments.*

Introduction

In developed nations, food waste is a significant problem that presents both economic and environmental difficulties (DeConinck, P., 2017). Among the most frequently discarded materials are peels, pomace, rind, and seeds as by-products of fruits and vegetables that are typically considered non-edible and are often thrown away without further use (Kumar, H., 2020). These materials are rich in organic compounds and can serve as valuable raw materials for various industrial applications. This research explores an innovative approach to sustainable ink production by utilizing locally available food waste, specifically banana peels, tapioca peels, and potato peels. There is interest in developing volatile organic compounds (VOC) free ink or low VOC free ink formulations using natural and biodegradable components such as plant-based pigments from food waste to reduce both health hazards and environmental pollution, aligning with green chemistry principles and improving overall safety. Carbonization

is a thermal decomposition process in which organic materials such as food waste are heated in a limited or no oxygen environment to convert them into carbon-rich residues like charcoal or carbon black. These black pigments, primarily composed of elemental carbon, serve as a valuable byproduct. During the combustion process, organic materials present in food waste such as banana, tapioca, and potato peels undergo thermal decomposition, resulting in the formation of black carbon-rich residues. Due to their intense colouration and stability, these carbon pigments can be effectively utilized as a dye source in the formulation of commercial ink, offering a sustainable alternative to synthetic pigments (Ogunniyi, D. S., & Kio, O. J., 2011). The primary goal is to repurpose these agricultural by-products, which are abundantly available and otherwise underutilized, to develop an eco-friendly, cost-effective commercial marker ink (Wong, G., 2022).

Bananas, belonging to the genus Musa within the family *Musaceae*, are among the most important fruit crops cultivated worldwide. Native to tropical regions, bananas thrive in warm, humid climates and are grown extensively across Asia, Africa, and Latin America. They are highly valued for their flavour, nutritional benefits, and year-round availability, making them a staple fruit in both tropical and non-tropical regions. The banana plant itself also contributes significantly to agricultural and economic sustainability in tropical regions, offering biomass for compost, animal feed, and even natural fibre products. A study focusing on carbon ink derived from banana peels found that a formulation containing 30% banana peel carbon concentration yielded optimal results. The measured properties were density, pH, pigmentation and viscosity (Fatimah, S., Mustika, N., Pratiwi, S., 2020).

Tapioca is a starch extracted from the root of the cassava plant (*Manihot esculenta*), a crop native to South America and the Caribbean. Today, cassava is cultivated globally and is recognized by various names depending on the region including cassava and yucca. The term "tapioca" originates from the word tipi'óka, meaning "starch" in the Tupí language of South America. Nutritionally, tapioca is almost entirely composed of carbohydrates and contains very little protein, gluten, saturated fat, cholesterol, or sodium. Tapioca itself also contributes significantly to agricultural and economic sustainability in tropical regions, offering biomass for compost, animal feed, and even natural fibre products. A study focusing on carbon ink derived from tapioca peels found that a formulation containing 35% tapioca peel carbon concentration yielded optimal results. The measured properties were density, pH, pigmentation and viscosity (Fatimah, S., Mustika, N., Pratiwi, S., 2020).

The potato (*Solanum tuberosum*) is an herbaceous annual plant belonging to the nightshade family (*Solanaceae*). It is cultivated primarily for its nutrient-rich, starchy tubers, which are a dietary staple in many regions of the world. Nutritionally, it is rich in B vitamins like thiamin (B1) and niacin (B3), which play key roles in energy metabolism and easily digestible, making them suitable for people of all ages, including children and the elderly. In addition to their food value, potatoes contribute to food security due to their adaptability to diverse climates, short growing cycles, and high yield per hectare. A study focusing on carbon ink derived from potato peels found that a formulation containing 38% tapioca peel carbon concentration yielded optimal results. The measured properties were density, pH, pigmentation and viscosity (Fatimah, S., Mustika, N., Pratiwi, S., 2020).

Environmental Concerns of Current Commercial Ink

Commercial inks, widely used in printing, writing instruments, packaging, and textiles, often pose significant environmental concerns due to their chemical composition and production processes. The following are key environmental issues associated with conventional ink formulations presence of Volatile Organic Compounds (VOCs), use of petrochemical-based ingredients, toxic pigments and heavy metals, water and soil contamination, lack of biodegradability, and high energy consumption and carbon footprint.

Presence of Volatile Organic Compounds (VOCs)

Many commercial inks, particularly solvent-based inks, contain high levels of volatile organic compounds (VOCs). VOCs are chemicals that easily vaporize at room temperature, contributing to air pollution and the formation of ground-level ozone (a major component of smog). Inhalation of VOCs can also pose serious health risks to workers and consumers, including respiratory issues, headaches, and long-term chronic illnesses.

Use of Petrochemical-Based Ingredients

Traditional inks often rely on petrochemical derivatives such as mineral oils, synthetic dyes, and resins. These non-renewable resources are energy-intensive to extract and refine, contributing to the depletion of fossil fuels and increased greenhouse gas emissions. Their non-biodegradable nature also means they persist in the environment long after use (Singh, P., & Sharma, A., 2016).

Toxic Pigments and Heavy Metals

Some inks contain hazardous substances such as lead, cadmium, chromium, and mercury, especially in coloured or metallic inks. These heavy metals can contaminate water and soil if not properly disposed of, posing risks to aquatic life and ecosystems and potentially entering the food chain.

Water and Soil Contamination

Improper disposal of ink waste, including through printing effluents or landfill leakage, can introduce toxic compounds into water bodies and soil. This contamination disrupts ecosystems and may render water unsafe for human consumption or agricultural use.

Lack of Biodegradability

Most commercial inks are not biodegradable, especially those based on synthetic polymers. This leads to long-lasting pollution in landfills and challenges in recycling printed materials, especially in the paper industry where de-inking is required before repulping.

High Energy Consumption and Carbon Footprint

The production of synthetic inks involves complex chemical synthesis, high-temperature processing, and energy-intensive purification stages. This contributes to a large carbon footprint compared to natural or plant-based alternatives.

Problem Statement

Commercial printing and marker inks, especially those used in mass printing (whiteboard, books, packaging, newspapers) are pose several environmental issues due to their chemical makeup, production processes, and disposal impacts. A variety of organic and mineral compounds, some of which were toxic, had short shelf lives, or were expensive to manufacture (Anastas, P.T., & Warner, J.C., 1998). Commercial ink markers, especially permanent markers and industrial-grade inks, often contain high levels of volatile organic compounds (VOCs). VOCs are a class of organic chemicals that easily evaporate at room temperature and include substances such as toluene, xylene, acetone, and ethanol. These compounds are used in markers ink in order to help dissolve pigments or dyes, to improve ink flow and drying time as well as to enhance adhesion to surfaces like plastic, metal, or glass. Some ink pigments contain toxic heavy metals such as lead, cadmium, chromium, and mercury. These substances pose serious environmental risks, as they can contaminate soil and water during disposal. In addition to harming ecosystems, these metals present significant health hazards to workers involved in manufacturing and disposal processes. Furthermore, inks containing heavy metals are difficult to recycle and challenging to incinerate safely, complicating waste management and increasing the risk of long-term environmental damage. Ink waste from industrial is often hazardous (Afolabi, O.O., & Adetuyi, F.O., 2017). Sludge from ink manufacturing may require special treatment before disposal. Synthetic inks do not biodegrade easily, contributing to long-term environmental impact. Ink residues on packaging can interfere with composting and biodegradability of otherwise eco-friendly materials. Ink manufacturing involves energy-intensive processes and generates greenhouse gas emissions. Transport of inks and solvents also contributes to the environmental load (ASTM International, 2015).

Research Objectives

The objectives of this research project are:

i. To determine the most suitable food waste from banana peels, potato peels or tapioca peels as sustainable alternative to synthetic marker ink.
ii. To analyse the similarities of physical properties of the plant-based pigments from food waste.

Literature Review

The literature review for this research paper is tabulated in Table 1 as below.

Table 1: Findings On Food Waste as Potential for Commercial Inks

No	Findings	Journal Title	Author, Year
1.	Banana fibre offers an eco-friendly and cost-effective alternative to synthetic fibres, making it a sustainable choice	Banana fibre: a natural and sustainable bioresource	Balda, S., Sharma, A., Capalash, N., Sharma, P., (2021)

	for various industrial and textile applications.	for eco-friendly applications.	
2.	Biomass waste with the potential to be utilized as a raw material in the production of activated carbons.	Natural fibres and their composites.	Chand, N., Fahim, M. (2021)
3.	The results indicated that the concentration of carbon derived from banana or cassava peels influenced key ink properties such as density, viscosity, pH, and pigment content. Notably, the whiteboard marker ink formulated from banana peel carbon exhibited characteristics comparable to those of commercial inks.	Carbon ink characterization from banana and cassava peels by carbonization method.	Fatimah, S., Mustika, N., Pratiwi, S. (2020)
4.	Food waste occurs at every stage of the supply chain from agricultural production and industrial processing to retail distribution and household consumption.	3D food printing sustainability through food waste upcycling.	Hooi, G., Pant, A., Zhang, Y., Chee, K.C., Hashimoto, M., Chen H.L., Tuan, X. (2022)
5.	Biosorption of two acid dyes Acid Blue 113 and Acid Black from aqueous solutions showed that dye uptake increased with longer contact time, reaching equilibrium at approximately 2 hours. However, the removal efficiency of the acid dyes decreased as the initial dye concentration increased, indicating a concentration-dependent biosorption performance.	Removal of acid dyes from aqueous solution using potato peel waste biomass: A kinetic and equilibrium study.	Hoseinzadeh, E., Samarghandi, M.R., Mckay, G. (2014)

Methodology

Based on Figure 1 below, the flow chart to produce marker ink from food waste is simplified into a process flow.



Figure 1: Flow Chart to Produce Marker Ink

Banana, potato and tapioca peels can be effectively transformed into carbon powder, which serves as a natural pigment for ink production. The process of the marker ink begins with washing and drying of the banana, potato and tapioca peels in order to remove any dirt and moisture. Once dried, the peels undergo carbonization, a process in which they are burned in a controlled, low-oxygen environment to produce charcoal. This charcoal is then ground into a fine powder, creating the black pigment material.

To formulate the ink, the carbon powder is mixed with a natural binder, such as acacia gum, and combined with solvents such as 70% alcohol and distilled water to achieve the desired consistency and flow properties. This eco-friendly method has been successfully applied to the production of whiteboard marker ink, show casing both its practical application and sustainability. For this research project, there are three variables to be measured and studied such as constant variable, constant variable, manipulated variable and measured variable. For constant variable, variables such as ethanol 70%, arab (acacia) gum, distilled water, and glycerin will be constant. Meanwhile, for manipulated variable, variables such as banana peels, tapioca peels, and potato peels will be manipulated. The third variable is measured variable where density, pH and pigmentation of the ink will be measured.

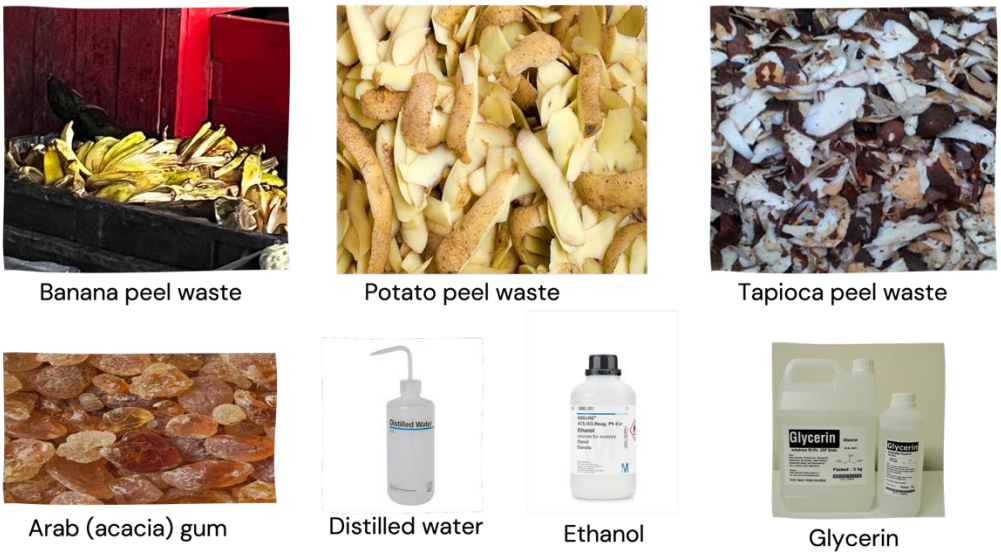


Figure 2: Raw Materials for The Carbonization Process to Produce Marker Ink

Carbonization Process

The initial step involved preparing the organic waste materials. Banana peels, tapioca peels, and potato peels were thoroughly washed to remove impurities, followed by oven-drying at 140°C for 7 hours to ensure complete dehydration. The dried peels were then subjected to carbonization through controlled burning in a low-oxygen environment, producing charcoal. The resulting charcoal was ground using a blender to achieve a fine powder. To ensure uniform particle size, the powder was sieved through a 200 mesh sieve, allowing only particles of the desired fineness to pass through while retaining larger particles for reprocessing.

Whiteboard Ink Formulation

To produce the whiteboard ink, the carbon powder derived from the banana, tapioca, and potato peels was blended with a resin solution composed of Arabic gum, 70% ethanol, distilled water, and glycerin as an additive. As Arabic gum is hydrophilic, it was first dissolved in distilled water at 80°C to 90°C with continuous stirring using a glass rod until a homogeneous slurry was achieved. The ink formulation was prepared by varying the carbon slurry concentration to evaluate the effect on ink characteristics. Concentrations tested included 25%, 30%, 35%, and 40% carbon content. For each variation, the carbon powder was mixed with 5 grams of Arabic gum, 35 mL of ethanol, ml, distilled water 50 ml, and glycerin 15 ml for each variation of concentration, then stirred thoroughly for approximately 30 minutes to ensure an even distribution of components. The final ink samples were subjected to characterization tests to assess their suitability for use in whiteboard markers.

Result and Discussion

From the experimental work, there are three variables to be measured which are density, pH and pigmentation of the ink from the banana, potato and tapioca peels.

Table 2 and Table 3 shows the result of density and pH of the ink based on mass of 25g, 30g, 35g and 40g from the banana, potato and tapioca peels respectively.

Table 2: Density (g/cm^3) vs Mass of Banana, Tapioca and Potato Peels (g)

No.	Mass of carbon (g)	Density of banana (g/cm^3)	Density of tapioca (g/cm^3)	Density of potato (g/cm^3)
1.	25	0.1923	0.1894	0.1866
2.	30	0.2308	0.2273	0.2239
3.	35	0.2692	0.2651	0.2612
4.	40	0.3077	0.3030	0.2985

Table 3: pH vs Mass of Banana, Tapioca and Potato Peels (g)

No.	Mass of carbon (g)	pH of banana	pH of tapioca	pH of potato
1.	25	6	4	5
2.	30	5	5	6
3.	35	6	6	6
4.	40	7	5	6

Figure 3 and Figure 4 shows the result of pigmentation and pH of the ink based on mass of 25g, 30g, 35g and 40g from the banana, potato and tapioca peels respectively.

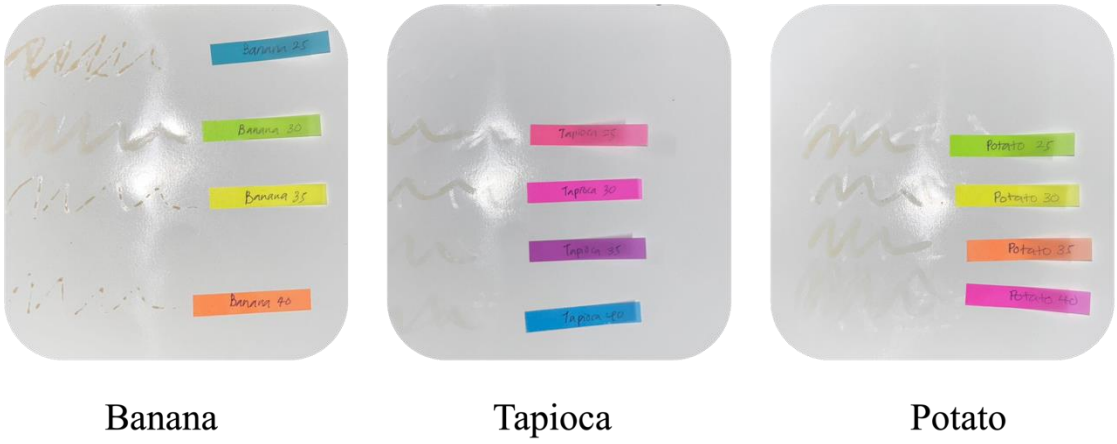


Figure 3: Pigmentation vs Mass of Banana, Tapioca and Potato Peels (g)

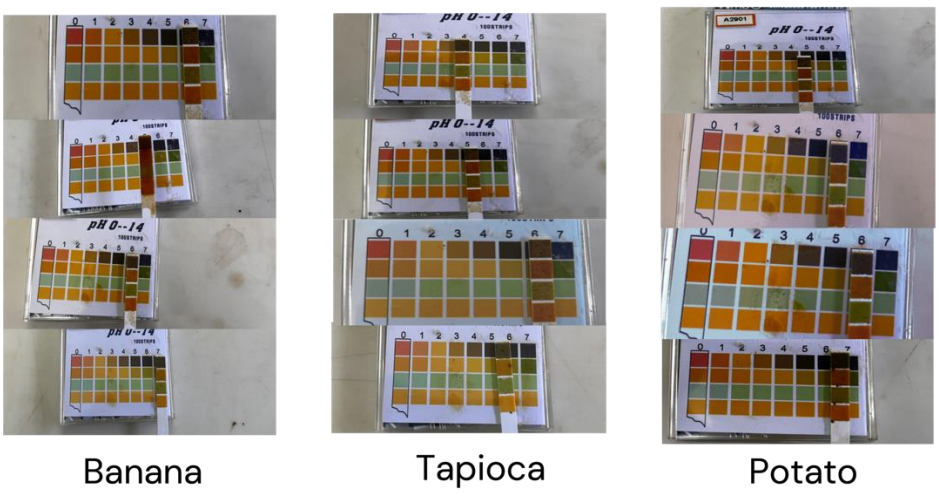


Figure 4: pH vs Mass of Banana, Tapioca and Potato Peels (g)

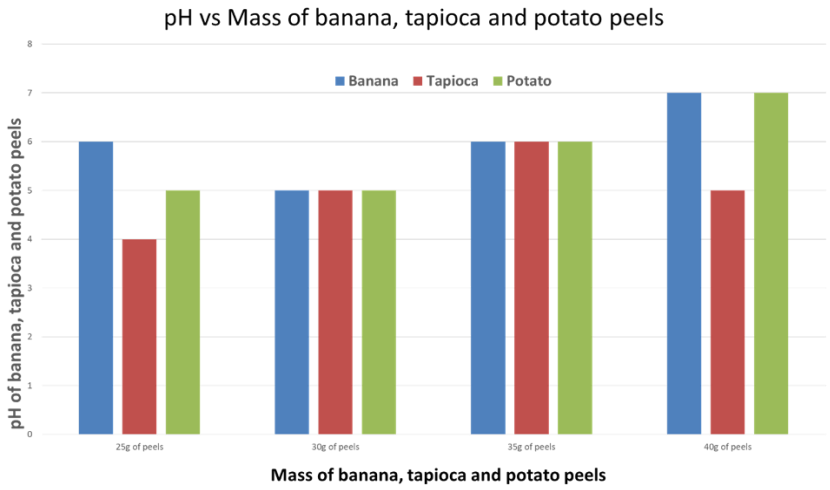


Figure 5: pH vs Mass of Banana, Tapioca and Potato Peels (g)

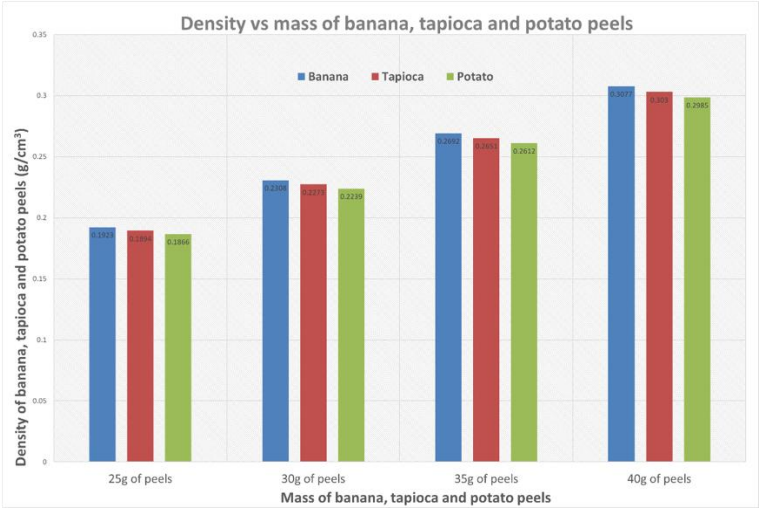


Figure 6: Density vs Mass of Banana, Tapioca and Potato Peels (g)

From the above Figure 3, Figure 4, Figure 5 and Figure 6, it shows that pigmentation of ink using banana peels is darker compared to tapioca and potato peels. The pigmentation intensity of banana peels has been observed to deepen as both the concentration and mass of the peels increase, indicating a direct correlation between material quantity and colour density. This characteristic is particularly relevant in the context of natural ink production, where darker pigmentation enhances visibility and usability. Additionally, banana peels exhibit a pH value that is approximately neutral (around pH 7), which is a significant advantage when considering their application as a base for natural and biodegradable inks. A neutral pH not only aligns with the safety and environmental standards typically required for commercial ink formulations, but also ensures chemical stability and minimal risk of adverse reactions with various substrates. The near-neutral pH of banana peel-based inks contributes to their compatibility with standard ink systems, making them suitable for use on a wide range of surfaces without compromising performance. This compatibility supports their potential as a sustainable alternative in printing technologies, particularly in applications focused on eco-friendly packaging, labelling, and

educational materials. Thus, banana peels present a promising raw material for the development of safe, natural, and environmentally responsible ink products.

Most water-based and conventional printing inks are engineered to perform effectively on substrates with a pH ranging from 5.5 to 7.5, which corresponds to a neutral to slightly acidic environment. Deviations from this optimal pH range either towards higher alkalinity or increased acidity can adversely affect ink performance. Specifically, an imbalanced pH can lead to the degradation of pigment integrity, interfere with the adhesion of ink to the substrate, hinder proper drying, and potentially trigger unwanted chemical reactions. These effects compromise both the visual quality and durability of the printed material. Banana peels, which exhibit a pH within this suitable range, are therefore considered chemically compatible with many types of standard inks. This compatibility ensures that printing or marking on banana peels does not impair ink performance, making them a promising and sustainable substrate for applications such as eco-labelling, barcode printing, and educational materials.

The environmental drawbacks of commercial ink highlight the urgent need for sustainable alternatives. Shifting toward eco-friendly, plant-based, and biodegradable ink formulations such as those derived from food waste that can significantly reduce environmental impact, promote resource conservation, and align with green manufacturing principles. Industrial ink waste is often classified as hazardous, requiring careful handling and disposal. The sludge generated during ink manufacturing frequently contains harmful chemicals and must undergo specialized treatment to ensure it is safely disposed of in compliance with environmental regulations. Utilizing food or agricultural waste to produce ink pigments offers several important environmental advantages. These benefits align with sustainable development goals and green chemistry principles, addressing both waste management and pollution reduction.

Among the natural sources evaluated, banana peels demonstrate the most favorable properties for marker ink production compared to tapioca and potato peels. In terms of density, banana peel-based ink maintains a stable and appropriate range that supports smooth ink flow and consistent application. Its pH level, which is close to neutral, aligns well with commercial ink standards, minimizing the risk of chemical degradation or incompatibility with common printing substrates. Additionally, banana peels exhibit stronger and darker pigmentation as their concentration increases, enhancing the visual quality and effectiveness of the ink without requiring synthetic dyes. In contrast, tapioca and potato peels display less intense pigmentation and may have slightly more variable pH levels, making them less ideal for consistent ink formulation. Collectively, these characteristics position banana peels as a superior and sustainable raw material for developing natural marker inks.

Converts Food or Agricultural Waste into Valuable Material

Transforming food waste such as banana peels, tapioca peels, and potato peels into ink pigments gives new life to materials that would otherwise be discarded. This process, known as waste valorisation, supports a circular economy by turning waste into a useful product. It reduces the environmental impact of food waste while creating value-added, eco-friendly materials for industrial use (Sharma, A., & Kaushal, R., 2018).

Reduces Landfill Volume

Food and agricultural waste are among the most common materials in landfills. When these organic materials decompose in landfills, they generate methane, a potent greenhouse gas. By redirecting this waste into pigment production, the volume of material sent to landfills is significantly reduced. This not only lowers methane emissions but also decreases the burden on waste management systems and extends landfill lifespans.

Provides a Non-Toxic Alternative to Petroleum-Based Pigments

Conventional inks often contain petroleum-based chemicals and synthetic dyes that can be harmful to human health and the environment. In contrast, pigments derived from food waste are natural, biodegradable, and non-toxic. They do not release harmful volatile organic compounds (VOCs) or heavy metals, making them safer for users, manufacturers, and ecosystems. This also reduces the risk of soil and water contamination, promoting overall environmental safety.

Conclusion

Using natural ink derived from food waste presents a wide range of environmental, economic, and health benefits, making it a compelling alternative to conventional synthetic inks. One of the key advantages is eco-friendly and sustainable nature. By repurposing food scraps such as fruit peels, vegetable skins, and coffee grounds, this approach significantly reduces waste and lessens the dependence on petroleum-based inks and toxic chemical additives. The inks produced are typically biodegradable and non-toxic, helping to reduce environmental pollution and contributing to a more sustainable printing industry. Another major benefit is that these natural inks are low in volatile organic compounds (VOCs) or completely VOC-free. VOCs, commonly found in synthetic inks, can pose serious health risks. In contrast, natural inks are safer for human use, particularly in applications involving food packaging or children's products, as they are free from heavy metals and harmful solvents.

Moreover, these inks are made from renewable raw materials, including beetroot, turmeric, spinach, pomegranate, and carbonized food waste like banana peels. These materials are not only abundant but also support a circular economy by turning waste into valuable resources. From an economic perspective, natural inks can be cost-effective over the long term. Utilizing low-cost or freely available food waste as raw material helps reduce the production costs of producing marker ink, while it also lowering waste disposal expenses for the food industry.

Additionally, the possibility of localised natural ink production reduces reliance on the long-distance transportation, further decreasing on the environmental footprint. Natural inks are also safe for sensitive applications, making them ideal for eco-friendly packaging, educational materials, and art supplies. They are particularly suitable for use in biodegradable or compostable products. Lastly, natural inks provide a unique aesthetic appeal, offering organic textures and earthy tones that resonate with environmentally conscious consumers and are well-suited for sustainable fashion, art, and design projects.

These findings indicate that carbon ink derived from banana peels is a promising and practical alternative for whiteboard markers. Among the tested materials, banana peels produce ink with

physical properties most closely resembling those of industrial standard whiteboard markers. The carbonized banana peel ink demonstrates key characteristics such as consistency, colour intensity, and pH that align well with commercially available ink formulations.

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OCCUPATIONAL SAFETY AND HEALTH (OSH) AWARENESS AMONG STAFF AND STUDENT AT MECHANICAL DEPARTMENT, POLIMAS

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Abstract: *Safety is a state in which hazards and conditions leading to physical, psychological or material harm are controlled to preserve the health and well-being of individuals and the community. The safety aspect is an important factor in any organization, including Institutions of Higher Learning. All aspects of occupational safety and health should have particular attention by the organization because it involves direct costs and indirect costs. The purpose of this study is to determine the level of awareness among staff and students of Mechanical Engineering department in a polytechnic on Occupational Safety and Health (OSH) at the workplace. This fits with the work environment of the department where it involves a lot of use of workshops and laboratories. A set of questionnaires has been used which focused on assessing attitudes, participation, level of satisfaction with aspects of the workplace safety, the role of management, and awareness about the risk of accidents in their workplace. The respondents for this study consisted of 68 staff and 206 students. Data was analyses descriptively using frequency distribution, percentages and means for identifying the level of awareness towards safety aspects in the workplace. Mean overall scores for this study were 3.78 where it shows the level of awareness on OSH is high among the respondents. The lowest overall mean scores obtained in management support category and the highest overall means score is in the attitude category. Almost all the department staff and students expect more efforts made by management to promote safety in the workplace.*

Keywords: *Occupational Safety and Health (OSH), Awareness, Institutions of Higher Learning, workplace safety*

1.0 Introduction

Occupational safety and health issues are particularly important aspect involving high-risk work either in the construction, manufacturing and other industries that involve the use of chemicals and machinery. This is not an exception in institutions of higher learning, especially those offering engineering or science and technologies courses widely used in laboratories and workshops for teaching and learning. One polytechnic was selected among institutions of higher learning in Malaysia as a case study for this project.

Malaysia has a right path to become a developed country. To achieve our 2020 vision, the education sector has been the main focus of our government. During the 2013 budget presentation, the Government has allocated almost 39 billion ringgits for the educational sector to strengthen human capital. Polytechnics have become one of the favorite choices among holders of the Malaysian Certificate of Education (MCE).

1.1 Problem statement

Safety and health is the responsibility of all parties, including employers and workers, to prevent the occurrence of injuries or accidents at the workplace. Employees should take all precautionary measures and follow the rules during perforn1ing the task given. At the same time employers should provide and create a safe working area and provide adequate personnel protective equipment to the workers.

Thuss, one of the areas of concern by OSIIA I994 was to increase the awareness of employer and workers about importance of good occupational safety and health practices. All a aspect of occupational safety and health should have particular attention from the organization because it involves direct cost and indirect costs. Direct costs are cost of sick leave, payment of co t against the inability to do the job, cost of the replacement of worker who died or injured due to occupational accidents and worker compensation payments. An example of indirect costs is the reduction of productivity of the organization.

Table 1.1: Frequency of reported accidents year 2009 - 2013

Details	Years				
	2009	2010	2011	2012	2013
Total accidents reported	55, 186	57, 639	59, 897	61, 552	63, 578
Incident Rate (per 1,000 workers)	1.04	1.05	3.40	3.31	3.28
Fatality Rate (per 100,000 workers)	NA	3.45	6.17	4.64	4.62

1.2 Project objective

The aim of this project is to study on occupational safety and health (OSH) awareness among employees and students at an Institution of Higher Learning in Malaysia. The objectives of this study are:

To determine the level of awareness among Department of Mechanical Engineering staff and students at one of the higher Learning Institutions in Malaysia towards safety and health (OSI I) at the workplace.

To evaluate the relationship between demographic factors that influences the awareness level among Department of Mechanical Engineering staff and students towards safety and health (OSH) at the workplace.

3.To propose action to be taken by the department to increase awareness about OSH among their staff and students.

1.3 Scope and boundaries of studies

This project is carried out in one of the Higher Learning Institutions that is a polytechnic located

in the northern region of Malaysia where the staff and students are involved with the use of tools and machinery, and they were exposed with the high-risk workplaces. The result of this study would not represent the overall polytechnics or other institutions. Due to differences in aspect, i.e. mission, vision and management approach for each institution.

2.0 Methodology

This study is a survey of perceptions of academics and non-academic staff in Department of Mechanical Engineering, on their awareness of occupational safety and health at work. This study involved the collection of data through questionnaires that will be performed on the selected respondents.

This study is the evaluation of knowledge, understanding, opinions, acceptance and awareness of respondents on the study made. The conclusion in this study is based on a group of respondents selected to represent the whole population in this department. The questionnaire was distributed only once to the respondents and that means there is no control group in this study.

2.1 Research Model

The model for this study was established based on the goals and objectives of this study. Overview of the overall execution of this study can be summarized as shown in figure 2.1.

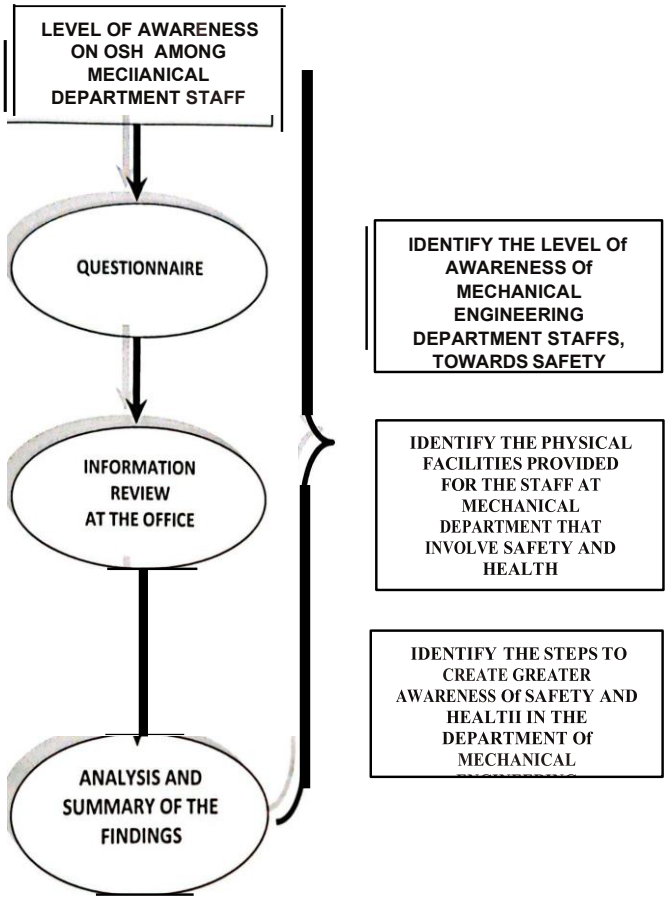


Figure 2.1: Research Model

2.2 Sampling Method

Methods of data collection for this study are based on the type of data required. In general, in this study data was collected based on primary data sources. Primary data is data obtained from primary sources (respondents) from questionnaires and analysis.

For this study, a set of questionnaires has been prepared, which aimed to look at Department of Mechanical Engineering staff and students' awareness of occupational safety and health at the workplace. This questionnaire consists of two parts, Part I and Part II. Part I of this questionnaire is to investigate and evaluate the background of the respondents, and Part II served to examine the respondents' perceptions of the policies and workplace safety policies, procedures / regulations for workplace safety, equipment, safety training, safety and health committee in the workplace, commitment and attitude and work environment. This questionnaire uses two methods to determine the reaction of the respondents, using multiple choice questions and five-level scale of the Likert Scale. A summary of the scale is shown in Table 3.1 below:

Table 2.1: Level of Likert Scale Items

Scale	Explanatory Answers
1	Strongly Disagree
2	Disagree
3	Agree less
4	Agree
5	Highly agree

When preparing the questionnaire, the priority circumstance that should be included in the question items are:

1. Background of the respondents.
2. Commitment and Attitude.
3. Participation.
4. Occupational safety and health committee.
5. Prevention Actions.
6. Regulations and Enforcement.
7. Management support.
8. Working Environment.

Process hazards identification methods are used to evaluate possible hazards due to mal operations associated with the process, and to identify any potential hazards. The techniques predominantly deal with hazards due to deviation from the normal operating conditions (e.g. temperature, pressure), and the presence of harmful materials. A visit has been made to selected workshops and laboratories to get a clear picture of those places. Each workshop has been observed and of all matters relating to safety will be recorded in the hazard analysis form. A table was designed to obtain information about the safety of the workplace environment. Every

possibility that will lead to an accident will be recorded and it has specific level for each circumstance.

The risk level of a hazard is then calculated by multiplying the probability and the severity level therefore resulting in a figure that considers not only how serious a hazard is but also how likely it is that the accident will happen. Cumulative number of these levels will determine the level of risk for that place.

2.3 Data Analysis Method

Statistical Package for Social Sciences (SPSS) software is used to analyze data. All data obtained will be processed by using frequency tables and percentages. Overall mean for each category will determine the response of the respondents for that category. Analysis of the frequencies and percentages were used to explain the demographics of respondents to the objective type questions they have answered, while the data related to the opinions and recommendations, and interviews were analyzed qualitatively.

Table 2.2: Mean Value Scores for Determining Level of Respondents Satisfaction and Awareness. (Durrishah Idrus et al, 2004)

Range of mean	Level of strength
3.68- 5.00	High
2.34-3.67	Medium
1.00-2.33	Low

3.0 Result and Discussions

This chapter discusses the result from the study that been done. 68 questionnaires have been filled by staff and 206 respondents among the students population. This is about 72 percent of the overall staff population and about 20 percent of the student population.

Table 3.1: Percentage of the Respondents Population.

Percentage of the Respondents by Gender.		Frequency(N)	Percent (%)
Valid	MALE	208	75.9
	FEMALE	66	24.1
	Total	274	100.0
Percentage of the Respondents by Age.		**Frequency(N)**	**Percent (%)**
Valid	below 22	190	69.3
	23 - 25	16	5.8
	26 - 29	5	1.8
	30 - 34	31	11.3
	35 - 39	7	2.6
	above 40	25	9.1
	Total	274	100.0

Items from the questionnaire can be divided into two sections where section A focus on the background of the respondent and section B examines knowledge and perceptions about policies and regulations, safety and health committee, commitment and attitude of the

respondents toward safety in workplaces, management support and awareness about their work environment.

Table 3.2: Distribution Of Questionnaire Items For This Study.

Section		Aspect of Assessment	Number of items	Number of Question
A		Background of the respondent	5	1 - 5
B	i)	Attitude	6	6 – 11
	ii)	Participation	4	12 – 15
	iii)	Occupational Safety and Health Committee	8	16 – 23
	iv)	Prevention Actions	7	24 – 30
	v)	Regulation and Enforcement	7	31 – 37
	vi)	Management Support	4	38 – 41
	vii)	Working Environments	4	42 – 45

3.1 Background of the Respondents.

For this section, there are 5 questions involved. This section collects the respondent's data such as age, level of education, working experiences, and knowledge or exposure on the safety manner.

Table 3.3: Summary of the respondent's background

Education Level		SPM	CER/DIP	DEGREE	MASTER/PHD	TOTAL
Group	STAFF	0	8(11.76%)	47(69.12%)	13(19.12%)	68(100%)
	STUDENT	101(49.03%)	105(50.97%)	0	0	206(100%)
	Total	101(36.86%)	113(41.25%)	47(17.15%)	13(4.74%)	274(100%)
Total training days		**NONE**	**ONCE**	**2 TIMES**	**> 2 TIMES**	**TOTAL**
Group	STAFF	15(22.06%)	29(42.65%)	12(17.65%)	12(17.65%)	68(100%)
	STUDENT	45(21.84%)	106(51.46%)	40(19.42%)	15(7.28%)	206(100%)
	Total	60(21.90%)	135(49.27%)	52(18.99%)	27(9.85%)	274(100%)
Working Experiences		**<1 YEAR**	**1-5 YEARS**	**5-10 YEARS**	**> 10 YEARS**	**TOTAL**
Group	STAFF	0	4(5.88%)	37(54.41%)	27(39.71%)	68(100%)
	STUDENT	187(90.78%)	18(8.74%)	1(0.48%)	0	206(100%)
	Total	187(68.25%)	22(8.03%)	38(13.86%)	27(9.85%)	274(100%)

From the analysis in table 3.3, a total of 13 respondent are master PHD holders (4.74%), 47 respondents are degree holders (17.15%), 113 certificate diploma holders (41.24%), and only 101 respondents had Malaysian Certificate of education (MCE) (36.86%). From the populations of the staff, 13 respondents had master PHD (19.12%), 47 possess degree (69.12%), and 8 respondents had certificate/diploma (11.76%). The data collected showed almost 51.46% of the staff population attended at least one training course on safety. For the student's population, 17.65% hm c attended more than two times on safety training and this is higher rate than staff population which is only 7.28% from overall staff population.

3.2 Level of occupational safety and health awareness of the respondents.

This subchapter will elaborate and analyze how the respondents gave responses to the answers in section B of the questionnaire. This section contains 7 categories which will evaluate their attitude, participation and their contribution, the rule and effectiveness of safety committee, action that have been taken by the management, existing regulation and enforcement, management support in promoting safety, and awareness about their working environments.

3.2.1 Attitude.

The first category in this section is to determine the attitude of the respondents towards safety in their workplaces. It consists of 6 questions which are focused on the respondents' view about their role in ensuring their workplaces are safe.

Table 3.4: Frequencies Distribution for Questions Related to Attitude.

Question		Strongly Disagree	Disagree	Neither Agree or Not Agree	Agree	Strongly Agree
Q6 : I have an important role in ensuring my workplace is safe.	STAFF	1	4	2	31	30
	STUDENT	2	4	27	89	84
	TOTAL(%)	**3(1.09)**	**8(2.92)**	**29(10.58)**	**120(43.80)**	**114(41.60)**
Q7 : I am aware that the safety policy is essential for each organization.	STAFF	0	1	0	18	49
	STUDENT	2	0	4	34	166
	TOTAL(%)	**2(0.73)**	**1(0.36)**	**4(1.45)**	**52(18.98)**	**215(78.75)**
Q8 : I do not operate the machine if that machine is not in perfect condition.	STAFF	1	0	4	25	38
	STUDENT	1	0	22	53	130
	TOTAL(%)	**2(0.73)**	**0(0)**	**26(9.49)**	**78(28.47)**	**168(61.31)**
Q9 : I have to attend courses/seminars on workplace safety.	STAFF	1	0	4	27	36
	STUDENT	2	0	25	101	78
	TOTAL(%)	**3(1.09)**	**0(0)**	**29(10.58)**	**128(46.72)**	**114(41.60)**
Q10 :Personal Protective Equipment (PPE) is to eliminate the risk of accidents.	STAFF	1	9	5	32	21
	STUDENT	2	7	46	83	68
	TOTAL(%)	**3(1.09)**	**16(5.84)**	**51(18.61)**	**115(41.97)**	**89(32.48)**
Q11 :In my view, the awareness of all parties about the safety in the workplaces should be improved.	STAFF	0	0	1	13	54
	STUDENT	2	0	0	39	165
	TOTAL(%)	**2(0.73)**	**0(0)**	**1(0.36)**	**52(18.98)**	**219(79.93)**

From question 6 and 9, it shows that almost all respondents realize their role in ensuring their workplaces are safe and hope that they will be given courses or seminars on the workplace's safety. Question 8 showed 61 % of respondents realized that the equipment is not properly maintained and can pose a hazard to the user.

Almost all the respondents (98.91%) agreed the awareness of all parties about safety in the workplaces should be improved. This shows the sensitivity of all parties about safety in the workplace is indeed high. Overall mean for attitude questions is 4.48 which interprets a good attitude toward safety among all respondents.

Table 3.5: Analysis Mean for the Respondent's Attitude

Question	Group	N	Mean	Std Error Mean
Q6 : I have an important role in ensuring my workplace is safe.	STAFF	68	4.25	.108
	STUDENT	206	4.21	.057
Q7 : I am aware that the safety policy is essential for each organization.	STAFF	68	4.69	.067
	STUDENT	206	4.76	.041
Q8 : I do not operate the machine if that machine is not in perfect condition.	STAFF	68	4.46	.090
	STUDENT	206	4.51	.050
Q9 : I have to attend courses/seminars on workplace safety.	STAFF	68	4.43	.090
	STUDENT	206	4.23	.051
Q11 :In my view, the awareness of all parties about the safety in the workplaces should be improved.	STAFF	68	4.78	.055
	STUDENT	206	4.77	.038
Overall Mean			**4.48**	
Q10 :Personal Protective Equipment (PPE) is to eliminate the risk of accidents.	STAFF	68	3.93	.125
	STUDENT	206	4.01	.062

For question 10, it is to assess the respondent's awareness about the function of the Personal Protective Equipment (PPE). The appropriate answer is PPE not to eliminate the risk of accidents, but it is to minimize the risk for accidents to occur. From the mean for question 10 it shows that most of the respondents are not aware of the function of the PPE.

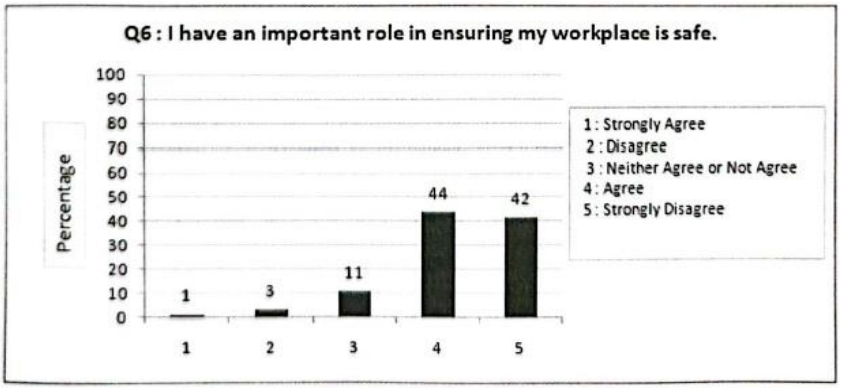


Figure 3.1: Frequencies distribution for question 6

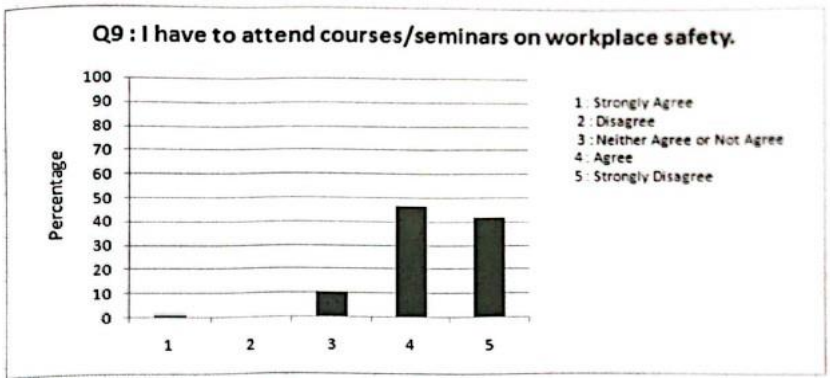


Figure 3.2: Frequencies distribution for question 9

3.2.2 Participant.

To evaluate the involvement of all respondents in ensuring a safe workplace, the second category consists of 4 items on their participation.

Table 3.5: Analysis Mean for The Respondent's Participant

Question		Strongly Disagree	Disagree	Neither Agree or Not Agree	Agree	Strongly Agree
Q12 : I have contributed to the safety campaign at my workplace.	STAFF	3	6	19	32	8
	STUDENT	6	11	102	63	24
	TOTAL (%)	**9(3.28)**	**17(6.20)**	**121(44.16)**	**95(34.67)**	**32(11.68)**
Q13 : The management gave me the space to enhance safety in the workplace.	STAFF	0	8	20	32	8
	STUDENT	1	6	73	91	35
	TOTAL (%)	**1(0.36)**	**14(5.11)**	**93(33.94)**	**123(44.89)**	**43(15.69)**
Q14 : If the machinery / equipment are malfunction, I know who should to be contact.	STAFF	2	2	12	38	14
	STUDENT	2	0	56	92	56
	TOTAL (%)	**4(1.46)**	**2(0.73)**	**68(24.82)**	**130(47.44)**	**70(25.55)**
Q15 : Is not necessarily providing training for all that are involved with the use of machinery.	STAFF	28	17	12	7	4
	STUDENT	21	58	59	37	31
	TOTAL (%)	**49(17.88)**	**75(27.37)**	**71(25.91)**	**44(16.06)**	**35(12.77)**

From question 12 nearly half of respondents (44.16%)' Were unsure about their contribution to the campaign in their workplace place. Feedback from Question 13 indicated 70.29% of respondents agreed that the employer provides adequate space to improve safety in the workplace.

Question 14 is to determine whether the respondent alert and care about the machineries or equipment's condition. This will indicate whether they have reported any malfunction of equipment to the appropriate party.

This category also has a question that requires respondent • to choose a lower scale for the answer. Question 15 is supposed to ensure that all involved with the use of the machines should be given adequate training in operating the machines.

The average mean for this category is 3.66 and interpreted as most of the respondents skeptical about their contribution or participation in the safety campaign. From the data also we can conclude that most respondents are not sure about management openness to enhance safety in the workplaces.

Table 3.7: Analysis mean for the respondent participation

Question	Group	N	Mean	Std Error Mean
Q12 : I have contributed to the safety campaign at my workplace.	STAFF	68	3.53	.118
	STUDENT	206	3.43	.061
Q13 : The management gave me the space to enhance safety in the workplace.	STAFF	68	3.59	.103
	STUDENT	206	3.74	.055

3.2.3 Occupational Safety and Health Committee.

In exploring respondents' view about the function of Occupational Safety and Health Committee, this section consists of 8 questions related to the OSH Committee roles. Statistic from question 16 indicates that majority of the respondents are aware of the Occupational Safety and Health Committee structure. From the mean obtained also, show student population was not yet aware of the existence of this committee in the depm1ment compared with the population of staff.

Table 3.8: Analysis mean for the Occupational Safety and Health Committee.

Question	Group	N	Mean	Std. Error Mean
Q16 : I was aware about the existence of the Occupational Safety and Health Committee in my workplace.	STAFF	68	3.88	.123
	STUDENT	206	3.69	.071
Q17 : I know the organizational structure of this committee.	STAFF	68	2.91	.132
	STUDENT	206	3.28	.061
Q18 : Safety Committee has done their job properly.	STAFF	68	2.97	.109
	STUDENT	206	3.46	.062
Q19 : Policies/regulations provided are easily understandable.	STAFF	68	3.29	.081
	STUDENT	206	3.81	.054
Q20 : I have/need to follow adequate safety training.	STAFF	68	3.76	.115
	STUDENT	206	3.69	.062
Q21 : I know the exit routes and assembly areas in the event of fire.	STAFF	68	3.19	.138
	STUDENT	206	3.94	.066
Q22 : Fire drill to be held at least once a year.	STAFF	68	4.19	.123
	STUDENT	206	4.15	.063
Q23 : In the event of an accident, I know the steps/procedure that I have to follow.	STAFF	68	3.21	.112
	STUDENT	206	3.93	.057
Overall Mean			**3.69**	.062

Mean obtained from question 17 (2.91) also showed the average staffs still do not recognize the organizational structure of this Committee. For students, the average mean for this question is 3.28 which are higher than average means of staffs. This shows that students have more exposure to the committee rather than staffs.

Table 3.9: Frequencies Distribution for Question Related to Occupational Health Committee

Question		Strongly Disagree	Disagree	Neither Agree or Not Agree	Agree	Strongly Agree
Q16 : I was aware about the existence of the Occupational Safety and Health Committee in my workplace.	STAFF	1	7	12	27	21
	STUDENT	6	15	66	68	51
	TOTAL(%)	7(2.74)	22(8.03)	78(28.47)	95(34.67)	72(26.28)
Q17 : I know the organizational structure of this committee.	STAFF	8	13	30	11	6
	STUDENT	7	19	107	55	18
	TOTAL(%)	15(5.47)	32(11.68)	137(50)	66(20.09)	24(8.76)
Q18 : Safety Committee has done their jobs properly.	STAFF	5	10	38	12	3
	STUDENT	4	17	92	67	26
	TOTAL(%)	9(3.28)	27(9.85)	130(47.44)	79(28.83)	29(10.58)
Q19 : Policies/regulations provided are easily understandable.	STAFF	0	6	38	22	2
	STUDENT	3	5	53	113	32
	TOTAL(%)	3(1.09)	11(4.01)	91(33.21)	135(49.27)	34(12.41)
Q20 : I have/need to follow adequate safety training.	STAFF	0	9	13	31	15
	STUDENT	3	14	62	92	35
	TOTAL(%)	3(1.09)	23(8.39)	75(27.37)	123(44.89)	50(18.25)
Q21 : I know the exit routes and assembly areas in the event of fire.	STAFF	6	12	21	21	8
	STUDENT	4	6	55	74	67
	TOTAL(%)	10(3.65)	18(6.57)	76(27.74)	95(34.67)	75(27.37)
Q22 : Fire drill to be held at least once a year.	STAFF	2	4	5	25	32
	STUDENT	2	11	26	83	84
	TOTAL(%)	4(1.46)	15(5.47)	31(11.31)	108(39.42)	116(42.34)
Q23 : In the event of an accident, I know the steps/procedure that I have to follow.	STAFF	2	12	29	20	5
	STUDENT	2	4	52	97	51
	TOTAL(%)	4(1.46)	16(5.84)	81(29.56)	117(42.70)	56(20.44)

Response to question 18 indicated that the staffs believe the committee has yet to carry out its duties properly. This shows that the population of staffs expect more actions taken by this committee in promoting safety at the workplace. The distribution of answers given by respondents also indicated that many are still unsure about the role of this committee toward providing a safe workplace.

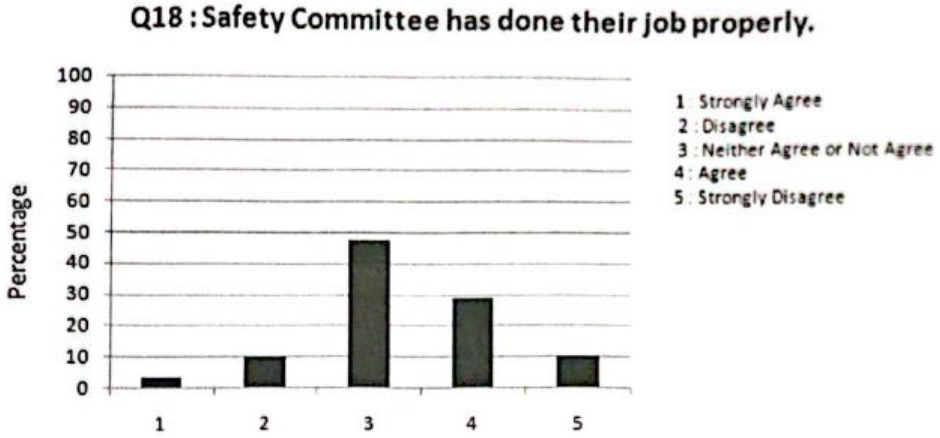


Figure 3.3: Frequencies distribution for question 18

Mean from questions 19, 20 and 21 indicate that a good exposure for safety manner have been done among respondents. Most of the respondents agreed that they know the steps or procedure to follow in the event of an accident. This shows this committee had provided adequate information to all about emergency measures in the event of an accident at the workplaces. Questions 22 and 23 are about the effectiveness of safety training among the respondents. Mean obtained showed most respondents believe there should be fire drills at least once a year.

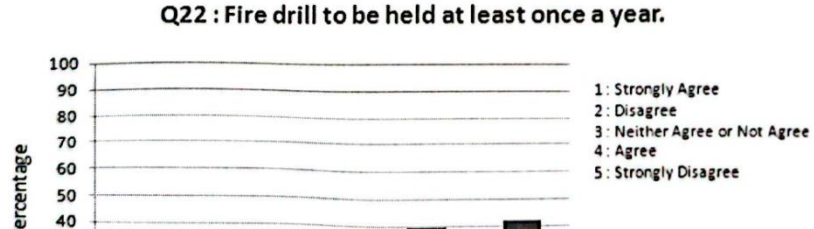


Figure 3.4: Frequencies distribution for question 22

3.2.4 Prevention Actions.

This section consists of seven questions, which will assess the respondents' satisfaction with the preventive measures taken by the employer. Questions in this section also attempts to measure the respondents' satisfaction with equipment provided related to the prevention of accidents at the workplaces. From the whole question in this section, question 24 is related to the Personal Protective Equipment (PPE). 43.07% of respondents felt that the Personal Protective Equipment provided is insufficient. Statistic from question 25 shows 45.26% of respondents still do not know how to use PPE correctly. This indicates proper training, or explanation must be given before they use the PPE.

Table 3.10: Frequencies distribution for questions related to Prevention Actions

Question		Strongly Disagree	Disagree	Neither Agree or Not Agree	Agree	Strongly Agree
Q24 : Personal Protective Equipment (PPE) is provided with adequate.	STAFF	4	9	43	8	4
	STUDENT	3	13	75	74	41
	TOTAL(%)	**7(2.55)**	**22(8.03)**	**118(43.07)**	**82(29.93)**	**45(16.42)**
Q25 : I know how to use Personal Protective Equipment (PPE) properly.	STAFF	4	11	22	23	8
	STUDENT	3	9	64	101	29
	TOTAL(%)	**7(2.550**	**20(7.30)**	**86(31.39)**	**124(45.26)**	**37(13.50)**
Q26 : All laboratories / workshops are provided with sufficient first aid kit.	STAFF	1	8	23	25	11
	STUDENT	5	9	64	87	41
	TOTAL(%)	**6(2.19)**	**17(6.20)**	**87(31.75)**	**112(40.88)**	**52(18.98)**
Q27 : Fire extinguishers are provided with adequate.	STAFF	2	4	13	29	20
	STUDENT	2	5	40	92	67
	TOTAL(%)	**4(1.46)**	**9(3.280**	**53(19.34)**	**121(44.16)**	**87(31.75)**
Q28 : I know the location of fire extinguishers.	STAFF	3	4	16	24	21
	STUDENT	3	2	47	101	53
	TOTAL(%)	**6(2.19)**	**6(2.19)**	**63(22.99)**	**125(45.62)**	**74(27.01)**
Q29 : Existing accident prevention measures are sufficient.	STAFF	2	6	38	17	5
	STUDENT	7	3	62	96	38
	TOTAL(%)	**9(3.28)**	**9(3.28)**	**100(36.50)**	**113(41.24)**	**43(15.69)**
Q30 : I feel safe to operate the machinery and equipments in my workplace.	STAFF	2	6	31	25	4
	STUDENT	6	8	58	91	43
	TOTAL(%)	**8(2.92)**	**14(5.11)**	**89(32.48)**	**116(42.34)**	**47(17.15)**

The average mean for this section is 3.72, which indicates a relatively high level of satisfaction among respondents to the preventive measures implemented at their workplace. These findings indicated that the management had tried to implement better safety management.

72.63% of the respondents knew about the position of fire extinguishers and the percentage achieved is quite high. Data obtained also shows that 42.34% of respondents agreed that they felt safe to use the equipment and facilities provided and 7% strongly agreed with this

statement. This indicates more than half of respondents' population satisfied with machinery and equipment's condition.

Table 3.11: Analysis mean for Prevention Actions

Question	Group	N	Mean	Std. Error Mean
Q24 : Personal Protective Equipment (PPE) is provided with adequate.	STAFF	68	2.99	.104
	STUDENT	206	3.67	.064
Q25 : I know how to use Personal Protective Equipment (PPE) properly.	STAFF	68	3.29	.129
	STUDENT	206	3.70	.057
Q26 : All laboratories / workshops are provided with sufficient first aid kit.	STAFF	68	3.54	.116
	STUDENT	206	3.73	.064
Q27 : Fire extinguishers are provided with adequate.	STAFF	68	3.90	.121
	STUDENT	206	4.05	.058
Q28 : I know the location of fire extinguishers.	STAFF	68	3.82	.131
	STUDENT	206	3.97	.056
Q29 : Existing accident prevention measures are sufficient.	STAFF	68	3.25	.101
	STUDENT	206	3.75	.062
Q30 : I feel safe to operate the machinery and equipments in my workplace.	STAFF	68	3.34	.102
	STUDENT	206	3.76	.064
Overall Mean			**3.72**	

3.2.5 Regulations and Enforcement.

From analysis data in this section, 53.28% strongly agreed that safety policy should be informed to all staffs and students. Nearly 43% agreed the chemicals and all equipment's are provided with clear and precise label. 55 % also agreed that they know the function of Standard Operating Procedures (SOP).

The average mean of respondents chose not to be sure about the machines' condition in the workshops. This conclusion is from the responses of question 34, which is related to the maintenance of the machines at the workshops. 43% of respondents agreed that there are still many who have not complied with the safety regulations. Meanwhile the average mean for question 37 shows most of the respondents know there is an Act about job safety in Malaysia that the employer should follow.

Table 3.12: Frequencies distribution for questions related to Regulations and Enforcement

Question		Strongly Disagree	Disagree	Neither Agree or Not Agree	Agree	Strongly Agree
Q31 : Safety policy should be informed to all staff and students.	STAFF	0	1	2	30	35
	STUDENT	2	2	12	79	111
	TOTAL(%)	**2(0.73)**	**3(1.09)**	**14(5.11)**	**109(39.78)**	**146(53.28)**
Q32 : I know the function of Standard Operating Procedures (SOP).	STAFF	1	3	18	39	7
	STUDENT	2	6	57	112	29
	TOTAL(%)	**3(1.09)**	**9(3.28)**	**75(27.37)**	**151(55.11)**	**36(13.14)**
Q33 : The label on the equipment and chemicals are provided with clear and precise.	STAFF	0	5	30	27	6
	STUDENT	2	1	61	89	53
	TOTAL(%)	**2(0.73)**	**6(2.19)**	**91(33.21)**	**116(42.34)**	**59(21.53)**
Q34 : Machinery/equipments are maintained properly.	STAFF	6	11	24	21	6
	STUDENT	10	19	53	81	43
	TOTAL(%)	**16(5.84)**	**30(10.95)**	**77(28.10)**	**102(37.23)**	**49(17.88)**
	STAFF	0	2	13	29	24

The average mean for this category is 3.87, which shows most of the respondents are satisfied with the enforcement of safety regulations in their workplace. Question 34, which involved the maintenance of machinery within the stipulated time, shows a score of minimum mean. Question 31, regarding safety policy, shows a higher mean, which is 4.46 and question 34 on machinery condition gave a lower mean, which is 3.15. This indicates most respondents felt machinery in the workshops still need proper maintenance.

Table 3.13: Analysis Mean for The Regulations and Enforcements

Question	Group	N	Mean	Std. Error Mean
Q31 : Safety policy should be informed to all staff and students.	STAFF	68	4.46	.077
	STUDENT	206	4.43	.051
Q32 : I know the function of Standard Operating Procedures (SOP).	STAFF	68	3.71	.094
	STUDENT	206	3.78	.053
Q33 : The label on the equipment and chemicals are provided with clear and precise.	STAFF	68	3.50	.093
	STUDENT	206	3.92	.056
Q34 : Machinery/equipments are maintained properly.	STAFF	68	3.15	.131
	STUDENT	206	3.62	.074
Q35 : Existing safety regulations should be revised.	STAFF	68	4.10	.099
	STUDENT	206	4.16	.064
Q36 : There are still many who have not complied with the prescribed safety regulations.	STAFF	68	4.09	.108
	STUDENT	206	4.10	.059
Q37 : I know that there is an Act about job safety in Malaysia that Polytechnic should complied with.	STAFF	68	3.74	.102
	STUDENT	206	3.82	.061
Overall Mean			**3.87**	

3.2.6 Management Support.

This section consists of four questions on management support in promoting safety among all staffs and students. For question 38, nearly 38% of respondents are still not sure whether promotion, campaign and activities about safety have been conducted adequately. 44.5% agreed that the management give encouragement in safety campaign. For question 40, 37.59% agreed that the management also gave adequate allocation and space for safety campaign. The

data also show majority of respondents feel the managc1nent is concerned about the safety matter.

Table 3.14: Frequencies distribution for questions related to management support

		Strongly Disagree	Disagree	Neither Agree or Not Agree	Agree	Strongly Agree
Q38 : Promotion, campaign and activities about safety have been conducted adequately.	STAFF	4	23	30	8	3
	STUDENT	11	16	74	79	26
	TOTAL(%)	15(5.47)	39(14.23)	104(37.96)	87(31.75)	29(10.58)
Q39 : The employer / management give encouragement in safety campaign.	STAFF	5	15	26	20	2
	STUDENT	3	11	46	102	44
	TOTAL(%)	8(2.92)	26(9.46)	72(26.28)	122(44.53)	46(16.79)
Q40 : Allocation and adequate space are given for safety campaign.	STAFF	4	11	38	15	0
	STUDENT	5	14	59	88	40
	TOTAL(%)	9(3.28)	25(9.12)	97(35.40)	103(37.59)	40(14.60)
Q41 :The management is concerned about the safety matter.	STAFF	3	19	22	21	3
	STUDENT	4	8	52	90	52
	TOTAL(%)	7(2.55)	27(9.85)	74(27.01)	111(40.51)	55(20.07)

The mean score for this category is 3.24, indicating that most of the respondents are still not sure about promotion and support from the management towards raising awareness about occupational safety and health at their workplaces.

Table 3.15: Analysis mean for management support

	Group	N	Mean	Std. Error Mean
Q38 : Promotion, campaign and activities about safety have been conducted adequately.	STAFF	68	2.75	.110
	STUDENT	206	3.45	.069
Q39 : The employer / management give encouragement in safety campaign.	STAFF	68	2.99	.118
	STUDENT	206	3.84	.061
Q40 : Allocation and adequate space are given for safety campaign.	STAFF	68	2.94	.096
	STUDENT	206	3.70	.066
Q41 :The management is concerned about the safety matter.	STAFF	68	3.03	.118
	STUDENT	206	3.86	.063
Overall Mean			**3.24**	

3.2.7 Working Environments.

The last category is related to respondents' awareness about their working environments. It consists of four questions where it will compare the lathe workshop, welding workshop, fitting workshop, projects workshop, and machines laboratory. For question 42, nearly 39% of respondent agreed that lathe workshop has higher risk of accidents compared to welding workshop.

Table 3.16: Frequencies distribution for questions related to working environments.

Question		Strongly Disagree	Disagree	Neither Agree or Not Agree	Agree	Strongly Agree
Q42 : Lathe Workshop has higher risk of accidents compared to Welding Workshop.	STAFF	3	8	19	24	14
	STUDENT	10	14	29	82	71
	TOTAL(%)	13(4.74)	22(8.03)	48(17.52)	106(38.69)	85(31.02)

The data obtained shows 45.26% agree welding workshop has higher risk of accidents compared to project workshop. 36.5% of respondents also agreed that fitting workshop has higher risk of accidents compared to project workshop. For question 45, 41.61 % agreed that project workshop has higher risk of accidents compared to strength of material/machine Lab.

From the hazard analysis form, welding workshop had a score of 34 points for level of risk and the lowest score is for project workshop, which is only 12 points. To determine this level, an observation has been done for each location. Among the criteria considered are the activities carried out and the overall condition at each place.

Table 3.17: The risk level for workshop and laboratory.

Location	Level of Risk
Welding Workshop 1	34
Lathe Workshop	21
Project Workshop	19
Fitting Workshop	15
Machine Laboratory	12

There are two scales used in determining the risk level, namely scale of severity and scale of probability. In severity level, it gives one for trivial injury and five for fatality. For probability level, the value of one is to a remote incident and level of five to a certain incident.

From average mean obtained, most respondents agree that welding workshop has higher risk of accidents compared to other locations. This is from average means for question 43 where a score of 4.07 is obtained. For question 42, average means is 3.74, indicating that most respondents agreed that Lathe Workshop has higher risk of accidents compared to Welding Workshop. This indicated that they have a wrong perception about safety in both workshops. From hazard analysis conducted, it shows Welding Workshop has a higher risk compared to Lathe Workshop.

Questions 44 shows most of respondent gave a medium level of mean indicating that they are still not sure about the risk level between Fitting Workshop and Machine Laboratory. Average

means of question 45 indicated the students and staffs agree that Project Workshop has higher risk of accidents compared to Strength of Material/Machine Laboratory. This is consistent with the finding from the hazard analysis conducted.

Table 3.19: Analysis mean for the working environments.

Group	Staff	Student	Total
Q42 : Lathe Workshop has higher risk of accidents compared to Welding Workshop.	3.56	3.92	3.74
Q43 : Welding Workshop has higher risk of accidents compared to Fitting Workshop.	4.09	4.05	4.07
Q44 : Fitting Workshop has higher risk of accidents compared to Project Workshop.	3.12	3.65	3.38
Q45 : Project Workshop has higher risk of accidents compared to Strength of Material/Machine Lab.	3.99	3.72	3.85

3.3 Relationship between demographic factors and questionnaire items.

This section will analyze the relationship between demographic factors and questionnaire items. Among the factors to be evaluated are gender, age, educational level, experience, and total training days. From the analysis, we can conclude that the gender factor does not have much influence on the answers given by respondents. Distribution of mean shows a minor difference amongst all questions except question six which showed a relatively significant of mean difference when compared by gender. In evaluating the relationship between gender and the question items in the questionnaire, question six showed quite a big difference. Most men strongly agreed that they play an important role in ensuring a safe workplace, while the majority of woman only agreed to this question.

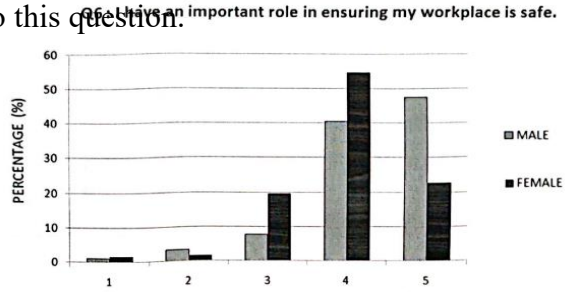


Figure 3.4: Frequencies distribution for question 6 based on gender

From table 3.20, mean differences amongst men and female is very small. These data show that gender does not affect the distribution of responses for this study.

Table 3.20: Mean analysis relate the answer with gender

Sex	Attitude	Participation	OSH Committee	Prevention actions	Regulations and Enforcement	Management Support	Total
MALE	4.51	3.79	3.67	3.75	3.94	3.56	3.87
FEMALE	4.47	3.43	3.63	3.60	3.94	3.39	3.74

From mean analysis shows that age factor also does not have any influence to the answers given by all respondents. For management support category, there is a high range where the lowest mean is 2.78 and the higher mean is 3.84.

Table 3.21: Mean analysis relate the answer with age.

Age	Attitude	Participation	OSH Committee	Prevention actions	Regulations and Enforcement	Management Support	Total
below 22	4.50	3.71	J.75	3.82	3.99	3.70	3.91
23 - 25	4.45	3.79	3.64	3.62	381	**3.84**	3.86
26- 29	4.60	3.87	3.85	3.69	403	3.35	3.90
30- 34	4.53	3.58	3.26	3.35	3.76	**2.78**	3.54
35 - 39	4.31	3.48	3.32	3.47	3.78	3.04	3.57
above 40	4.55	3.79	3.58	3.51	387	2.99	3.72
Total	4.50	3.70	3.66	3.72	3.94	3.52	3.84

Meanwhile, table 3.22 shows mean analysis to relate the answer given to the educational level. This data also shows that the answers given are not much influence by level of education of each respondent.

Respondents with SPM level show higher mean which are 3.94 compared to 3.42 for post graduate or PHD level. This shows that respondents in the master and PHD level are quite concerned with safety in the workplace. For management support category, a lower mean come from respondents with degree, which is only 2.91, while higher mean comes from SPM holders where average mean is 3.71.

Table 3.22: Mean analysis relate the answer to education level

Education Level	Attitude	Participation	OSH Committee	Prevention actions	Regulations and Enforcement	Management Support	Total
SPM	4.50	3.68	3.77	3.90	4.05	3.71	**3.94**
CER/DIP	**4.49**	3.77	3.74	3.73	3.93	3.70	3.89
DEGREE	4.54	3.61	3.39	3.46	3.80	2.91	3.62
MASTER/Pim	**4.38**	362	3.15	3.12	3.64	2.63	**3.42**

When comparing experiences with average mean for each question items, it also shows insignificant difference between all levels of experience. Lowest mean was 2.8, that is item regarding management support category and this is from respondents who have more than 5 years of experience.

Table 3.23: Mean analysis relate the answer with experience

Experiences	Attitude	Participation	OSH Committee	Prevention actions	Regulations and Enforcement	Management Support	Total
<!YEAR	4.50	3.74	3.76	3.84	3.99	3.72	3.93
1-5 YEARS	4.41	3.48	3.51	3.45	3.82	3.56	3.71
5-10 YEARS	4.49	3.61	3.30	3.32	3.74	2.80	3.54
> 10 YEARS	**4.58**	3.77	3.63	3.59	3.95	3.06	3.76

Relationship between the numbers of training days with the items in the questionnaire also showed there is no significant difference between both. Result from this study showed demographics factor did not have significant difference in the answer given by the respondents.

Table 3.24: Mean analysis relate the answer with education total training days

Total training days	Attitude	Participation	OSH Committee	Prevention actions	Regulations and Enforcement	Management Support	Total
NONE	4.37	3.57	3.45	3.51	3.72	3.30	3.65
ONCE	4.57	3.80	3.71	3.81	4.01	3.63	3.92
2 TIMES	4.45	3.65	3.73	3.74	4.02	3.57	3.86
>2 TIMES	*4.55*	3.60	3.75	3.64	3.89	3.36	3.80

3.4 Results Summary

From these findings, it appears that the staff and students in Department of Mechanical Engineering have a high awareness level on workplace safety. At the same time, one can see that most respondents expect the management to organize more activities related to workplace safety. Besides that, a comprehensive campaign should be conducted to encourage the participation of all parties towards a safe workplace. This study also shows that demographic factors do not actually affect the findings. Roles and responsibilities are equal for all ages, education levels, positions, and gender in promoting workplace safety.

The assessment of risk levels in the workshops shows that welding workshops obtain the highest score, and machine laboratory obtain the lowest score. This is in line with the respondents' views where question 43 gave mean score of 4.07 from Likert scale value and it can be concluded that most respondents agreed welding workshop had the highest risk level. In the observations made, there were many respondents who did not use proper Personal Protective Equipment. The management must enforce strict rules to prevent the accident.

4.0 Conclusions and Recommendations

A total of 274 department staff and students were involved as respondents in this study. Statistical Package for Social Science (SPSS) for MS Windows Release 17 is being used to analyze the data collected. The descriptive data analysis methods such as frequency, percentage and mean value were used to describe the demographics of respondents and the assessment of the level of awareness towards healthy and safe workplace.

Respondents' population for this study consisted of 66 women (24.l%) and 208 men (75.9%). For the age factor, more than half of respondents (69.3%) are under 22 years old and 11.3% of the respondents are in the range of 30 to 34 years old.

To complement this study, the discussion focused on findings of the three objectives in this study. This is to identify whether all three objectives have been achieved successfully.

4.1 Level of Awareness Among Staffs and Students in the Mechanical Department Regarding Safety and Health (OSH) at the Workplace.

The overall mean of responses obtained was 3:78. Findings from this study showed the level of awareness of employees and students in this department are at a high stage. For attitude category, the average mean is 4.48. This is the higher mean among all categories.

Meanwhile for management support aspect, average mean is 3.24 which is the lowest mean among other categories. This shows that most respondents recognize that management support in aspects of safety at workplace is still not enough. This shows that the management should provide opportunities for all parties to promote and increase the awareness of OSH amongst all employees.

4.2 Recommendations on How to Increase OSH Awareness.

Based on the findings, it appears that the level of awareness towards health and safety are at a moderate level. However, here are some suggestions to be considered by the department in enhancing their staffs and students' awareness of Occupational Safety and Health. Among them are:

1. **Provide adequate training program**. This is because the study clearly shows that the respondents realize training is important in increasing their awareness of occupational safety and health. Additionally, safety training is also essential as section 15 (2) (c), OSHA 1994 state the procurement of information, instruction, training and preparation as is necessary to ensure as far as practicable, the safety and health of workers at workplace.
2. **Provide adequate safety-related campaigns.** This is because safety campaigns will be able to provide additional input in the form of knowledge to participants about the importance of safety.
3. **The OSH Committee in polytechnics should also diversify its safety programs.** If the safety programs are always organized in the same way and methods, it can cause participants to be bored and do not give the expected commitment. Among the programs that can be held are healthy lifestyle campaigns, zero accident campaigns and organize a contest on health and safety awareness among employees.

4. **Enforcing the use of PPE to their employees while carrying out the job.** This is because studies conducted by DOSH (2000) show that the enforcement of safety attires such as safety shoes, goggles, helmets and gloves can protect workers from injury. In addition to employee monitoring, supervision on safety of workshops, machinery and equipment properly and safely can be used to create a harmonious working environment.

4.2 Recommendations for Future Study.

1. Several recommendations for improvement can be implemented in future research to get a better understanding of the implementation of the safety aspects in polytechnic. Among these are:
2. Extending the population of respondents to all departments in the polytechnic. This will provide a more accurate picture about the implementation of the safety aspects in a polytechnic.
3. Increase the number of items in the questionnaire to broaden the criteria that can be assessed.
4. To conduct a comparative study on the level of safety awareness amongst staffs with other institutions of higher learning to get the actual situation.
5. Other than assessing the level of awareness on safety, other aspects such as the impact of work activities on the health of workers can also be carried out.
6. Conducted a comprehensive hazards assessment which includes all workshops and laboratory.

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A STUDY ON CONSTRUCTION OF FUTURE INDUSTRY INNOVATION ECOLOGY AND POLICY SUPPORT SYSTEM IN SUZHOU, CHINA

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Abstract: *With the transformation of global information technology and economic structure, the development of future industries are the key to the transformation of urban economy. This paper aims to explore and construct the innovation and support strategy framework of future industries in Suzhou, China to promote the sustainable development and technological innovation. According to the industrial status, development potential and future industrial trends of Suzhou, this paper identifies the influencing factors suitable for the key areas of future industrial development in Suzhou and proposes support strategies for optimizing innovation (innovation ecological strategy framework) based on the multi-criteria decision-making (MCDM) theory. Therefore, this study is conducive to the optimization of industrial structure, the promotion of scientific and technological innovation and economic development.*

Keywords: *Future industries, Innovation ecosystem, Support strategies, Identification of key areas*

1. Introduction

As an important manufacturing base in the Yangtze River Delta region, Suzhou, China, has formed a diversified industrial structure dominated by electronic information, high-end equipment manufacturing, biomedicine and new materials after decades of industrial accumulation and upgrading [1]. *Suzhou Future Industry Scenarios Innovation Three-Year Action Plan (2024-2026)* has opened more than 1,500 kilometers of intelligent connected vehicle test roads. With its superior location and perfect transportation network, Suzhou has not only taken over a large number of international advanced manufacturing transfers, but also actively promoted local enterprises to extend to the middle and high end of the industrial chain [2]. Thus, driven by sustainable development and the digital economy, Suzhou has strong development potential. On the one hand, by deepening industrial collaboration with

surrounding cities such as Shanghai and Wuxi, industrial technological innovation is strengthened [3]. On the other hand, with the accelerated application of artificial intelligence and green and low-carbon technologies, Suzhou's future industrial infrastructure will form an emerging industrial ecosystem with global competitiveness.

Talent resources and market environment have become key supports for Suzhou's future industrial development. From the perspective of the market environment, Suzhou's private economy is vibrant (private enterprises account for more than 90%), and the scale of foreign investment utilization has ranked first in Jiangsu for ten consecutive years [4]. In terms of talent resources, Suzhou has attracted and cultivated more than 40,000 high-level talents, and has co-built innovation institutes with universities such as Nanjing University and the University of Science and Technology of China, forming a talent supply model of "*industry-education integration*" [5]. The industry-university-research platform jointly built by universities, research institutes and enterprises has jointly improved the availability of technology, talents and funds. The ability to obtain resources determines whether innovation factors can be gathered in a timely manner [6]. Indicators such as patent output rate, technology transfer rate and project incubation success rate can directly reflect the matching degree between R&D investment and economic value [7]. In addition, cross-industry cooperation and public service platforms have achieved resource sharing, information sharing and win-win benefits, thus forming a virtuous cycle of technological innovation and market development [8]. Hence, Suzhou actively creates an open market environment. The synergy of these factors will help Suzhou build a future industrial innovation ecology and policy support system.

This paper focuses on building a framework for innovative industry development and support strategies to systematically empower Suzhou's future industrial upgrading. The study takes "key industry influencing factors" as the core logic, integrates the current status, development potential and future industry trends of different industries, and focuses on breakthroughs in three dimensions: (1) Based on literature analysis, we identify the influencing factors in key areas of Suzhou's future industries; (2) Combined with key industry influencing factors, we build a collaborative innovative industry development and support strategy framework (IDSSF) to achieve dynamic matching of industry-university-research resources and innovation efficiency monitoring; (3) Based on expert interviews, we verify the innovative industry development and support strategy framework to provide a paradigm reference for the construction of the future industrial ecosystem in the Yangtze River Delta.

2. Literature review

Future industrial innovation ecology has gradually shifted from static factor analysis to dynamic system construction. [9] show that "Innovation Ecosystem 4.0" theory reveals the closed-loop driving effect of data factors on technology research and development, scenario

verification and commercial diffusion, especially the "Ecosystem Resilience Index (ERI)". However, they rarely combine the actual industrial structure and innovation ecological characteristics of a specific region (such as Suzhou), and it is difficult to fully reflect the interaction mechanism and coordination strategy among multiple subjects in emerging industrial clusters. At the same time, the regional innovation system theory further emphasizes that the completeness of infrastructure and information network connectivity in innovative clusters have a significant impact on the diffusion of emerging industries [10]. [11] think that the secondary indicators such as high-end talent supply, capital factor allocation and policy orientation are refined using bibliometrics and hierarchical analysis, providing a mature indicator system for subsequent quantitative evaluation. In addition, the collaborative efficiency of government, enterprises and universities can be improved by more than 40% with the support of digital technology. Suzhou's innovation practice further refines the theory through the "chain leader enterprise + common technology platform" model [12]. However, the platform has not yet been put into use on a large scale. Therefore, the relevant platforms of innovation and strategy have a role in the actual industrial development.

In the study of innovation ecosystems, resource acquisition capability is established as a core intermediary dimension, which originates from resource-based economics (RBE) and dynamic capability theory. The efficient mobilization of technological assets, talent factors and funding channels by regions or enterprises is the basis for sustainable competitive advantage and ecological resilience [13]. Input-output efficiency quantifies factors such as R&D investment, platform construction and talent training with patent output, technology incubation and market value conversion efficiency [14]. Synergy and complementarity draw on the theory of complementary assets, emphasizing the deep integration of multiple subjects such as government, scientific research institutions, enterprises and capital in the technology-market-capital chain [15]. In addition, policy support, as an institutional lever, not only reduces innovation risks through tools such as fiscal incentives, tax incentives and regulatory sandboxes, but also catalyzes resource allocation and market demand through regulations and public procurement [16]. Therefore, in terms of industrial foundation and market environment, innovation capabilities and excellent talents play an important role (Table 1).

Table 1 Crucial factors in innovation industry

Crucial factors	Second factors	Details	Theory	References
Technological Innovation Capability	Resource acquisition Inputs and outputs Synergy and Complementarity Policy Support	Decision on technology, talent, finance, equipment	Resource base view	[13]

Industrial Infrastructure	Resource acquisition Inputs and outputs Synergy and Complementarity Policy Support	Reflected transformation of elements	Innovation systems assessment	[14]
Talent Resources	Resource acquisition Inputs and outputs Synergy and Complementarity Policy Support	Higher education resources	Complementary assets	[15]
Market environment	Resource acquisition Inputs and outputs Synergy and Complementarity Policy Support	Political incentives, tax benefits	Theory of policy instruments	[16]

3. Methodology

MDCM (Multi-Criteria Decision Making) is a systematic decision-making method used to evaluate and select the best solution under multiple conflicting criteria. Analytic Hierarchy Process (AHP) is the widely used specific method under the MCDM framework. AHP not only solves the problem of weight allocation between criteria in multi-criteria and multi-level decision-making, but also provides an operational mathematical tool for MDCM, so that complex decision-making problems can be systematically optimized and innovative industries and strategic needs.

Step 1: To construct a hierarchical model. IDSSF of future industry collaboration in Suzhou ensures the systematic and logical nature of the decision-making structure. This study first constructs a top-down hierarchical model: "Optimizing the future industrial development strategy" is set as the decision-making target layer, and the criterion layer is set up, including four key first-level indicators - technological innovation capability, industrial infrastructure, talent resources and market environment; each criterion is further refined into a second-level sub-criterion layer (resource acquisition capability, input and output, synergy and complementarity and policy support) to enhance the pertinence and evaluability of the indicators. This structure clearly shows the hierarchical relationship between decision-making goals and various influencing factors, laying the foundation for subsequent weight calculation and priority sorting.

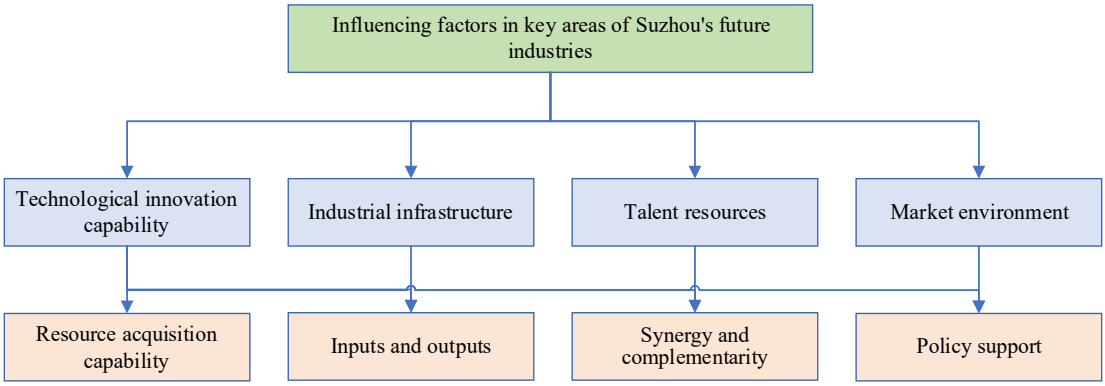


Figure 1 Hierarchical model for Suzhou's future industries

Step 2: To construct a judgment matrix. Using the 1-5 scale (Table 2), measure the variations in significance by means of relative scales by experts and create a judgment matrix that fulfills. Of the three professionals, more than five years of innovation sector experience (Table 3). For instance, in the Suzhou policy assessment, if technological innovation capacity is somewhat more significant than industrial infrastructure (scale 3) and complete the symmetric components following reciprocity. Local pairwise comparison helps to simplify subjective assessment using this approach.

Table 2 Relative Importance Scale (1–5)

Scale	Verbal Description	Explanation
1	Equal importance	Two criteria contribute equally
2	Slightly more important	i is marginally more important than j
3	Moderately more important	i is moderately more important than j
4	Strongly more important	i is strongly more important than j
5	Extremely strongly more important	i is extremely more important than j

Table 3 Expert Panel Profile

Expert ID	Title	Years	Main Expertise
E1	Manager	5	Strategic planning for emerging industries
E2	Professor	7	Technology R&D Management
E3	R&D Director	5	Innovation ecosystem assessment

Step 3: To calculate the relative weight vector. The maximum eigenvalue (λ_{max}) of the matrix and its corresponding eigenvector, and then normalize the eigenvector (component divided by the vector sum) in Equation (1) to obtain the weight vector that satisfies the normalization. On the basis of constructing the judgment matrix, in order to obtain the relative importance of each factor at the same level, it is necessary to calculate the judgment matrix λmax and its corresponding eigenvector $W=[W_1, W_2, \ldots, W_n]^T$。

$$V_j = \frac{W_i}{\sum_1^n W_j} \quad (1)$$

Step 4: Consistency verification. Consistency verification is a key step in judging the logical rationality of the matrix. Its core goal is to ensure that the subjective judgment of experts conforms to the transitivity rule. The consistency index (Equation (2)) is calculated based on the maximum eigenvalue (λ_{max}) of the judgment matrix. Then, the consistency ratio (Equation (3)) is calculated in combination with the random consistency index (*RI*, Table 4). If $CR<0.1$, the matrix logic is considered to be self-consistent and the weight result is credible; if $CR\geq0.1$, the scale value in the judgment matrix needs to be adjusted (correct the contradictory comparison relationship or recalibrate the expert score) to eliminate significant logical conflicts, thereby ensuring the scientific nature of subsequent weight synthesis and decision-making conclusions.

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (2)$$

$$CR = \frac{CI}{RI} \quad (3)$$

Table 4 Average consistency indicator

n	1	2	3	4	5
RI	0	0	0.52	0.89	1.12

4. Results

In Suzhou's forthcoming industrial collaborative innovation and support strategy, technological innovation capability is paramount, assigned the highest weight of 0.457, signifying that ongoing breakthroughs and efficient transformations of core technologies are the principal catalysts for the advancement of emerging industries. Industrial infrastructure (0.204) and talent resources (0.127) follow closely, indicating that a comprehensive intelligent manufacturing platform, a robust digital support system, and the availability of high-caliber R&D and management personnel are essential for the implementation and expansion of new industries. Although capital and market environment are ranked lowest at 0.105, they still hold significant importance, underscoring the necessity of optimizing the investment and financing structure. Unblocking market demand is an essential requirement for ensuring the healthy functioning of the industrial environment.

Conversely, the capability for resource acquisition (2.135) possesses the highest weight, signifying Suzhou's comparative advantages in procuring essential elements such as R&D funding, platform resources, talent, and equipment. The efficiency of input and output (0.930) closely follows, highlighting the significant influence of the alignment between R&D input and patent output, infrastructure development, operational efficiency, talent cultivation, and achievement transformation on the ecosystem's vitality. Although the weights for synergy and complementarity (0.481) and policy support (0.105) are somewhat lower, they serve as the institutional and network foundation for bolstering the system's resilience and evolutionary capabilities, underscoring the profound integration of government, enterprises, research

institutions, capital, and other entities in information sharing and collaborative project development, as well as the targeted support of fiscal and tax incentives for innovation factors.

Consequently, Suzhou still has some shortcomings in the efficiency indicators of R&D patent output rate, and it is necessary to optimize resource allocation through innovation for Suzhou's future industrial growth. We should focus on strengthening technological innovation, improve industrial infrastructure and talent introduction and cultivation methods, and continue to optimize the capital and market environment to form a closed loop of "technology-industry-talent- environment" coordinated promotion. Meanwhile, the dynamic monitoring and feedback system needs to be combined with sensitivity analysis to test the key weights to ensure that the strategy is ranked robustly under different scenarios, so as to achieve high-quality transformation from industry-driven in Suzhou. In addition, this work also has some limitations. The size and composition of the expert sample are relatively limited, and only three experts with many years of business and policy experience are selected. Even though their judgments are based on facts, they will always have personal opinions that affect how the judgment matrix is filled out and how weights are assigned. AHP itself is a static weight analysis method, which is difficult to fully capture the evolution and path of innovation factors in different times or between different projects.

5. Strategies and IDSSF

Figure 2 shows the three main components of the IDSSF that this article aims to build: policy design, platform construction, and ecological synergy. These components are crucial for understanding the elements that will shape Suzhou's industrial development in the future. To begin, we will strengthen the capacity to acquire resources and the framework for investing varied money by creating dedicated innovation funds and directing venture capital. Secondly, we utilize intelligent technology to construct an intelligent management platform that spans the whole life cycle. This platform allows us to optimize R&D investment, patent output, project progress, market feedback, and real-time monitoring, ultimately leading to a significant increase in output efficiency. Collaboration between businesses, universities, and researchers not only improves synergistic and complementary impacts, but also encourages the co-construction of industries through deep integration across factors and subjects. Finally, we will launch performance evaluation and dynamic adjustment mechanisms based on platform data to speed up the process of responding to policy support and improve differentiated fiscal subsidies, tax incentives, and rapid review of intellectual property rights.

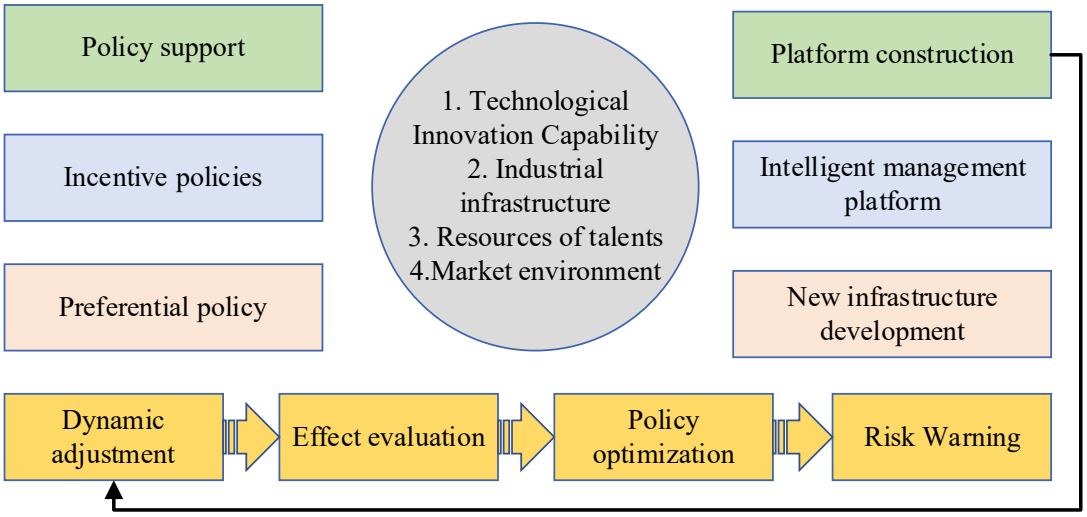


Figure 2 Innovative industry development and support strategy framework

On the other hand, with regard to the capabilities of technological innovation, we propose that significant scientific and technological projects with the purpose of accelerating the creation of open innovation platforms and technology transfer hubs should be implemented. On the other hand, with regard to the infrastructure of the industrial sector, we propose that the development of digital parks and smart factories should be sped up, and that the promotion of 5G+ industrial Internet, digital twins, and cloud manufacturing services should be encouraged. While this is going on, the "industry-university-research" joint training mechanism ought to be enhanced, and a two-way incentive policy ought to be developed for the purpose of attracting high-end talents and retaining local skills. Both of these goals are related to the availability of talent resources. In terms of the market environment, we propose that the financial service system should be optimized, market access and procurement processes should be simplified, and domestic and foreign e-commerce and supply chain platforms should be expanded. These recommendations are intended to construct a development ecosystem that is of high quality and possesses both innovative vitality and industrial competitiveness.

This study engaged three senior industry experts (Table 3) to perform semi-structured in-depth interviews to assess the feasibility and practicality of IDSSF across the dimensions of policy, industry, and operation. The experts unanimously confirmed the efficacy of innovation in addressing the financial challenges faced by start-ups and stressed that policy support requires further refinement. Simultaneously, experts recommended incorporating market demand forecasts and danger warning modules into the platform. Experts emphasized the necessity of integrating standardized processes and hierarchical authority management inside collaborative frameworks to prevent redundant resource allocation and information silos. Furthermore, they recommended that the policy support subsystem incorporate varied incentives and dynamic adjustments, and advised that platform operational data be integrated into the ongoing

assessment indicator system for fiscal subsidies and tax incentives. In response to this feedback, the paper enhanced the IDSSF framework in three areas: first, the linkage mechanism was refined; second, the data analysis and risk warning capabilities of the intelligent platform were broadened; third, the process nodes and feedback loops of collaborative governance were optimized to ensure the framework's efficacy.

6. Conclusions

This paper methodically undertook three basic activities centered on the research objective of identifying the important influencing variables of Suzhou's future industrial development. (1) Utilizing the Analytic Hierarchy Process (AHP), this study identified and prioritized four primary factors: technological innovation capability, industrial infrastructure, talent resources, and capital and market environment, alongside four secondary factors: resource acquisition capability, input-output efficiency, synergy and complementarity, and policy support; (2) Leveraging a collaborative platform, this research developed a Collaborative Innovation Industry Development and Support Strategic Framework (IDSSF) that amalgamates policy design, platform construction, and ecological collaboration, while delineating essential modules such as an intelligent management platform and a multi-party collaborative mechanism; (3) Through comprehensive interviews with three categories of experts from governmental and corporate sectors, the framework's feasibility was validated and enhanced, focusing on improving the connection between funding and performance, augmenting the platform's risk warning capabilities, and refining the collaborative process nodes. The study indicates that technological innovation capability and resource acquisition capability are pivotal in advancing the development of emerging industries in Suzhou. It underscores the essential role of core technology research and factor aggregation in establishing a robust industrial ecology. Furthermore, the enhancement of industrial infrastructure and input-output efficiency is crucial for the effective realization of innovative outcomes. While talent resources, synergy and complementarity, and policy support are comparatively less significant, they form the institutional and organizational foundation necessary for the ongoing evolution and virtuous cycle of the ecosystem, thereby offering vital support for sustaining regional competitive advantages.

On the other hand aspect, future study may be further explored in the following areas. Future research will incorporate system dynamics (SD) and agent-based simulation technologies to model the dynamic evolution of the IDSSF operating mechanism, thereby elucidating path dependence and nonlinear feedback among factors. Additionally, it will integrate big data and artificial intelligence to develop predictive and optimization algorithms grounded in machine learning, facilitating real-time responses and precise adjustments to R&D investment, patent output, and fluctuations in market demand. Furthermore, it will expand cross-regional multi-case comparative studies to encompass additional cities within the Yangtze River Delta and

potentially a broader economic belt, assessing the framework's applicability and generalizability across diverse industrial structures and policy environments.

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Declaration of competing interest

The results of this study are not affected by any financial or interpersonal issues.

Data availability

The article contains the data that underpins the study's results.

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AUGMENTED REALITY INTEGRATED ROBUST FUSION MODEL FOR SIGN LANGUAGE RECOGNITION USING COMPUTER VISON AND MACHINE LEARNING

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Abstract: *Sign language recognition (SLR) interprets sign language into text, bridging the communication gap between the deaf-mute community who use sign language and those who do not. Recent advancements in computer vision, deep learning, and augmented reality have shown significant progress in the field of motion and gesture recognition, however, large variations in hand actions, facial, and body postures, and the absence of region-specific datasets prevent universally accurate effective sign language recognition. This research developed an efficient model for SLR which includes an RGB-MHI attention module, and the Faster R-CNN deep learning architecture integrated with augmented reality. The proposed model was validated on two benchmark datasets, achieving an accuracy of 98.97% on the AUTSL dataset and 96.7% on the BosphorusSign22k dataset. Furthermore, the model was tested on a self-created dataset named "Amar Vasha" based on Bangla Sign Language (BdSL) to ensure cross-domain adaptability. Experimental results demonstrate that the proposed model achieves state-of-the-art performance on all three benchmarks.*

Keywords: *Computer Vision, Machine Learning, Augmented Reality, Sign Language Recognition*

Introduction

Human-computer interaction (HCI) applied to sign language recognition (SLR) can play a crucial role in enhancing communication between individuals who use sign language and those who communicate verbally. This form of machine interpretation relies on semantic cues encompassing various manual and non-manual visual modes of communication, such as hand gestures, body orientation and movement, facial expressions, eye gaze, and mouth shapes. Typically, SLR systems use red, blue, green-motion history images (RGB-MHI) attention modules fused with the Faster R-CNN deep learning architecture to create and enhance classification of these signs; however, advancements in computer vision and deep learning have significantly improved the processing of these diverse semantic features, enabling vision-based recognition to automatically interpret sign language with much more nuance, speed and accuracy. This, in turn, has enhanced the ability of sign language users to communicate with others who are not fluent in sign language.

Despite recent and rapid growth of the SLR tools for translating sign language into verbal language, the scope, number of modalities and variety of non-verbal, manual sign-based languages and their associated lexicons have impeded the creation of a consistent, universal

SLR, particularly compared with conventional action recognition (Han et al., 2022). There are currently 300 different sign-based languages used by more than 70 million people around the world. In some of those languages, a facial expression is a common modality of communication, especially to convey emotions (Han et al., 2022). In others still, arms and hand gestures are commonly used to express meaning, while in others body motion is typical (Rastgoo et al., 2022). Furthermore, different signers using the same language may show a great deal of variance in the way they sign the language; speed, body motion, and whether the user is right or left-handed can all influence reception (Moryossef et al., 2021). The use of similar gestures can impose various meanings depending on the number of repetitions a user performs (Moryossef et al., 2021).

Further improvement of SLR systems using augmented reality requires increasing the size and scope of datasets used by the systems and to collect data from all the various sign languages used around the world (Mahayuddin and Saif, 2021). Doing so, however, is logistically complicated and cost prohibitive. A potential remedy to these limitations, however, is repurposing and validating existing datasets (De Coster et al., 2021). This study incorporates an innovative fusion model for sign language recognition using the previously collected AUTSL (Sincan and Keles, 2020; Boháček and Hrúz, 2022) and BosphorusSign22k (Özdemir et al., 2020) datasets, in combination with a dataset for Bangla sign language created for this study, named the Amar Vasha (AV) dataset.

This new fusion model incorporates an RGB-MHI attention module, setting itself apart from previous research by not relying on explicit modalities. The RGB-MHI attention module was designed to summarize entire videos in a single frame without the need to explicitly recognize specific parts, such as a user's hands or face. The proposed RGB-MHI attention module provides robust semantic cues for overall recognition, while reducing temporal loss through the preservation of motion history information for each frame in three different channels.

This research integrates the RGB-MHI attention module with the Faster R-CNN deep learning framework, creating a multi-model assembly to enhance accuracy in sign language recognition using augmented reality. The model achieved an accuracy of 98.5% for the AUTSL dataset and 95.6% for the BosphorusSign22k dataset, surpassing previous research in this area. Additionally, the self-created AV dataset, was developed to ensure its adaptability across various domains. An accuracy of 99.7% was achieved, surpassing other datasets for the same language.

The remainder of the paper is organized as follows: Section 2 situates the new model within related research. Section 3 expands upon the proposed research methodology. Section 4 provides comprehensive experimental results for robust validation of the proposed methodology. Finally, section 5 concludes with explicit discussion of results and offers some potential directions for future research.

Literature Review

Early research in SLR systems used glove-based electrochemical devices to ascertain sign symbols. While useful, such systems altered sign language users' normal conveyance of signs, as the gloves were unnatural and cumbersome, making interpretation susceptible to misclassification (Karmokar et al., 2012). The development of various subsequent research

methods, bolstered by digital video and virtual reality, has enabled more natural recognition of signs. These latter methods also allowed for the examination of additional communication channels, such as facial expressions and body posture. Figure 1 outlines the various methods researchers have used.

In addition to methods that allowed sign language users to communicate more naturally, researchers have sought to investigate the use of the supplementary channels of visual communication used in tandem with manual signing. For instance, Viegas et al. (2022) sought to ground grammatical and semantic functions of facial cues by modeling the relationship between text, gloss, and users' facial expressions. While this model improved the overall quality of automatically generated sign language, challenges remained. Finger movement was difficult to ascertain, making complex hand shapes harder to recognize. Additionally, tools capable of mitigating the loss of facial expression caused by occlusion were determined to be needed.

Similarly, the resemblance between words in sign language poses a challenge for translation algorithms. Abdullahi and Chamnongthai (2022) addressed this issue by employing fast fisher vector (FFV) to select and encode in deep learning bidirectional long short-term memory (Bi-LSTM). They utilized orientation angles and prosodic features to differentiate between similar sign patterns. Despite improvements in accuracy, the FFV-Bi-LSTM faced challenges in learning subtle hand motion differences for similar patterns, resulting in biases and misclassifications. Furthermore, the proposed method struggled to handle similar sign patterns, introducing a multi-feature problem.

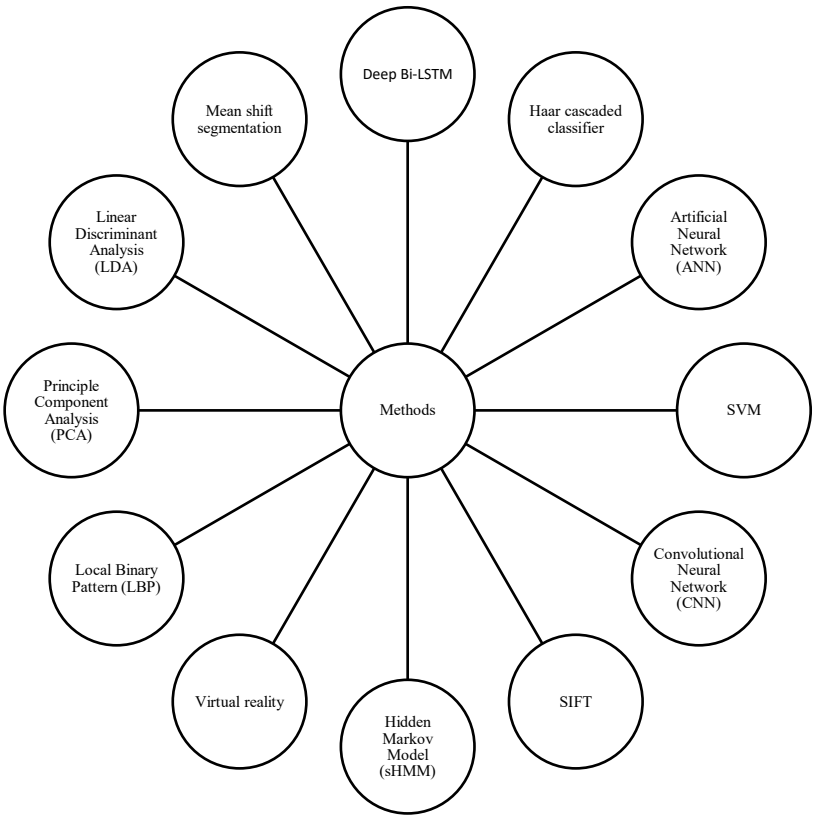


Figure 1: Existing Methods for Sign Language Recognition

Jiang et al. (2021) proposed a skeleton aware multi-modal SLR. This method aimed to address challenges in understanding complex hand gestures, body posture, and facial expressions. The method introduced a unique skeleton graph using whole-body key points obtained from a pretrained pose estimator and relied on multiple depth modalities.

Barbhuiya et al. (2021) employed convolutional neural networks (CNNs) to identify static signs across different users. They utilized a customized pre-trained backbone network and a multiclass support vector machine (SVM) classifier, specifically targeting American Sign Language letters and numbers. The researchers achieved an accuracy of 99.82%, outperforming other methods. This cost-effective approach proved to enhance human-computer interaction on a regular computer; however, the researchers observed that omitting discriminative features resulted in a higher misclassification rate for similar sign patterns which was also observed by Mahayuddin and Saif (2021) during classification of data using augmented reality. Rastgoo et al. (2021) integrated multiple features for hand sign recognition, utilizing multimodalities, such as deep hand features and hand pose features. Their proposed method involved extracting features from various modalities. To enhance semantic information, the researchers introduced an RGB-MHI attention module, leveraging motion history images. The RGB-MHI module's format enriched features, addressing challenges like skin color similarity and body posture related to sign language recognition. Additionally, the proposed RGB-MHI attention module was fused with the Faster R-CNN deep learning framework to improve classification for signs at a far distance and those that require both hands. These enhancements were subsequently validated on three comprehensive datasets.

For the most part, the scope of research on SLR has been limited to American Sign Language (ASL) (Naglot and Kulkarni, 2016), French Sign Language (FSL) (Naglot and Kulkarni, 2016), Danish Sign Language (DSL) (Naglot and Kulkarni, 2016), British Sign Language (BSL) (D RAJ and Jasuja, 2018), and Indian Sign Language (ISL) (Ekbote and Joshi, 2017). Despite its approximately 3 million users, Bangla Sign Language (BdSL) has not been rigorously investigated for recognition, with only a much smaller subset of Sign Language Recognition (SLR) research conducted on it. For example, Karmokar et al. (2012) implemented a Neural Network Ensemble (NNE) with real-time input from a webcam to investigate BdSL. Their findings revealed that the NNE struggled in conditions of insufficient light, low-quality images, or when the user's skin color closely resembled that of the environment.

In a related study, Rahaman et al. (2014) utilized cascaded classifiers based on Haar-like features to recognize BdSL hand signs. Their approach involved detecting the hand area, converting signs into binary images using hue and saturation, and classifying them with a pre-trained K-Nearest Neighbor classifier (Mahayuddin and Saif, 2022). Although they achieved a notable accuracy of 98.17% for vowels, the accuracy for consonants was unsatisfactory. Furthermore, efforts to address skin color (Mahayuddin and Saif, 2021) and hand segmentation (Saif and Mahayuddin, 2020) did not yield satisfactory outcomes. Rahaman et al. (2015) later utilized Canny edge detection to encode Vector Contours (VC) for contour-based sign language recognition from gray images of BdSL sign words. They created a feature space for each sign word using the Auto-Correlation Function (ACF), despite the increased computation complexity. Meanwhile, Ahmed and Akhand (2016) employed an Artificial Neural Network (ANN) to determine the relative tip positions of a BdSL sign language user's fingers in two-dimensional space. While effective, this method struggled to accurately recognize signs at long

distances.

In another approach, Hoque et al. (2018) adopted Faster-r CNN for real-time detection of BdSL recognition. While effective on their BdSLImset dataset, it proved limited when applied to other sign systems. Similarly, Sharmin et al. (2018) explored real-time usage of BdSL, employing color segmentation and converting frames into YCbCr. Despite using Hu moment invariants for feature extraction and SVM for classification, this method faced difficulties detecting the hand region when the background resembled skin color.

Addressing challenges related to users' skin color, Aziz et al. (2017) utilized mean shift segmentation and geometric hashing for one-handed signs but encountered issues in the presence of skin-colored objects. Yasir et al. (2015) used Scale Invariant Feature Transform (SIFT) for their developed Bag of Feature (BoF) for BdSL sign language recognition. Although, they used SVM classifier on vocabulary set, average accuracy for classification was not satisfactory enough comparing with existing research. Shanta et al. (2018) also applied a SIFT approach for BdSL sign language detection, using CNN for classification and achieving accuracy; however, they did not include two-handed gestures during validation and struggled with recognizing sign language from body posture. In contrast, Yasir and Khan (2014) incorporated two-hand gestures in BdSL sign language, applying principal component analysis (PCA) (Saif and Mahayuddin, 2022) and LDA to reduce dimensionality and transform images. While their method incurred additional computation costs due to a large framework, it achieved better accuracy. Yasir et al. (2017) used leap motion controller (LMC) based on virtual reality (Saif and Mahayuddin, 2021) to track continuous motion, achieving low error rates. Santa et al. (2017) employed Local Binary Pattern (LBP) for feature extraction and SVM for classification from video of BdSL sign language users. Despite converting RGB data into the YCbCr color space for skin color segmentation, their method faced challenges when dealing with multiple hands.

Proposed Research Methodology

The proposed research methodology is comprised of four components: data pre-processing, RGB-MHI attention module, Faster R- CNN, and fusion of RGB-MHI attention module with Faster R-CNN shown in Figure 2. The RGB-MHI attention module was formed from the feature map received from base network VGG-16 to extract strong semantic information from RGB frame and later fused with Faster-RCNN for final classification. Prior data pre-processing was conducted, followed by data augmentation for improved performance of the proposed model. Further details are illustrated in subsequent sections.

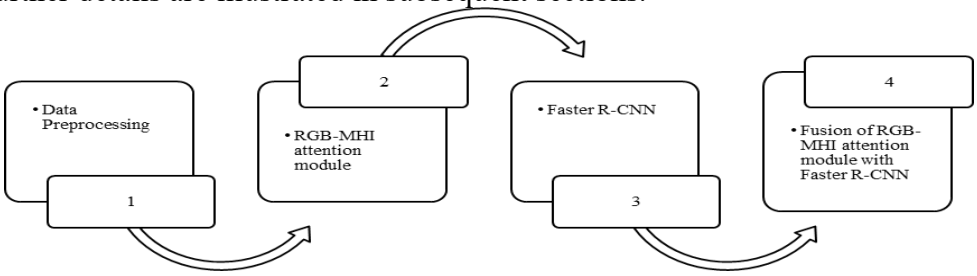


Figure 2: Components of Proposed Fusion Model

Data Proprocessing

A VGG-16 backbone network was used for sufficient semantic information extraction from RGB data and to provide enough information for the RGH-MHI attention module in the subsequent step. In certain RGB data, the presence of another person moving behind the signer prompted the selection and prioritization of the person closest to the camera, specifically focusing on the one with the relatively largest bounding box. Consequently, expansion of the bounding box on both left and right sides was accomplished and all the RGB data were cropped into squares. RGB-MHI data were generated for every video frame and the images were cropped into a square format using bounding box information obtained from a pretrained Faster R-CNN model applied to the respective datasets. For all videos, 33 frames were fixed based on uniform sampling.

RGB- MHI Attention Module

Attention mechanisms, implemented within deep learning architectures, have shown promise at enhancing the classification performance in computer vision tasks. In sign language recognition, attention mechanisms can serve as a viable alternative to segment either spatial or temporal parts of the stream. This approach helps in constructing robust models by focusing on specific cues during the recognition process. This research utilized an RGB-MHI attention module with Faster R-CNN deep learning architecture to focus on semantic cues extracted in the previous step. The proposed model used only RGB data without any explicit part for recognition, such as the user's hands or face. RGB-MHI was formed to summarize the entire video in a single frame to represent compact and relevant semantic pattern and to feed into the Faster R-CNN deep learning framework.

MHI is gray scale image format to capture brighter moving pixels (Bobick and Davis, 2001). Proposed RGB-MHI includes magnitude and phase information inspired by previous research (dos Santos et al., 2020). Each frame is split into three equal parts for calculating motion history separately. In this context, the R-channel preserves motion history data from the initial temporal region; the G-channel preserves from central one; and the B-channel preserves from the last temporal region. Thus, preservation of motion information into three separate channels helped temporal information loss. MHI images were calculated by adding the absolute differences in pixel intensities between consecutive frames, as described in Eq. (1). Here S denotes the total number of frames in video, f_t denotes t video frame, coordinates of pixels are denoted by (a; b), absolute difference of the weight is represented by K calculated as K = t/S.

$$M(a,b) = \sum_{t=2}^{N} f_{t-1}(a,b) - f_t(a,b)|\mathrm{K} \qquad (1)$$

The proposed RGB-MHI attention module used pretrained VGG-16 on the ImageNet (dos Santos et al., 2020) dataset and was then fine-tuned for three sign language datasets. The VGG-16 included a fully connected (FC) layer consisting of 1024 neurons and incorporated a ReLU non-linearity. Subsequently, to mitigate the risk of losing details in the spatial context effects for the MHI images, a final FC layer, utilizing a SoftMax function, followed. Optimal results were attained when all the convolutional layers in the pretrained VGG-16 model were employed.

Faster R-CNN based Flatten Feature Maps Using Semantic Feature Extraction

For strong semantic cues, such as texture, edge and color from an RGB image, Faster R-CNN deep learning architecture was used to locate regions of interest (ROI). The use of the region proposal network (RPN) in Faster R-CNN results in the selection of fewer windows with practical scales and aspect ratios, influencing the identification of positively classified objects. Accordingly, a non-maximal suppression technique is applied for further refinement. Proposal costs were minimized by employing the RPN, which shares convolutional layers. Subsequently, an additional convolutional layer was utilized to regress region bounds and objectness scores based on the foreground position.

The RPN acted as an attention detector that was fused with the RGB-MHI attention module in order to determine optimum bounding boxes across scales and aspect ratios in the prediction layer. Among convolutional layers, 13 layers + 13 layers +4 layers were used to extract feature maps for sharing with subsequent RPN layers and fully connected layers. The RPN used convolutional layers to generate foreground anchors based on the SoftMax classifier and bounding box regression offsets for proposal calculation. Max pooling was used to produce fixed size, 7*7 feature maps aligned with window size. If the longer side of the image was excessively large, it was constrained to a specified size, preserving the aspect ratio. Faster R-CNN extracted features by projecting regions through the RPN onto the deep convolutional layer, specifically conv-5. This layer, from the VGG-16 architecture, is downsampled by a factor of 32 compared to the original input size. This is done to obtain appropriate features for the prediction layer. The overall Faster R-CNN architecture employed by the proposed model is illustrated in Figure 3.

D. Fusion of Faster R-CNN and RGB-MHI Attention Module

The RGB-MHI attention module was fused with Faster R-CNN deep learning framework as multi-model assembles to achieve higher accuracy. Two weights, l_1 and l_2, were assigned in the last layers before SoftMax to calculate weighted sum for final prediction as discussed in Eq. (2) and shown in Figure 3.

$$\text{Prediction} = \text{softmax}\ (l_1 x_1 + l_2 x_2) \qquad (2)$$

Balance was achieved using Single Shot Detector (SSD) (Mahayuddin and Saif, 2019). To compute the feature map, SSD operates on the output of the classification layer from Faster R-CNN only once per given frame. SSD applied a small 4x4 convolutional kernel to the feature map to predict bounding boxes and their corresponding probability estimates. Anchor boxes were also used at various aspect ratios in order to learn the offset instead of learning the box. Each convolutional layer operated at a different scale, so objects with various scales could be detected with higher prediction rate. In this context, Unity3D environment was used for recognition object in augmented reality which is a cross platform. After that, ARCore solution was used to integrate augmented reality for mobile phone in order to make the recognition more convenient and to employ the sensor fusion to track planar surfaces. Besides, data augmentation was applied in the RGB-MHI formation in both the training and the validation sets. The bounding box from either the left or right was expanded to prevent the signer's appearance in the center of the videos. This required vertical shifting of the bounding box randomly within limited pixel constraints. Afterwards, horizontal flip was applied to accommodate the proposed model for both hands.

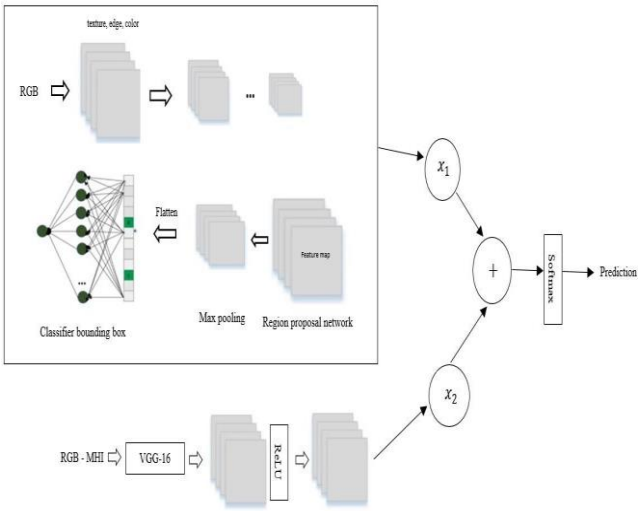


Figure 3: Proposed Fusion Model for Sign Language Recognition

Experimental Results and Analysis

Experimentation of the proposed fusion model was conducted on an average computer system: an Intel® Core™ i7-6100U processor with 16 GB RAM running Windows 11.

A. Datasets

Three datasets are used for validation: AUTSL (Sincan and Keles, 2020; Boháček and Hrúz, 2022), BosphorusSign22k (Özdemir et al., 2020), and the Bangla sign language dataset developed for this study and named the Amar Vasha (AV) dataset. The AUTSL dataset, comprised of 226 signs and 36,302 video samples, is characterized as a large-scale and independent sign system, as opposed to being an isolated dataset. Among the 43 sign users in this dataset, 31 are training set. The validation set was six, and the remaining six were used in the test set. This dataset incorporated 20 distinct backgrounds, serving as a challenge to guarantee the signer-independent evaluation of the proposed method in this research. Various backgrounds that included moving trees and pedestrians behind the sign user were used.

The BosphorusSign22k dataset (Özdemir et al., 2020) is comprised of 744 signs with 22,542 video samples depicting health and finance scenarios, as well as other common activities where a sign language user would need to communicate with a non-sign language user. Six signers contributed to this dataset, with one reserved for testing. One signer was allocated to the validation set for this particular dataset.

Six Bangla signs were used in the AV dataset. Three of them were alphabetic signs (অ, আ, ও) and three were numeric signs (১, ২, ৩). More than a thousand images captured in 640x480 pixels of each sign were used to create the AV dataset. After normalization, 700 images with 224x224 pixels were used for each sign. In total, 4000 images were used for training and 520 images were used for testing.

In all datasets, when videos contained multiple individuals, and pedestrians were passing by the signer, the algorithm selected the largest bounding box associated with a person. The number of frames was fixed at 32; however, some frames were skipped during sampling for

the isolated videos. After cropping, a square RGB-MHI image was generated to obtain the bounding box information from Faster R-CNN. Data augmentation was applied to improve the variability in the training and validation sets. To avoid having sign users consistently appear in the center of the videos, bounding boxes were adjusted either to the left or right. To accomplish this, bounding boxes were vertically shifted for the signer to be in various vertical positions. In order to balance the positioning equally, horizontal flip was also applied to accommodate the sign user when they used both hands. All frames were resized to 224x224 for validation.

B. Training Details

This research used PyTorch library (Paszke et al., 2019) for implementing the proposed method. Optimum hyper parameters were determined based on experimentation, i.e. learning rate. An Adam optimizer with an initial learning rate of 1e-4 was also used. The learning rate was reduced to a 0.2 factor, in case no improvement was observed in the validation set until three epochs. The overall process was repeated several times until improvement could be observed. Each dataset was partitioned into training and testing data. For experimentation purposes, 90% of the images were assigned to the training set, while the remaining 10% were allocated to the testing set. The complete training process was observed until total loss decreased to 0.05. When total loss decreased to 0.05, training was stopped to avoid overfitting. If total loss increased rather than decreased, the training process was immediately stopped. When this stoppage occurred, the last step number was saved for later usage in the inference graph and to monitor the whole training process. The proposed model was trained on GTX 1080 GPU, where inference time for one image was approximately 2s with 2k proposals.

C. Experimental Results on AUTSL Dataset

To observe empirical performance with different depths and to validate the proposed model, the VGG-16 was implicated on a layer-by-layer basis. The best result was achieved when all layers of VGG-16 were used. Compared to the baseline method, which is presented with the AUTSL dataset (Sincan and Keles, 2020), the proposed method achieved 95.3% classification accuracy using single image RGB-MHI. This is higher than 2D-CNN with an attention based bidirectional LSTM model taking entire video frames. Also, since it only needs single pattern interpretation from a single image, using RGB-MHI image training was very fast. This was especially true when compared to 2D models, where entire video frames are used as inputs. Moreover, since there are more than 200 different sign classes in the AUTSL dataset, the 95.3% accuracy rate showed that a single RGB-MHI image was capable of learning important discriminative features to represent isolated signs. In order to increase the generalization capability of the proposed method, training was done with the augmented data. During the experiment, the classification accuracy increased from 95.3% to 97.7% when seven times more training data was generated through the use of data augmentation. In previous research using the AUTSL dataset (Sincan and Keles, 2020), participants were allowed to use validation labels to fine tune the complete methodology. The initial learning rate was set to 2e - 3, instead of 1e - 2. Since there was no validation set in this experiment, fine tuning was stopped when the training loss was reduced to the same level as the previous run. The proposed method, with the union of training and validation sets, obtained a 98.97% classification accuracy. Experimental results on AUTSL dataset are shown in Table 1.

Table 1: Experimental Results on AUTSL Dataset

Proposed Method	Frame Size	Accuracy	Computational Time
Without augmentation	224x224	95.3%	0.11s
With augmentation	224x224	97.7%	0.13s
After fine-tuning	224x224	98.97%	0.12s

Table 2 shows existing research results on the AUTSL dataset compared against the proposed method. Various modalities were used in previous research to increase classification accuracy, i.e. skeleton joints, optical flow, and hand crops. The proposed method received better results using the same AUTSL dataset. Thus, the utilization of both the RGB image and the RGB-MHI images derived from the RGB image distinctly demonstrated the effectiveness of the RGB-MHI attention module for sign language classification, along with the benefits of data augmentation.

Table 2: Comparison With Existing Research Results on AUTSL Dataset

Method	Modalities	Accuracy
MS-G3D (Vázquez-Enríquez et al., 2021)	RGB, skeleton joints, bones, joint motion, bone motion	96.15%
I3D-VLE-transformer (Gruber et al., 2021)	RGB, hand crops, pose, location vectors	95.46%
VTN-PF (De Coster et al., 2021)	RGB, hand crops, location vectors, skeleton	92.92%
OpenPose+Holistic (Moryossef et al., 2021)	Skeleton	81.93%
2DCNN+Attentioned BLSTM (Sincan and Keles, 2020)	RGB	49.22%
Proposed Method	RGB, RGB-MHI image	98.97%

D. Experimental Results on BOSPHORUSSIGN22K Dataset

The evaluation of the proposed method on the BosphorusSign22k (Özdemir et al., 2020) dataset yielded a classification accuracy of 78.3%. Drawing inspiration from prior research (Sincan et al., 2021; Vázquez-Enríquez et al., 2021), the parameters trained on the AUTSL dataset were used to examine the outcomes of transfer learning. The decision to use AUTSL pretrained data was motivated by two factors: first, it contains similar signs, albeit in different contexts with different signers; and second, as demonstrated in previous research (Vázquez-Enríquez et al., 2021), pretraining with AUTSL has proven effective for other sign languages, such as Spanish Sign Language.

The proposed model was fine-tuned using the union of the training and validation datasets, resulting in an accuracy rate of 93.6%. In light of the limited number of signers in the training data (four signers) and to enhance the generalization of the proposed model, an additional sign language user was included in the validation set. The utilization of pretrained datasets, specifically AUTSL and ImageNet, contributed to an increased classification accuracy of 96.7%. The experimental results using the BosphorusSign22k dataset are presented in Table 3.

Table 3: Experimental Results on BOSPHORUSSIGN22K Dataset

Proposed Method	Frame Size	Pretrained datasets	Accuracy	Computational Time
RGB-MHI	224x224	ImageNet	78.3%	0.11s
Fine tune with train + validation data	224x224	AUTSL	93.6%	0.12s
Fine tune with train + validation data	224x224	AUTSL, ImageNet	96.7%	0.14s

The performance of the proposed model on the BosphorusSign22k dataset, as compared to results from previous research, is presented in Table 4. The achieved accuracy of 96.7% surpasses the performance of other existing methods on the BosphorusSign22k dataset. Notably, the proposed method did not rely on concise part extraction for segmentation as a modality. Instead, RGB-MHI was employed to assist in focusing on relevant parts for sign classification.

Table 4: Comparison With Existing Research Results on BOSPHORUS22K Dataset

Method	Modalities	Accuracy
MC3-18 Spatio-Temporal Sampling (Gökçe et al., 2020)	RGB, cropped hands, cropped face	94.94%
IDT (Özdemir et al., 2020)	HOG, HOF, MBH	88.53 %
MC3-18 Spatio-Temporal Sampling (Gökçe et al., 2020)	RGB	86.91%
MC3-18 (Özdemir et al., 2020)	RGB	78.85 %
Proposed Method	RGB, RGB-MHI image	96.7%

E. Experimental Results on Amar Vasha (AV) Dataset

The AV dataset used in this experimentation comprises both alphabetic and numeric signs, totaling 38 signs from the 51 Bangla alphabets (Islam et al., 2018). This research specifically focused on six signs—অ, আ, ও, ১, ২, and ৩—selected based on criteria such as the use of both hands, the placement of hands with respect to the body, posture, and facial expression. Among these signs, single-handed gestures represent ১, ২, and ৩, while double-handed gestures represent অ, আ, and ও. The choice of these six signs was made to test both single and double-handed signs.

The classification results for these signs exhibited fluctuations due to variations in the experimental environment and the distance of the background from foreground objects. Similar to the AUTSL and BosphorusSign22k datasets, a frame size of 224x224 was employed for the AV dataset, owing to its good texture and smoothness. The proposed method achieved recognition accuracy of 99.9% for অ, 99.8% for আ, and 98.4% for ও, as shown in Table 5. The lower accuracy for ও compared to অ and আ was attributed to its similarity with the sign আ.

Regarding numeric signs, the proposed model achieved recognition accuracy of 99.9% for ১, 98.2% for ২, and 99.7% for ৩. However, due to the similar angle of hand positions during training, the accuracy for ২ was lower than that for ১ and ৩. Notably, accuracy increased when

the angle of the signer's hand position approached that during training. Additionally, due to the similarity of these signs with others in terms of shape, the accuracy for ও and ৩ classifications fluctuated. Experimental results are detailed in Table 5, and selected real-time video frame results are presented in Figure 4.

Table 5: Summary of Experimental Results on AV Dataset.

Object	Frame Size	Accuracy	Computational Time
অ	224x224	99.9%	0.12s
আ	224x224	99.8%	0.12s
ও	224x224	98.4%	0.13s
১	224x224	99.9%	0.12s
২	224x224	98.2%	0.12s
৩	224x224	98.8%	0.12s

The proposed method was compared against existing Bangla sign language recognition methods, as summarized in Table 6. In one study (Karmokar et al., 2012), 47 signs with 235 samples achieved a recognition rate of 93%. However, the neural network ensemble (NNE) exhibited reduced accuracy in challenging conditions. Another investigation (Mahayuddin and Saif, 2021), trained on 3600 samples for 36 hand signs revealed challenges particularly for consonants, attained a recognition rate of 96.46%.

Two artificial neural network (ANN) architectures (Ahmed and Akhand, 2016) achieved a recognition rate of 98.99% using a fingertip position-based approach. In contrast, Faster R-CNN (Hoque et al., 2018) achieved a slightly lower accuracy of 98.20%, attributed to limitations in handling similar sign patterns. Another study, employing a dataset of 34 signs with 1020 sample images (Sharmin et al., 2018), demonstrated a training accuracy of 98.24% and a testing accuracy of 87.79%; however, challenges were encountered in hand region detection against a skin-colored background. Several other studies utilized various datasets and methods, achieving accuracies ranging from 70% to 99% (Shanta et al., 2018; Santa et al., 2017; Islam et al., 2018; Hasan et al., 2017; Uddin and Chowdhury, 2016; Hasan et al., 2016; Kishore et al., 2015). It is noteworthy that the proposed research, employing 4200 samples for 6 signs, surpassed these state-of-the-art methods with an outstanding accuracy of 99.1%.

Table 6: Comparison With Existing Research Results

Method Name	Recognition Rate (Percent)	Total Signs	Total Samples	Frame Rate
Neural Network Ensemble (NNE) (Boháček and Hrúz, 2022)	93	47	235	N/A
K-Nearest Neighbor (KNN) (Özdemir et al., 2020)	96.46	36	3600	93.55792 milliseconds
Artificial Neural Network (ANN)	98.99 (Karmokar et al., 2012)	37	518	N/A

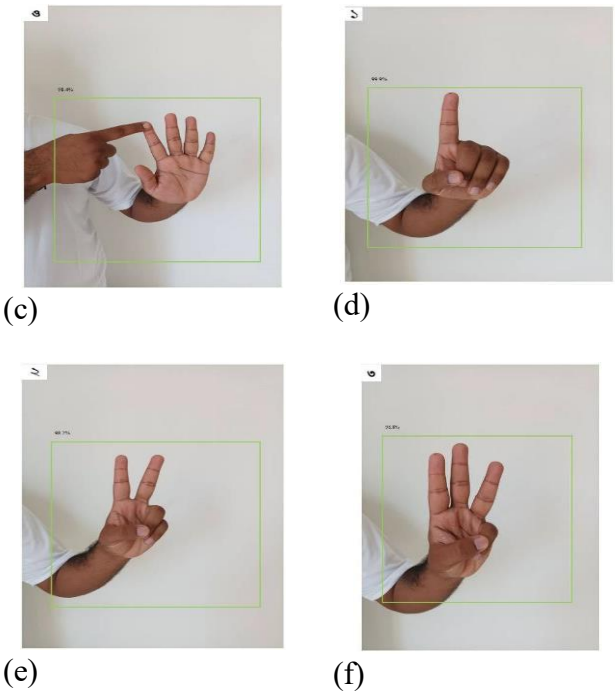
(Karmokar et al., 2012; Mahayuddin and Saif,2021; Ahmed and Akhand, 2016)	96.5 (Mahayuddin and Saif,2021)	20	400	N/A
	95.1 (Ahmed and Akhand, 2016)	36	288	N/A
Support Vector Machine (SVM) (Sincan and Keles, 2020; Rahaman et al. (2014); Saif and Mahayuddin, 2020;Rahaman et al., 2015)	97.7 (Saif and Mahayuddin, 2020)	N/A	4800	N/A
	86.53 (Rahaman et al., 2015)	16	320	N/A
	94.26 for words and 94.49 for sentences (Rahaman et al., 2014)	25	4800	25 fps
	87.79 (Sincan and Keles, 2020)	34	1020	
Convolutional Neural Network (CNN) (Rastgoo et al., 2022; Mahayuddin and Saif, 2022)	90.63 (Rastgoo et al., 2022)	38	1700	N/A
	92 (Mahayuddin and Saif, 2022)	36	1800	N/A
Faster Region-based CNN (Faster R-CNN) (Islam et al., 2018)	98.2	N/A	N/A	90.03 milliseconds
Proposed Method	99.7%	6	4200	8



(a)



(b)



(c) (d)

(e) (f)

Figure 4: Bangla Sign Language Classification. (a) অ, with Accuracy 99%. (b) আ, with Accuracy 99.7% (c) ৩, with Accuracy 99.8%. (d) আ, with Accuracy 99.7% (e) ২, with Accuracy 97.7% (f) ৩, with Accuracy 99.7%.

Conclusion

In this research, the entire video content was condensed into a single frame using the RGB-MHI attention module, without explicit focus on specific parts like hands or face. Three distinct channels in the form of motion history images were employed to capture robust semantic cues for comprehensive classification. The fusion of the RGB-MHI image with efficient machine learning framework named Faster R-CNN was performed to assemble a multi-model approach, resulting in higher accuracy. In this context, cross platform Unity3D environment was used to embed with the fusion model. Promising experimental outcomes were achieved on two publicly available datasets, AUTSL and BosphorusSign22k, with an accuracy of 98.97% and 96.7%, respectively, surpassing existing research benchmarks. Additionally, the proposed model underwent validation on a self-created dataset named Amar Vasha for Bengali Language, ensuring cross-domain adaptability. A noteworthy accuracy of 99.7% was attained for the Amar Vasha dataset, outperforming other datasets in the same language. The deaf and hearing-impaired community faces social barriers due to the limited adoption of sign language among the general population. To address this issue, a solution is proposed in the form of vision-based continuous sign language recognition. This technology aims to translate sign language gestures, thereby alleviating communication challenges. The future development of this model involves validation using diverse datasets that represent different sign languages and incorporate various deep learning architectures. The envisioned vision-based fusion model for sign language recognition is expected to play a crucial role in enhancing communication between the deaf and hearing-impaired community and the general population in their daily activities.

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A STUDY OF THE PROGRAMME LEARNING OUTCOMES (PLOs) FOR THE DIPLOMA IN QUANTITY SURVEYING AT POLITEKNIK SULTAN AZLAN SHAH, MALAYSIA

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Abstract: *This research presents an achievement analysis of the Programme Learning Outcomes (PLOs) for the Diploma in Quantity Surveying (QS) for Session 1: 2024/2025 at Politeknik Sultan Azlan Shah. The analysis covers student performance across multiple semesters, emphasizing the attainment levels of each PLO. Key areas of both success and concern are identified, with particular focus on PLO1 (Knowledge & Understanding) and PLO7 (Numeracy Skills), which recorded the lowest attainment levels. Findings show that while the overall attainment for all PLOs met the Performance Indicator (PI) benchmark of 50%, certain courses, most notably DCQ20082 (Basic Land Surveying), did not meet the expected targets. To address these gaps, the study recommends Continuous Quality Improvement (CQI) initiatives, including enhanced training sessions, the adoption of interactive teaching methodologies, and enhanced assessment strategies. The research also compares PLO achievements across different academic sessions, highlighting a notable improvement in PLO4 (Interpersonal & Communication Skills), attributed to strong performance in courses such as Industrial Training and Computer Application. Despite these gains, persistent difficulties in achieving PLO1 suggest a need for curriculum revisions and additional student support mechanisms. This comprehensive evaluation aims to guide ongoing curriculum enhancement and instructional strategies, ensuring the QS program remains aligned with industry standards and responsive to student learning needs. The analysis includes detailed statistical data, identification of underperforming courses, and actionable recommendations for CQI implementation.*

Keywords: *Quantity Surveying, Programme Learning Outcome, Academic Achievement*

Introduction

In the evolving landscape of the construction and built environment sector, the role of quantity surveyors has become increasingly critical in ensuring cost efficiency, contractual compliance, and project sustainability. As such, academic programmes that prepare future professionals in this field must be rigorously designed to meet industry demands and educational standards. The Diploma in Quantity Surveying serves as a foundational qualification that equips students with the technical knowledge, practical skills, and ethical grounding necessary for entry-level roles in the profession.

Programme Learning Outcomes (PLOs) are central to the academic integrity and effectiveness of any educational programme. They articulate the specific competencies that students are expected to achieve upon graduation, encompassing cognitive, psychomotor, and affective domains. In the context of Quantity Surveying, these outcomes typically include proficiency in cost estimation, contract administration, construction technology, and professional practice,

among others. Evaluating the alignment, clarity, and attainability of these PLOs is essential to ensure that the curriculum remains relevant, comprehensive, and responsive to both academic benchmarks and industry expectations.

This study aims to examine the PLOs of the Diploma in Quantity Surveying, assessing the achievement, implementation, and impact on student learning and employability. By analyzing the extent to which these outcomes reflect the competencies required in the field, the study seeks to provide insights that can inform curriculum development, teaching strategies, and quality assurance practices. Ultimately, the findings are expected to contribute to the continuous quality improvement (CQI) of Quantity Surveying education and the professional readiness of its graduates.

Literature Review

The Diploma in Quantity Surveying programme at Politeknik Sultan Azlan Shah (PSAS), Perak, Malaysia is a comprehensive programme designed to equip students with the essential skills and knowledge required in the field of quantity surveying. This program is structured to provide a solid foundation in both theoretical and practical aspects of quantity surveying, preparing graduates for successful careers in the construction industry. Knowing the technical and multidisciplinary nature of the profession, requiring for skills in cost management, construction technology, legal frameworks, and project administration, PLOs are especially important in the framework of Quantity Surveying education.

National qualification systems and professional bodies like the Royal Institution of Surveyors Malaysia (RISM) and the Board of Quantity Surveyors Malaysia (BQSM) have shaped how PLOs are incorporated into Quantity Surveying initiatives in Malaysia. Emphasising measured learning outcomes and student-centered learning strategies, these bodies drive for outcome-based education (OBE). Moreover, studies on student learning experiences in Malaysian Quantity Surveying courses emphasise the need of matching PLOs with learning methods and evaluation strategies.

The Diploma in Quantity Surveying programme at PSAS spans over six (6) semesters, including industrial training, which allows students to gain hands-on experience in real-world settings. The curriculum is meticulously crafted to cover a wide range of topics, including measurement of building works, construction technology, building services, professional practice, law and contract, project management, and economics. The programme emphasizes the development of key competencies such as knowledge and understanding, cognitive skills, practical skills, interpersonal and communication skills, digital and numeracy skills, leadership, and professional ethics. According to Abdulqader et al. (2023), most higher education programs aim to fulfil the essential graduate characteristics anticipated to be reflected in the learning outcomes.

The primary objectives of the Diploma in Quantity Surveying programme at Politeknik Sultan Azlan Shah (PSAS) are:

1. To provide students with a thorough understanding of the principles and practices of quantity surveying.

2. To develop students' ability to apply theoretical knowledge to practical situations in the construction industry.
3. To enhance students' skills in measurement, costing, and management of construction projects.
4. To foster critical thinking, problem-solving, and decision-making abilities.
5. To prepare students for professional roles in the construction industry, ensuring they are equipped with the necessary technical and soft skills.

In addition to that, industrial training is a key component of the Diploma in Quantity Surveying program, which takes place in the final semester on the third year of study. This training provides students with the opportunity to apply their knowledge and skills in a real-world environment, gaining valuable experience and insights into the industry. It also allows students to build professional networks and enhance their employability upon graduation. After completing a course, students are expected to have a variety of learning outcomes and graduate dispositions from the program (Abdulqader et al., 2023).

Program Learning Outcomes (PLOs) are important indicators of what knowledge and skills students should possess when they graduate. PLOs in Malaysia are in line with the Malaysian Qualifications Framework (MQF), which guarantees uniformity and excellence between Politeknik Sultan Azlan Shah and other higher education establishments. According to Akintayo et al. (2024), in higher education, the evaluation and improvement of learning outcomes have taken prominence in educational accountability and quality. Ab Malek et al. (2023) emphasized the significance of university course design in ensuring that graduates succeed in the workforce.

Under the Ministry of Higher Education Malaysia, Politeknik Sultan Azlan Shah place a strong emphasis on Technical and Vocational Education and Training (TVET). In this context, PLOs are intended to give students technical proficiency in quantity surveying, encourage soft skills like ethics, teamwork, and communication, and encourage adaptation and lifelong learning in the construction sector. Furthermore, the PLOs analysed in the Diploma of Quantity Surveying programme are listed below:

PLO1: Knowledge & Understanding
PLO2: Cognitive Skills
PLO3: Practical Skills
PLO4: Interpersonal & Communication Skills
PLO5: Digital & Numeracy Skills
PLO6: Leadership, Anatomy & Responsibility
PLO7: Personal & Entrepreneurial Skills
PLO8: Ethics & Professionalism

Drawing on recent research related to the topic, this study explores the intricate nature of the programme learning outcomes, how they are measured, and the methods used to enhance them. Consequently, Ab Malek et al. (2023) mentioned that the quantity surveying profession faced many challenges, risks, and threats to survive and sustain their services in construction or even new sectors. The rapid evolution of educational demands necessitates curricula that are responsive to changes in societal, technological, and pedagogical landscapes (Kusmawan et al., 2025).

Apart from that, the advent of digital tools and online learning platforms has precipitated a significant transformation in higher education, altering traditional pedagogical approaches and reshaping learning outcomes (Rafiq et al., 2024). According to Romero Caballero et al. (2024), to improve performance in the workplace, Higher Education Institutions (HEIs) must develop pedagogical approaches that foster active, experiential, and experiential learning. They should also use creative pedagogical strategies linked to learning outcomes, the necessary generic competencies, and products that prove their growth and influence on the social environment.

Methodology

The instruments used to collect the data was from student performance records, including final examination results and continuous assessments records. This study involved 216 students who were enrolled in the Diploma in Quantity Surveying program for Session 1: 2024/2025. The analysis focused on the attainment of eight (8) PLOs across different semesters from the second until the sixth semester and all courses taught in the Diploma in Quantity Surveying programme, for Session 1: 2024/2025. Traditionally, the learning objectives are quantifiable and result-oriented (Abdulqader et al., 2023). Statistical methods were used to calculate the percentage of students' achievement meeting the Performance Indicator (PI) target which is 50%.

Analysis

Overall PLO Achievement:

The average achievement for all PLOs ranged from 59% to 87%. The highest achievement was in PLO5 (Digital & Numeracy Skills) and PLO6 (Leadership, Anatomy & Responsibility), while the lowest was in PLO1 (Knowledge & Understanding). Students' achievement on PLO1 was the lowest projected from final examination results and test results from the continuous assessment of each course.

Semester-wise PLO Achievement:

- **Semester 1:**
  No achievement records due to no student intake.

- **Semester 2:**
  Achievements ranged from 55% to 88%, with PLO1 (Knowledge & Understanding) being the lowest at 46%.

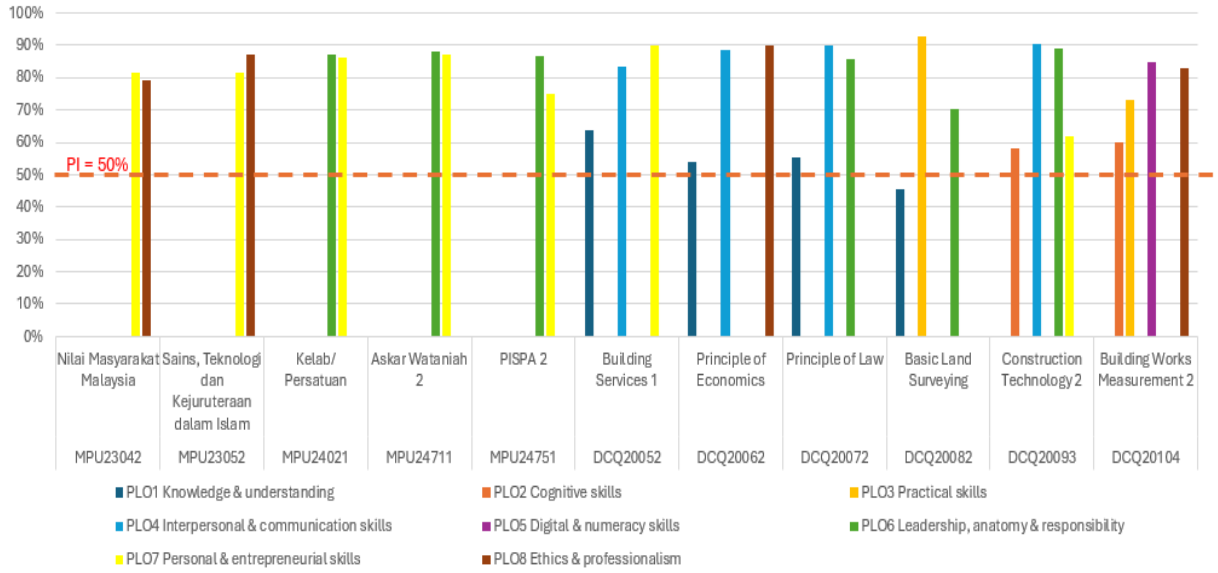


Figure 1: PLOs Achievement for Semester 2

- **Semester 3:**
  Achievements ranged from 58% to 88%.

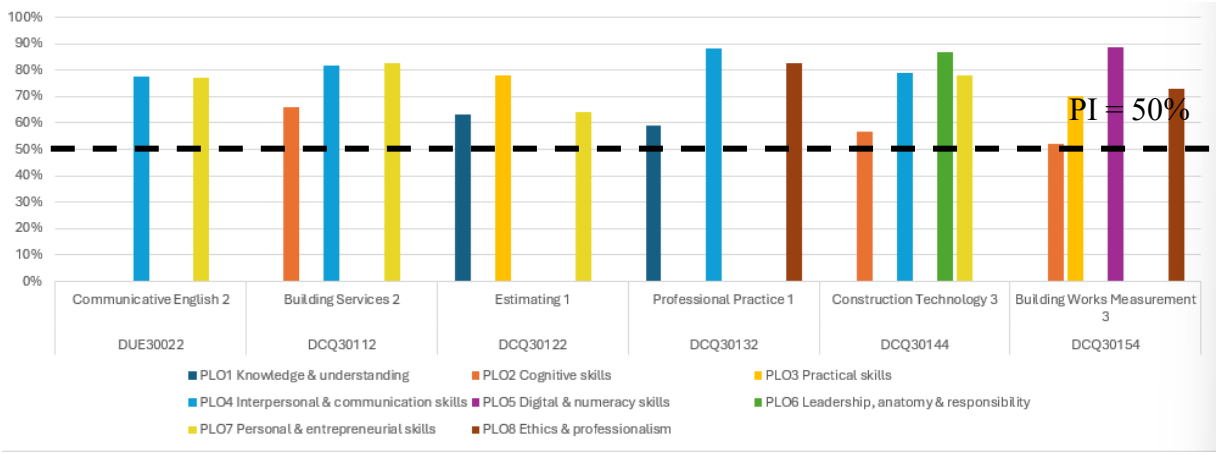


Figure 2: PLOs Achievement for Semester 3

- **Semester 4:**
  No achievement records due to no student intake.

- **Semester 5:**
  Achievements ranged from 62% to 91%.

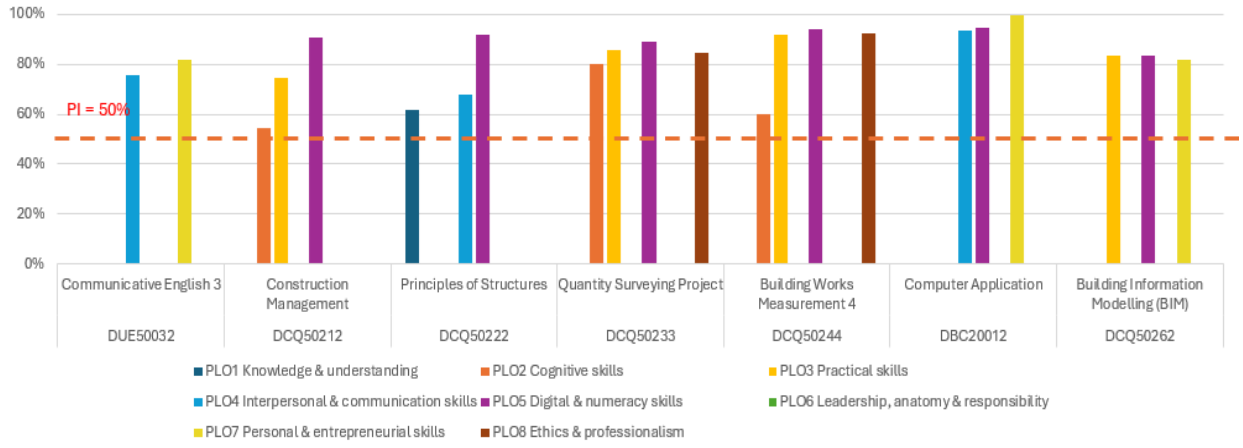


Figure 3: PLOs Achievement for Semester 5

- **Semester 6 (Extend):**
  Achievements ranged from 77% to 92%.

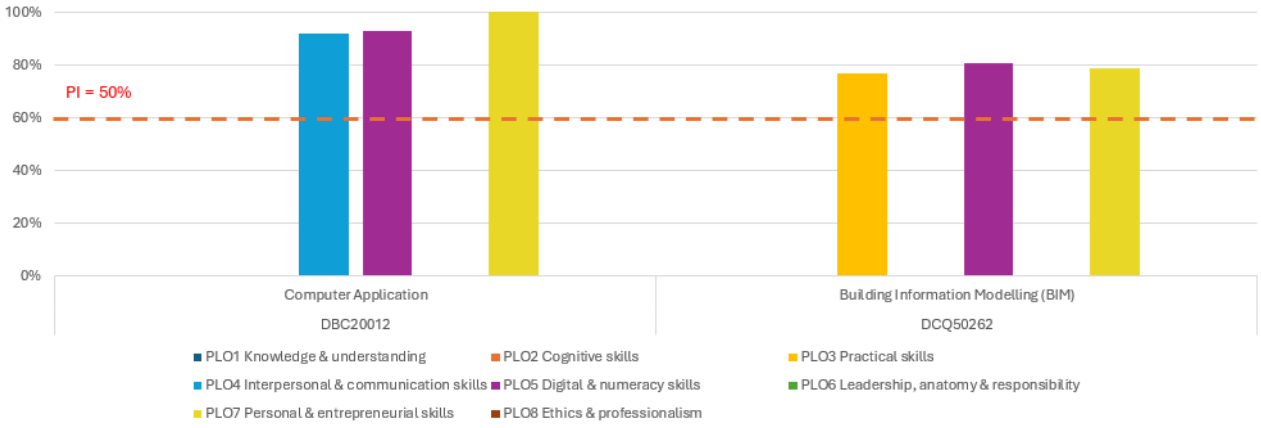


Figure 4: PLOs Achievement for Semester 6 (Extended)

- **Semester 6 (Industrial Training):**
  Achievements ranged from 85% to 90%.

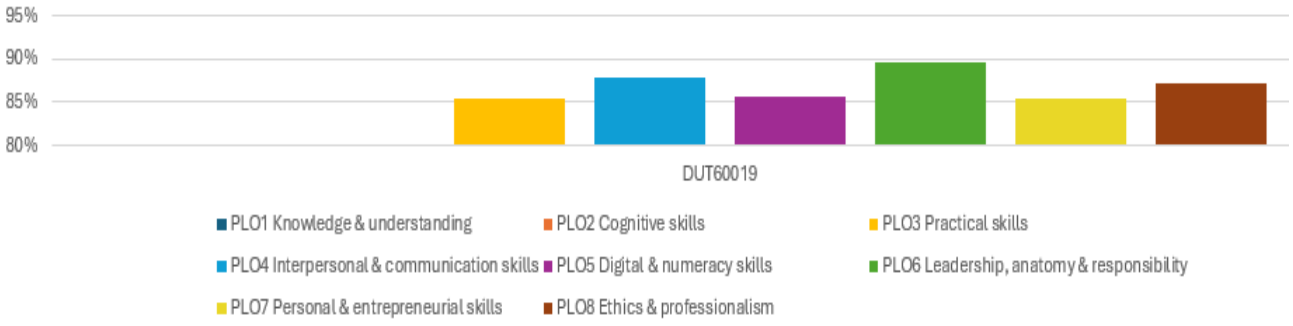


Figure 5: PLOs Achievement for Semester 6 (Industrial Training)

Courses Not Meet the PI Targets:

- **DCQ20082 (Basic Land Surveying):**
  Achieved 46% for PLO1 (Knowledge & Understanding).

The data gathered on PLOs' average achievement for the whole semester of Session 1:2024/2025 are shown in Table 1 and Figure 6, respectively. The data gathered and analysed to find ways for PLOs requires improvement in order to escalate the students' achievement in the next session.

Table 1:
Average PLO Achievement and Group Attainment Percentage over All Semesters

PLO / SEM	1	2	3	4	5	6	7	8	%
2	55	59	83	88	85	84	80	85	**77**
3	61	58	74	82	88	87	76	78	**76**
5	62	65	84	79	91	-	88	88	**80**
6	-	-	77	92	87	-	90	-	**87**
6 (EX)	-	-	86	88	86	90	85	87	**87**
AVERAGE	**59**	**61**	**81**	**86**	**87**	**87**	**84**	**85**	

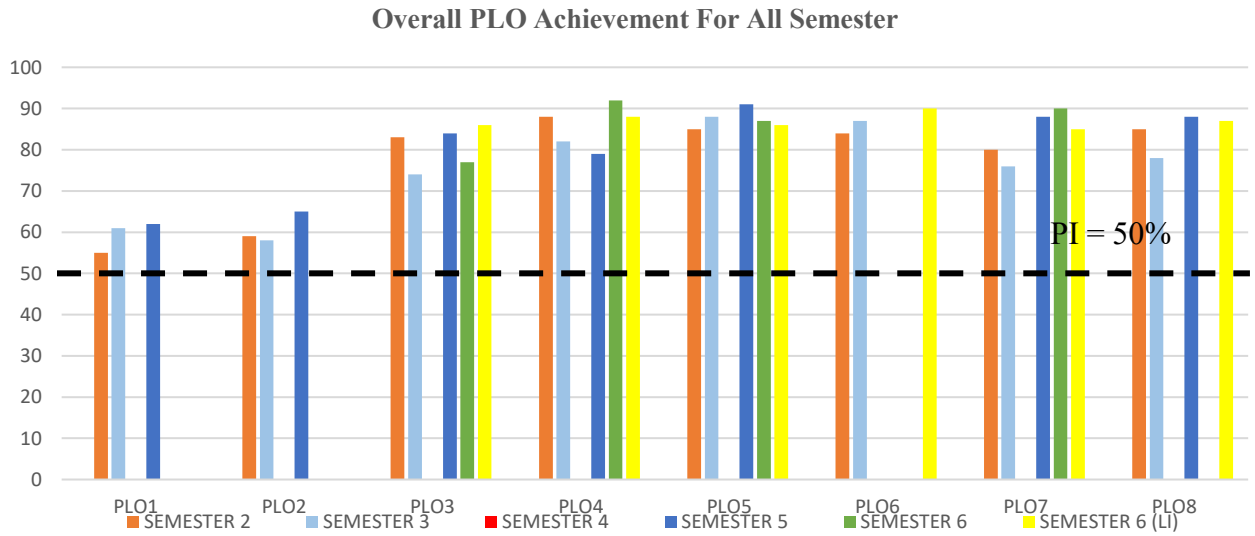


Figure 6: Overall PLO Achievement for All Semester

Discussion

The analysis indicates that while most PLOs have been achieved satisfactorily, there are specific areas that require improvement. The low achievement in PLO1 Knowledge & Understanding and PLO2 Cognitive Skills suggest a need for enhanced teaching methods and additional support for students in these areas, shown in Figure 7.

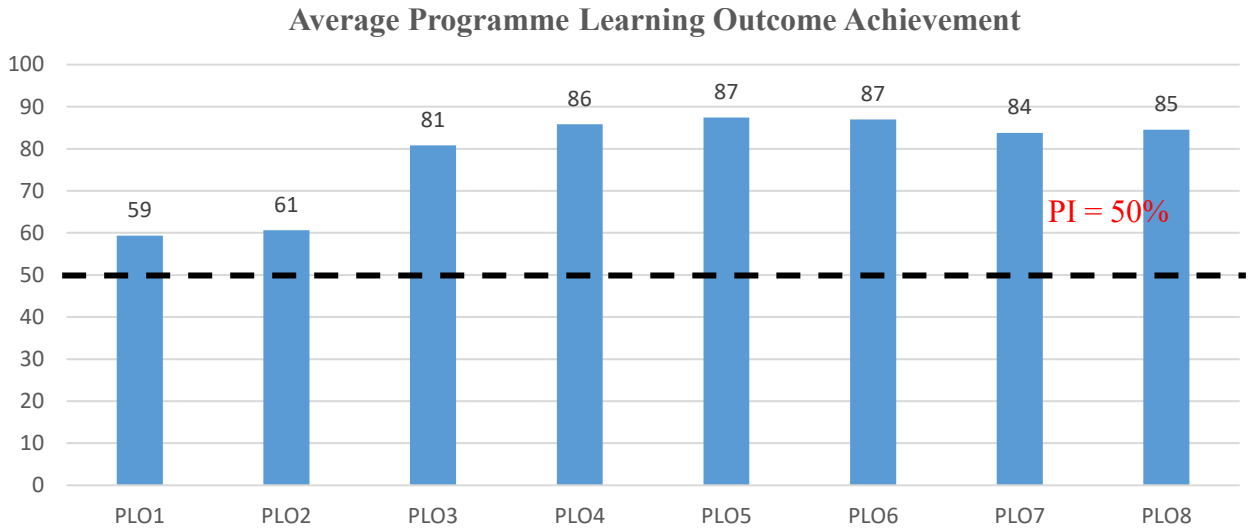


Figure 7: Average PLO Achievement for All Semesters

Furthermore, analysis on PLOs achievement been discussed for reach the outcome to improve the Course Learning Outcome (CLO) and so on PLOs achievement for the next cohort in future. Based on the graph above where PLO1 and PLO2 achievement are quite low than others, here are ways to improve them:

- **For PLO1 (Knowledge & Understanding):**
    1. Lecturers may conduct small group discussions to enhance student understanding in class.
    2. Lecturers suggested using engaging teaching methods to increase student interest in class.
- **For PLO2 (Numeracy Skills):**
    1. The lecturers suggested providing additional training for the students using various forms of drawings to help students understand and apply quantity surveying measurements and quantification.
    2. Lecturers must ensure students complete and submit all assessments.
    3. By increase more practice with past final exam questions to improve exam techniques and time management.

Recommendation

Several Continuous Quality Improvement (CQI) strategies aimed at enhancing the performance and learning outcomes of students in the Diploma in Quantity Surveying program at Politeknik Sultan Azlan Shah. The key proposals are as follows:

1. **Monitoring Student Performance:**
    - Continuous monitoring of student performance on continuous assessment to identify those with less than 50% achievement.
    - Providing additional training and support to students who are underperforming.

2. **Support for Failing Students:**
    - Organizing special meetings for students who fail courses to identify their problems and increase their motivation towards the learning process.
    - Ensuring that students complete additional exercises provided by course lecturers.

3. **Course Learning Outcomes (CLO) Improvement:**
    - Monitoring the implementation of CQI by course lecturers (refer to the CORR of course lecturers).
    - Conducting Excel usage courses to improve the achievement in quantity measurement courses with low performance.

4. **Programme Learning Outcomes (PLO) Enhancement:**
    - Implementing continuous programs and Industry Expert Enrichment Program (IEEP) to expose students to real industry practices in the construction sector.
    - Organizing site visits to construction sites to provide students with real-world experience and direct knowledge from the industry.

These CQI initiatives are designed to address specific areas where student performance is below expectations and to enhance the overall quality of the educational experience in the Diploma in Quantity Surveying program. By implementing these strategies, the program aims to better prepare students for their future careers in the construction industry.

Conclusion

The Diploma in Quantity Surveying at Politeknik Sultan Azlan Shah is a well-rounded program that prepares students for the dynamic and challenging field of quantity surveying. With a strong emphasis on both academic and practical training, the program ensures that graduates are well-equipped to meet the demands of the construction industry and contribute effectively to the built environment. Hence, academic institutions should conduct more programs for students regarding the quantity surveying profession in the non-construction sector to help students overcome these challenges and prepare them for the evolving demands of the quantity surveyor's profession (Ab Malek et al., 2023).

The study highlights the overall satisfactory achievement of PLOs for the Diploma in Quantity Surveying program at Politeknik Sultan Azlan Shah, Perak, Malaysia. However, targeted CQI initiatives are necessary to address the areas where performance is below the expected

standards. Continuous monitoring and improvement efforts will ensure the program remains relevant and meets industry demands.

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BRAND BOYCOTT AND ISRAEL-HAMAS WAR 2023: MALAYSIA MCDONALD'S AND STARBUCKS BRAND RESPONSE AND PERCEPTION

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Abstract: *With the escalation of the Israel-Hamas conflict on 7 October 2023, Palestinian supporters have called for boycotts of companies they claim support Israeli policies and have drawn millions of views on social media. Many of those boycotting has referred to the Boycott, Divestment, Sanctions (BDS) movement to target a few pro-Israel brands to make the boycott more effective, and two of the brands that have been most affected globally are Starbucks and McDonald's. This conceptual paper aims to investigate brand response and perception through its two research objectives: (1) to examine the response from McDonald's and Starbucks to the boycott against them in Malaysia; (2) to assess the intentions of the response by McDonald's and Starbucks during the boycott. Employing a qualitative research method, the research will analyse both brands' press statements, promotional campaigns and their social media response. The data from this research is expected to provide valuable insights into each brand's strategies and justifications in responding to the boycott to acquire appropriate information and arrive at a logical conclusion about the consumer brand boycott.*

Keywords: *Brand Boycott, Israel-Hamas Conflict, Malaysia, McDonald and Starbucks*

Introduction

Since the escalation of the Israel-Hamas conflict on 7 October 2023, Palestinian supporters have called for boycotts of companies they claim support Israeli policies and have drawn millions of views on social media. Many of those boycotting has referred to the Boycott, Divestment, Sanctions (BDS) movement to target a few pro-Israel brands to make the boycott more effective, and two of the brands that have been most affected globally are Starbucks and McDonald's (Vinall, 2024). The BDS movement was started in 2005 by a coalition of Palestinian civil society organizations, activists, academics, intellectuals, and trade unions that called for boycotts against brands closely associated with Israel. They called upon the international community "in the spirit of international solidarity, moral consistency, and resistance to injustice and oppression" to implement this call "until Israel meets its obligation to recognize the Palestinian people's inalienable right to self-determination and fully complies with the precepts of international law (Sriram Ananth, 2013).

The Boycott of McDonald and Starbucks

The Hamas attack on Israel on 7th October 2023 heightened the BDS movement (Boycott, Divestment and Sanctions). The BDS fights to end the international support for Israel's oppression of Palestine. Globally, two brands are slammed hard by people, McDonald's and Starbucks, due to their statement on the war. McDonald's faced boycott worldwide due to their Israel franchise statement on X on sending food to Israel troops and opening five for aid and donation to the force. This action irked consumers globally despite being a franchise move (Sawdah Bhaimiya, 2023; Owusu, 2023).

Although McDonald's is a global chain, its franchises are often owned locally and operate autonomously. Many countries such as "Saudi Arabia, Oman, Kuwait, the United Arab Emirates, Jordan, and Turkey issued statements disassociating themselves from the Israeli franchise and, in most cases, pledging aid to Gaza. McDonald's Corp declined to comment, but a source close to the company in the U.S. said the Israel franchise was an independent business that licensed McDonald's brand. The source said it's not unusual for franchisees to engage with their local communities when in need" (Magid, 2023; Hale, 2023).

Another controversial franchise move of the brand is McDonald's outlet in America used Israeli colours of blue and white to wrap its burgers, sparked another global outrage on social media (*Burger Wrapper 'Israeli-themed' burger wrapper poses PR headache as McDonald's in Muslim nations chip in for Gaza*, 2023). McDonald's corporation commented that the wrapper is generic for temporary shortages, special orders and limited-edition products. The wrappers come in many colours, and the use is due to the chain products and occasions. It is not intended to be affiliated with any political statement. Despite the staff's claim of using the blue and white wrapper as the store ran out of regular wrapping, netizens believe the brand should be more sensitive to the recent Palestinian issue (Reuters Fact Check, 2023; Frank, 2023; Townend, 2023). The global boycott of this fast-food chain significantly impacted their business. They lost both monetary and reputation as the brand faced backlash on social media (Napolitano, 2023).

Meanwhile, McDonald's Malaysia issued statements dissociating itself from the Israeli franchise. It said the company in Malaysia is a 100 per cent Muslim-owned entity and that it had contributed RM1 million to the Palestine Humanitarian Fund under the Prime Minister's Department (Hazlin Hassan, 2023). In addition, some McDonald's employees have also come forward to express their fear of their livelihoods, and these include disabled employees (Misguided 'Israel boycott' impacting innocent workers and businesses in M'sia, 2023). Furthermore, according to Reuters (2024), BDS Malaysia is being sued by McDonald's licensee Gerbang Alaf Restaurants Sdn Bhd (GAR) for a number of social media posts that purportedly associate the fast-food chain with Israel's "genocidal war against Palestinians in Gaza," among other businesses. In a writ of summons dated December 19, Gerbang Alaf Restaurants claimed that BDS Malaysia had encouraged people to boycott McDonald's Malaysia, resulting in job losses, financial losses, and other damages because of the closures and reduced hours of operation of its restaurants.

Starbucks hit with boycott amid the Israel-Hamas war as the company sued the Starbucks Workers United in federal court for alleged use of trademark infringement as a pro-Palestine from the union sent out a tweet on X post saying, "Solidarity with Palestine!" with the image

of a bulldozer operated by Hamas tearing down a fence on the Gaza strip during the attacks against Israel (Stewart 2023; Tenore; 2023; Meyersohn). Soon after the tweet, Starbucks made an official statement to distance the company from the workers' union's pro-Palestinian stance, “We unequivocally condemn these acts of terrorism, hate and violence, and disagree with the statements and views expressed by Workers United and its members” (Starbucks, 2023; Frau, 2023). Starbucks Stand received backlash from both pro-Palestine and Israeli supporters and called for a boycott. The Israel supporters called a boycott of the chain over the union's pro-Palestine posts; meanwhile, pro-Palestinian angered by Starbuck's non-supportive stand on the Gaza war. Starbucks boycott not only led to monetary and reputation loss but also vandalism to their store and employees in their stores being the target of hatred from customers confronting them in the stores and sending graphic and violent messages to company customer service staff (Sepulveda; 2023; Durbin, 2023; Starbucks CEO hits back at Gaza boycott amid 'record losses, 2023).

In Malaysia, Starbucks is owned by Berjaya Food Berhad (starbucks.com.my). However, many Malaysians still boycotted the coffee chain for its alleged ties to Israel. By December 2023, Berjaya Food stock prices had decreased by 24%, leading RHB Bank to issue a research note advising investors to sell their shares (Free Malaysia Today, 2023). As public opinion turned against Starbucks in October, Berjaya Group has donated a total of RM2 million to the Humanitarian Trust Fund for the People of Palestine, while Berjaya Media director Datuk Seri Azman Ujang explicitly stated that the company “stand firmly with the Palestinians who have been the victims for the longest time of the most inhumane form of apartheid in history” (Purushotman, 2023). In November, Starbucks Malaysia posted an advertisement on their X social media page that featured models wearing hijabs and other promotions such as Buy 1 Free 1 offers once a month from October 2023 until January 2024 (Starbucks Malaysia, 2023).

The Impact of Brand Boycott

Brand boycott issue is the long-standing conflict between Israel and Palestine, which has drawn attention from throughout the world, igniting debates over national identities and territorial rights. This protracted struggle, rooted in historical tensions, involves a complex interaction of political, cultural, and religious components and constantly reshapes the Middle East's geopolitical environment. This historical framework sets the setting for a sophisticated evaluation of the modern phenomena of boycotting brands that were seen to be in support of Israel (Argyres et al., 2020). Boycotting is more than just expressing personal preferences; it's a dynamic junction of personal views and global sociopolitical factors. To understand this interaction comprehensively, it is necessary to investigate the reasons behind these acts, their effects, and their wider global ramifications (Hayakawa, 2020).

As a protest against perceived prejudices, 72% of respondents in conflict-affected regions supported boycotting, according to recent surveys. Nonetheless, according to 58% of people in the same regions, boycotts of this kind have little effect and might not significantly alter the geopolitical landscape (Seyfi & Hall, 2020). Examining the reasons underlying these numbers reveals a complex dynamic. Of those surveyed, 64% expressed a wish to be involved in an international justice movement, and 42% highlighted their conviction that economic pressure is a useful tool for influencing political outcomes. On the other hand, 28% voiced scepticism, contending that more sophisticated answers than consumer activities are necessary due to the complexity of the Israel-Palestine problem (Seyfi et al., 2023). In other words, the actual data

percentages show the complex and multifaceted relationship between boycotting and the Israel-Palestine issue. Comprehending this phenomenon requires considering various viewpoints and incentives, providing a significant understanding of the intricacies of socio-political manifestations in the Malaysian context.

From a brand perspective, the boycott has prompted diverse responses from global companies, including Starbucks and McDonald's. While some companies expressed solidarity with either Palestine or Israel, others maintained a neutral stance, emphasizing the complexities of the IsraelPalestine conflict. In the case of Starbucks and McDonald's in Malaysia, both have expressed solidarity for Palestinians during the conflict. However, while both brands have donated to Palestinian relief funds, McDonald's has taken what can be said to be a more aggressive approach by suing the BDS movement in Malaysia, which risked inciting further irritation from the Malaysian public.

The brand boycott issue is the tension among Malaysian consumers regarding the boycott of Israeli products rooted in the Israeli-Palestinian conflict and the broader Boycott, Divestment, and Sanctions (BDS) movement. However, the effectiveness of this boycott is debated, with some arguing that it raises awareness and promotes discussions, while others claim that it has reduced economic opportunities in Palestine and inflicts more harm on the people than help (Ahmad, 2022; Rand Corporation, 2015). In Malaysia, the boycott of Israeli products is driven by animosity towards the Israeli government's actions towards Palestinians, as well as subjective norms and product judgments. Tension among Malaysian consumers regarding the boycott of Israeli products are driven by animosity towards the Israeli government's actions towards Palestinians, as well as subjective norms and product judgments (Hamid, 2021). This boycott is part of the larger Boycott, Divestment, and Sanctions (BDS) social movement, which seeks to pressure Israel to comply with international law and advocates for freedom, peace, and justice for all, especially for Palestinians (Hamid, 2021). The BDS movement has gained momentum in Muslim-majority and certain Western countries and is inspired by the South African anti-apartheid movement (Hamid, 2021).

However, the boycott movement has had adverse effects on Palestine, causing a US$2.4 billion decrease in Palestine's GDP, with a per capita GDP decrease of 12 per cent (Rand Corporation, 2015). In Malaysia, the boycott of Israeli products, such as McDonald's, affects the livelihood of many Malaysian employees and does not significantly improve the situation (Hamid, 2021). The economic losses suffered by Israel due to BDS are minimal, and the boycott of Israeli business brands and products is akin to injuring oneself before injuring the opponent (Hamid, 2021). Moreover, Israel's advanced technology and high per capita GDP suggest that the economic influence of Malaysia is far smaller than that of Israel, making the boycott seem more like a self-indulgent attitude than an effective strategy (Ahmad, 2022). The boycott of Israeli products in Malaysia and other countries can raise awareness and promote discussions and debates about the conflict, thereby exerting pressure on international organizations (Hussin, 2022).

In addition, the boycott movement has also reduced economic opportunities in Palestine and inflicted more harm on the people than help (Hussin, 2022). In Malaysia, the boycott movement affects some individuals' income but does not significantly improve the situation (Hussin, 2022).

Thus, this research will analyse these two companies' responses from a public relations perspective and public sentiment regarding the brands following these responses. The research findings will shed light on how socio-political sentiment can impact consumerism, brand profits, and the country's economic landscape. The interconnectedness of economic choices with social dynamics will be the central theme, highlighting the need for a holistic understanding of the repercussions of such movements. Therefore, this research proposes to employ qualitative methodology to obtain an in-depth understanding of the public relations response to the boycott of the two brands. The research design for this paper will be case studies. According to Creswell (2014), a case study is a qualitative design in which the researcher thoroughly examines a programme, event, activity, procedure, or one or more people. The cases are constrained by time and activity, and researchers gather comprehensive data over an extended period of time utilising a range of data-gathering techniques. This method is chosen based on its relevance to the phenomenon and to enable the researchers to look at it from different perspectives of the people involved. A combination of research methods will be employed to gather rich and diverse data. Content analysis will be applied to media coverage, public discourse, and social media platforms to enhance the data and thoroughly understand the subject. Additionally, interviews will be conducted with PR practitioners from Malaysia, McDonald's and Starbucks to gain valuable insights into the strategies and justifications of each company in responding to the boycott. The interviews will be transcribed, and a thematic analysis will be used to extract salient themes to answer the research questions.

Conclusion

Research on the 2023 Israel-Hamas brand boycott focuses on brand impact, brand perception and consumer behaviour. Mohamed Buheji and Dunya Ahmed's (2023) research on the framework to sustain the boycott's impact and momentum on the oppression of the Palestinians. The framework aims to identify the passive and active boycotters during and after the war on Gaza in 2023. It is so the outlook of the boycott can be a practical mechanism for both the boycott movement leaders and the sympathizers. It is to make the boycott movement's goals not as temporary but a longterm fight towards ending the oppression of the Palestinians. This research synthesized literature focusing on Free Palestine, Cease Fire on Gaza, or Stop the War on Gaza 2023.

Andyan Pradipta Utama et. al (2023) research on the impact of boycott movement against Israeli products based on Muslim consumers' perception. This research found the reason for boycotting Israeli products was influenced by a "complex interplay of ethical considerations, a religious adherence, and political beliefs, underscoring the importance of understanding consumer behaviour in a broader socio-political context." The consumer also believed that effective brand responses to boycott movements are essential. It is not only focused on communication strategies but also a genuine effort to understand and respect the Muslim community's values. The research synthesizes findings from various scholarly articles, reports, and case studies to understand political activism and consumer behaviour dynamics.

Research on boycotts and brands in the Israel-Hamas 2023 war is still relatively current, and its focus is mainly on brand impact, perception and consumer behaviour. To date, no specific research has looked into the McDonald's and Starbucks boycott case, particularly from the angle of public relations response and Malaysian perceptions towards it. Hence, this research

can contribute to the public relations industry to manage brand perception amid the boycott movement. The output of this research may help industry practitioner to strategies their response to this politically motivated issue within the value-laden environment. This research hopes to shed light on brand image and consumer perception at the societal level, particularly on the brand effort to address their stand on the Israel Hamas War 2023.

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EXPLORING WEBAR INNOVATIONS FOR SUSTAINABLE TOURISM IN KUALA LUMPUR

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Abstract: *The review article explores Web-Based Augmented Reality (WebAR) as a solution to boost sustainable tourism operations in Kuala Lumpur. Kuala Lumpur needs to manage its infrastructure and heritage site capacity since projections indicate it will welcome 15-20 million international visitors by 2025. This paper explores the integration of Web-based Augmented Reality (WebAR) into sustainable tourism development. With increasing tourist activity leading to environmental degradation and cultural site erosion, alternative experiences such as WebAR offer innovative ways to engage travelers while reducing physical site pressures. This study presents a conceptual framework highlighting the role of WebAR in enhancing cultural appreciation and minimizing environmental impact. Additionally, it outlines critical research directions including policy integration, sustainability metrics, stakeholder collaboration, inclusivity design, and environmental assessment. The findings suggest that WebAR has the potential to contribute significantly to sustainable tourism by offering immersive, accessible, and low-impact experiences.*

Keywords: *WebAR, Sustainable Tourism, Augmented Reality, Cultural Heritage, Environmental Impact.*

Introduction

Sustainable tourism has become a global imperative, driven by the need to preserve natural and cultural heritage while supporting local economies (Lin & Zhang, 2020) & (Tan & Lim, 2023). Technological innovations, particularly in the domain of Augmented Reality (AR), present new opportunities to achieve this balance. WebAR—an AR experience delivered through standard web browsers—has emerged as a promising tool in enabling immersive tourism without the need for physical site visitation. This paper investigates the potential of WebAR to support sustainable tourism objectives and proposes a conceptual framework along with future research pathways.

Tourism is a vital component of many national economies, especially in developing nations striving to enhance their global competitiveness. In Malaysia, particularly in Kuala Lumpur, the tourism sector has seen rapid growth, attracting millions of international visitors annually. However, this growth presents numerous sustainability challenges, including environmental degradation, overcrowding at heritage sites, and the strain on urban infrastructure (Ali, Wong, Tan, & Kumar, 2022).

As the tourism industry recovers post-pandemic, there is an urgent need to shift toward more sustainable models that balance economic benefits with environmental and cultural preservation.

Literature Review

Prior studies have emphasized the utility of AR in enhancing visitor experiences by overlaying digital information onto real-world environments. However, much of the focus has been on app-based AR solutions, which pose accessibility challenges (Chung, Han, & Joun, 2015) & (Kounavis, Kasimati, & Zamani, 2012). WebAR, which eliminates the need for application downloads, offers a scalable and inclusive alternative. Research in tourism and digital heritage suggests that AR can foster deeper cultural understanding and engagement while diverting footfall from ecologically or historically sensitive sites. Nevertheless, comprehensive studies on WebAR's implications for sustainability remain limited (Nguyen, Le, Chen, & Smith, 2021).

Research Gap:

Despite the proliferation of digital tourism tools, there is a distinct lack of focused research on Web-Based Augmented Reality (WebAR) as a mechanism for sustainable tourism development, particularly in urban Southeast Asian contexts such as Kuala Lumpur. While AR applications in general have been explored for enhancing user experiences, most existing studies center around app-based solutions rather than browser-based technologies, which are more scalable and accessible to a broader demographic.

Table 1 Highlights of the review

Aspect	**Findings**
Technology Focus	Web-Based Augmented Reality (WebAR)
Application Context	Sustainable urban tourism in Kuala Lumpur
Strengths of WebAR	No app download needed, broad accessibility, immersive storytelling
Limitations of Current Studies	Focus on user interface and experience, not sustainability impact
Gaps Identified	Lack of empirical data, integration with policy, standard metrics missing

Furthermore, the current body of literature inadequately addresses how WebAR specifically contributes to the environmental, socio-cultural, and economic dimensions of sustainability.

As found in Table 1, most research is either technological in nature—concerned with software design and user interface—or experiential, focused on tourist satisfaction. There is limited empirical analysis of how WebAR can reduce the ecological footprint of tourism, mitigate overcrowding at sensitive sites, or foster inclusive cultural education (Tan & Lim, 2023) & (Yung & Khoo-Lattimore, 2019).

Methodology

Sustainable tourism, as defined by the United Nations World Tourism Organization (UNWTO), is a form of tourism that takes full account of its current and future economic, social, and environmental impacts, addressing the needs of visitors, the industry, the environment, and host communities. This comprehensive approach ensures that tourism development is conducted responsibly, aiming to minimize negative impacts while maximizing benefits for all stakeholders involved.

Key aspects of sustainable tourism include:

- **Environmental Responsibility:** Making optimal use of environmental resources, maintaining essential ecological processes, and helping to conserve natural heritage and biodiversity.(UN Tourism)
- **Socio-Cultural Respect:** Respecting the socio-cultural authenticity of host communities, conserving their built and living cultural heritage and traditional values, and contributing to inter-cultural understanding and tolerance.(UN Tourism)
- **Economic Viability:** Ensuring viable, long-term economic operations, providing socio-economic benefits to all stakeholders that are fairly distributed, including stable employment and income-earning opportunities and social services to host communities, and contributing to poverty alleviation.(UN Tourism)

By integrating these principles, sustainable tourism seeks to foster a balanced and harmonious relationship between tourism activities and the destinations they affect. They ensure that tourism can continue to be a source of enjoyment and benefit for future generations (World Tourism Organization [UNWTO], 2005).

A qualitative approach was adopted to develop the conceptual framework. Secondary data from recent AR tourism applications, sustainability studies, and policy documents were synthesized. Conceptual mapping and logical deduction were used to identify critical relationships between WebAR use and sustainability outcomes. Two diagrams were created to visualize the proposed framework and research agenda.

Conceptual Framework: Webar for Sustainable Tourism

This conceptual framework illustrates how tourists interact with a WebAR platform to generate immersive experiences that reduce the need for physical site visits. These experiences promote cultural appreciation and environmental preservation.

Flow Summary:

- Tourists interact with a WebAR Platform.
- This generates an Immersive Experience while also Reducing Site Pressure.
- Reduced Site Pressure results in Environmental Benefits.
- Immersive Experiences promote Cultural Appreciation.
- Both streams ultimately contribute to Integrated Sustainable Tourism Outcomes.

Interpretation:

This model supports sustainable practices by leveraging technology to substitute some forms of physical travel. It reinforces that virtual interactions can still deliver meaningful tourism experiences while preserving local environments and promoting education about heritage.

Future Research Directions

This mind map identifies key areas for future research in WebAR tourism. Each branch represents a core domain that requires exploration to fully integrate WebAR into sustainable tourism strategies.

Highlighted Areas:

- Policy Integration: Embedding WebAR in tourism policies.
- Sustainability Metrics: Measuring WebAR's impact.
- Stakeholder Collaboration: Tech-government-community partnerships.
- Environmental Impact: Studying carbon reduction effects.
- Inclusivity Design: Making platforms usable for all.

Interpretation:

These directions emphasize that WebAR research must expand from technical focus to include ethical, behavioral, and social considerations to guide future adoption.

Conclusion

WebAR presents a transformative opportunity in sustainable tourism by offering scalable, immersive, and low-impact visitor experiences. The proposed conceptual framework demonstrates how WebAR can reduce physical site pressures while promoting environmental and cultural awareness. Future research must address policy, inclusivity, stakeholder involvement, and measurable sustainability impacts to realize the full potential of this technology. WebAR, if appropriately designed and deployed, can become a central tool in building resilient and responsible tourism systems worldwide.

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STUDENTS' SATISFACTION OF SPACE UTM ENGLISH COURSES IN DIPLOMA PROGRAMME FOR MALAYSIAN UNIVERSITY EXAMINATION TEST (MUET) PREPARATION

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Abstract: *This study examines students' perceptions of the effectiveness and relevance of the English courses offered by SPACE Universiti Teknologi Malaysia (UTM) in preparing for the Malaysian University English Test (MUET). Although these courses are designed to align with MUET components, listening, speaking, reading, and writing, there has been limited evaluation from the students' perspective. A structured questionnaire was distributed to 130 diploma students who had completed the English courses, revealing generally positive perceptions, particularly regarding speaking and listening practice, course alignment with MUET, and increased exam confidence. However, students also highlighted challenges such as outdated content, limited practice tests, and a lack of personalized feedback. The study applies the Expectancy-Value Theory to explain how students' motivation and perceived utility of the course influence their engagement and performance. Students recommended improvements such as more detailed feedback, one-on-one sessions, additional practice resources, and the integration of multimedia tools to enhance flexibility and interaction. These findings underscore the importance of continuous, student-centred improvements to English for Academic Purposes (EAP) courses to ensure better MUET preparation and academic success. The study offers practical recommendations to curriculum designers and educators seeking to enhance the quality and impact of MUET preparatory programmes.*

Keywords: *MUET, English for Academic Purposes, SPACE UTM, student perceptions, Expectancy-Value Theory.*

Introduction

The national test that is conducted to assess students' proficiency level in reading, writing, listening and speaking skills in Malaysia, is called MUET or also known as Malaysian University English Test. Before the students could enrol into a degree programme in the university, they must pass at least a minimum of band 2. This is to ensure that the students are well-equipped with the capabilities for academic success before they venture into their

university life. This test has become a primary concern for SPACE, the School of Professionaland Continuing Education at Universiti Teknologi Malaysia (UTM) to prepare the diploma students for MUET since it is one of the crucial components for the university admissions into UTM. The English courses offered by SPACE UTM in two semesters are Introductory to Academic English in the first semester, Intermediate Academic English in the second semester and Academic Reading and Writing. The aim of these courses is to enhance students' language proficiency and their readiness in facing higher education. Although the courses are tailored specifically to cater the students' needs in preparing them for MUET, there is a need to understand how students perceive these courses in terms of their effectiveness and relevance to MUET preparation. This research aims to explore the students' perceptions, identify the strengths and areas for improvement and provide actionable recommendations to enhance the courses. By understanding the students' experiences and feedback, SPACE UTM can better align its courses with the students' needs, ultimately contributing to higher MUET scores and better academic outcomes.

Literature Review

Expectancy-Value Theory (EVT)

Expectancy-Value Theory (EVT) offers a valuable framework for analyzing student motivation and satisfaction in English for Academic Purposes (EAP) courses, particularly in preparing for high-stakes assessments like the Malaysian University English Test (MUET). EVT posits that learners' engagement depends on their expectations of success (expectancy), perceived task value (utility value), and associated costs (Wang & Xue, 2022). Research shows that students with high expectancy and value demonstrate greater satisfaction and performance (Jiang & Zhang, 2023; Lihong et al., 2023; Chen, 2024), whereas perceived costs, such as effort or anxiety, which negatively impact motivation (Berweger et al., 2021; Goegan et al., 2021). Optimizing EAP courses requires fostering adaptive motivational profiles by enhancing utility value via linking coursework to MUET success and expectancy through scaffolded tasks) while minimizing costs through supportive feedback (Wu & Kang, 2021; Chan & Zhou, 2023). Cultural and contextual factors further shape these dynamics, necessitating tailored interventions (Li et al., 2024). Thus, applying EVT can improve EAP course design by addressing both psychological and pedagogical aspects of language learning, ultimately boosting MUET readiness and student satisfaction.

Students' Satisfaction in English Courses in Malaysian Higher Education

Research on students' satisfaction with English courses in Malaysian higher education highlights the interplay between pedagogical factors and contextual demands, particularly regarding the Malaysian University English Test (MUET). Satisfaction is often tied to course relevance, teaching quality, and alignment with exam preparation, as students prioritize practical outcomes over theoretical debates (Albury, 2019; Zailani et al., 2021). For instance, the MUET's "washback effect" drives curricula toward test-specific skills, yet this narrow focus may overlook broader competencies like emotional intelligence, which also enhances performance (Hamdzah et al., 2020; Mahmud et al., 2021). Additionally, institutional factors, such as lecturer preparedness, digital infrastructure, and policy stability could significantly shape satisfaction, especially in EMI and online learning contexts (Lo & Othman, 2023; Thien & Jamil, 2020; Yap et al., 2023). However, while exam-aligned courses meet immediate needs, a more balanced approach integrating MUET preparation with holistic language development

could better serve students' long-term academic and professional goals. Thus, further research should explore how culturally responsive and technology-enhanced curricula can optimize both satisfaction and learning outcomes.

Course Design and Content

Course design and content are foundational to student satisfaction and performance in English for Academic Purposes (EAP) and MUET preparatory courses. Well-structured English courses aligned with academic and professional needs enhance engagement and test readiness (Kaur & Sidhu, 2020; Rahman et al., 2019). Students benefit from content that reflects familiar, exam-relevant topics, which helps reduce anxiety and promote linguistic competence (Tabari et al., 2021; Bo et al., 2022). Preparatory courses improve not only language skills but also test-taking strategies and emotional preparedness (Mahmud et al., 2021). Importantly, incorporating emotional intelligence (EI) training leads to better MUET outcomes (Hamdzah et al., 2020). Despite these benefits, course effectiveness often depends on learners' prior knowledge and learning styles (Eitemüller & Habig, 2020). These findings ultimately suggest that to maximize impact, courses must deliver targeted content through adaptive and inclusive learning models.

Instructor Competency and Teaching Methods

Instructor effectiveness strongly shapes student outcomes. Student-centered methods, continuous feedback, and technology integration increase motivation and performance (Mustafa et al., 2022; Azman, 2019). Flipped classrooms and gamified platforms improve vocabulary and engagement compared to traditional methods (Knežević et al., 2020; Jayalath & Esichaikul, 2020). Yet, challenges remain in supporting diverse learners, particularly in listening and writing instruction (Kaivanpanah et al., 2021). Instructors must also address emotional and motivational needs during preparation (Wilby, 2020; Haron et al., 2020). Research further shows that student-centred digital platforms, such as Moodle and MUETBot, enhance learner autonomy and satisfaction (Abuhassna et al., 2021; Jayalath & Esichaikul, 2020). Therefore, professional development should emphasize not only pedagogical strategies but also the affective dimension of teaching.

Learning Environment and Technological Integration

A supportive and resource-rich learning environment, especially one integrating technology, is vital for EAP success. Digital and blended formats provide flexibility and promote interaction (Hashim et al., 2020; Hellerstein et al., 2020), but technological disparities, particularly in rural areas, may limit access (Ismail & Aziz, 2021). The shift to online learning during the pandemic also introduced new challenges, including unclear instructions and poor time management, affecting student satisfaction (Yue, 2022). However, this transition revealed opportunities for personalized and interactive learning approaches (Jayalath & Esichaikul, 2020). Engaging platforms with real-time feedback and collaborative features enhance exam readiness and satisfaction (Batouk et al., 2023). Nevertheless, motivation continues to be a more significant predictor of performance than satisfaction alone (Weppert et al., 2023), indicating that learning environments should foster both access and self-motivation.

Assessment And Feedback Mechanisms

Effective assessment and feedback practices are central to EAP course success. A balance of formative and summative assessments, coupled with personalized feedback, encourages student progress and satisfaction (Yunus & Mat, 2021). Service quality dimensions, such as assurance, empathy, and reliable online platforms, are key satisfaction factors in digital settings (Wong et al., 2021; Mohamed et al., 2021). Exam simulations and interactive assessments not only increase confidence but also reduce anxiety (Batouk et al., 2023). However, students still face challenges in speaking and vocabulary, areas that need targeted instructional focus (Razaki et al., 2024; Sohaimi et al., 2021). Given that satisfaction enhances motivation but is not the sole determinant of success (Weppert et al., 2023), future research should explore how adaptive, feedback-rich assessments can better support both affective and cognitive development, especially in high-stakes exam contexts like MUET.

Overall, enhancing student satisfaction in EAP courses requires a balanced integration of relevant content, effective teaching, inclusive environments, and transparent assessments, particularly when aligning with MUET preparation and addressing diverse learner needs.

Methodology

In this study, a quantitative questionnaire is utilized to determine how students perceived the English courses offered in the Diploma program at SPACE, UTM. The participants were chosen using a technique called stratified random selection. Only students who had taken all two English courses were eligible to participate in this study. There was a total of approximately 300 students graduated in the 2023/2024 SPACE UTM Diploma programme. A finite population of 300 students, required 169 respondents. However, the researcher distributed to 300 students, and only 130 students responded to the questionnaire. A pilot study was also conducted with 41 respondents to examine the internal consistency of the questionnaire. The results of the reliability analysis indicated a Cronbach's Alpha value of 0.978, suggesting extremely high internal consistency among the 28 items. Additionally, the Cronbach's Alpha based on standardized items was also 0.978, further confirming the robustness of the scale. According to George and Mallery (2003), a value above 0.9 is considered excellent, supporting the conclusion that the questionnaire items were measuring a consistent construct.

Findings

Research objective 1: Students' Perceptions of SPACE UTM English Courses for MUET Preparation

To address the first research objective *to identify the students' perceptions of the efficacy and relevance of SPACE UTM English courses in preparing them for the MUET*, a descriptive statistical analysis was conducted on responses from 130 students. The analysis focused on several aspects of the English course that align with the components and demands of the Malaysian University English Test (MUET).

Table 1: Students' Perceptions of the Efficacy and Relevance of SPACE UTM English Courses in Preparing Them for the MUET

	N	Minimum	Maximum	Mean	Std. Deviation
Course content is comprehensive for MUET	130	1	5	3.85	.827
Topic is aligned with MUET	130	1	5	3.84	.833
Sufficient practice opportunities for Listening	130	1	5	3.90	.861
Sufficient practice opportunities for Speaking	130	1	5	3.92	.863
Sufficient practice opportunities for Reading	130	1	5	3.85	.890
Sufficient practice opportunities for Writing	130	1	5	3.88	.877
Assessment match MUET task and difficulty	130	1	5	3.68	.942
Course content supports and help prepare for MUET	130	1	5	3.83	.882
The course has increased my confidence to sit for the MUET exam.	130	1	5	3.79	.895

As shown in Table 1, the mean scores for all items ranged from 3.68 to 3.92 on a 5-point Likert scale, indicating a generally positive perception among the respondents. The highest mean was recorded for the item *"Sufficient practice opportunities for Speaking"* (M = 3.92, SD = 0.863), followed closely by *"Sufficient practice opportunities for Listening"*(M = 3.90, SD = 0.861) and *"Sufficient practice opportunities for Writing"* (M = 3.88, SD = 0.877). These results suggest that students perceive the course as offering ample practice, particularly in the productive and receptive skills assessed in the MUET.

In terms of course alignment with the MUET, the item *"Topic is aligned with MUET"* scored a mean of 3.84 (SD = 0.833), while *"Course content is comprehensive for MUET"* had a slightly higher mean of 3.85 (SD = 0.827). This implies that students recognize the relevance and comprehensiveness of the course content, which they believe mirrors the requirements of the MUET syllabus.

The item with the lowest mean was *"Assessment match MUET task and difficulty"* (M = 3.68, SD = 0.942). Despite being in the moderately positive range, this relatively lower score indicates room for improvement in ensuring that the course assessments authentically reflect the MUET's format and level of difficulty.

Furthermore, students agreed that the course contributed positively to their exam preparedness and confidence. The statement *"Course content supports and helps prepare for MUET"* received a mean of 3.83 (SD = 0.882), while *"The course has increased my confidence to sit for the MUET exam"* followed closely with a mean of 3.79 (SD = 0.895). These findings underscore the perceived impact of the SPACE UTM English course not only in terms of skill development but also in boosting learners' self-efficacy.

Table 2: Correlation Between Course Help Prepare for MUET and Recommendation

		Course content supports and help prepare for MUET	The student would recommend this course to other students preparing for the MUET exam.
Course content supports and help prepare for MUET	Correlation Coefficient	1.000	.714**
	Sig. (2-tailed)	.	.000
	N	130	130
The student would recommend this course to other students preparing for the MUET exam.	Correlation Coefficient	.714**	1.000
	Sig. (2-tailed)	.000	.
	N	130	130

A Spearman's rho correlation analysis revealed a strong and significant positive relationship between students' perception of the course as helpful for MUET preparation and their willingness to recommend the course to others ($\rho = .714$, $p < .001$). This finding supports the hypothesis that students who view the UTMSPACE English courses as effective and relevant are more likely to endorse the course to their peers, indicating a high level of perceived value and satisfaction

Research objective 2: Identifying Strengths and Areas for Improvement in SPACE UTM English Courses

This section addresses the second research objective, which is to identify strengths and areas for improvement in the SPACE UTM English courses based on student feedback. The findings reflect the perceptions of 130 students who were allowed to select multiple responses for each feedback category.

Perceived Strengths of the Course

Table 2: Students' Perceptions of Course Strengths in English Language Instruction

	Responses		
	N	Percent	Percent of Cases
Quality of Teaching	73	22.6%	56.6%
Course Material	65	20.1%	50.4%
Class Activities	74	22.9%	57.4%
Practice Tests	92	28.5%	71.3%
Personalized Feedback	19	5.9%	14.7%

Based on student feedback, the most frequently cited strength of the course was the provision of *practice tests*, selected by 71.3% of respondents. This was followed closely by *class activities* (57.4%) and *quality of teaching* (56.6%). These findings suggest that students appreciate the course's practical focus and the interactive elements that enhance language

acquisition and exam preparedness. The *course materials* were also recognized as effective (50.4%), which points to the relevance and clarity of the content provided.

However, fewer students acknowledged the strength of *personalized feedback* (14.7%), indicating that while general course delivery was well-received, individualized support may be lacking. This is further reinforced by students' qualitative and suggestion-based responses discussed below.

Challenges Identified by Students

Table 3: Students' Perceptions of Challenges in English Language Courses

	Responses		
	N	Percent	Percent of Cases
Course has outdated content	30	17.2%	23.8%
Course lacks sufficient practice tests	85	48.9%	67.5%
Course provides inadequate explanations	42	24.1%	33.3%
Course is not aligned with MUET requirements	17	9.8%	13.5%

Students highlighted several areas needing improvement, with the most critical concern being the *lack of sufficient practice tests* (67.5%). Despite practice tests being noted as a strength, this paradox suggests a gap between the perceived usefulness of existing tests and the quantity or variety available. Other major challenges included *inadequate explanations* (33.3%) and *outdated content* (23.8%). The least cited concern was that the course is *not aligned with MUET requirements* (13.5%), indicating a general consensus on content relevance, albeit with some reservations.

Feedback Suggestions for Course Improvement

Table 4: Students' suggestions on Feedback in English Language Courses

	Responses		
	N	Percent	Percent of Cases
More frequent feedback sessions needed	30	17.2%	23.8%
Detailed feedback is recommended	86	49.4%	68.3%
One-on-one meetings should be provided	41	23.6%	32.5%
Clear action plans should be given	17	9.8%	13.5%

Students proposed several feedback-related enhancements. *Detailed feedback* emerged as the most desired improvement (68.3%), followed by the request for *one-on-one meetings* (32.5%) and *more frequent feedback sessions* (23.8%). These suggestions reinforce the earlier point about the need for more personalized academic support. Additionally, a minority of students (13.5%) recommended the inclusion of *clear action plans*, suggesting a desire for structured guidance to address their weaknesses.

Recommended Additional Resources

Table 5: Students recommendation of additional resources for English Language Courses

	Responses		
	N	Percent	Percent of Cases
More practice tests would help	87	34.0%	66.9%
Online resources would be beneficial	69	27.0%	53.1%
Extra tutoring sessions would be helpful	51	19.9%	39.2%
Study groups would support MUET preparation	49	19.1%	37.7%

Students also identified resources that could improve their MUET preparation. A significant majority (66.9%) recommended *additional practice tests*, underlining once again the central role of hands-on practice in perceived course efficacy. *Online resources* (53.1%), *extra tutoring sessions* (39.2%), and *study groups* (37.7%) were also suggested, reflecting diverse preferences in learning support systems.

Usefulness of Multimedia Tools

Table 6: Students' perception in integrating multimedia in English Language Courses

	Responses		Percent of Cases
	N	Percent	
Multimedia tools improve engagement	67	25.4%	51.5%
Multimedia tools provide diverse learning resources	58	22.0%	44.6%
Multimedia tools offer interactive learning opportunities	66	25.0%	50.8%
Multimedia tools make learning more flexible	73	27.7%	56.2%

The findings indicate strong support for integrating multimedia tools in English courses. The most highly endorsed function was *flexible learning* (56.2%), followed by *improved engagement* (51.5%) and *interactive learning opportunities* (50.8%). These results underscore the students' preference for dynamic and accessible content delivery, which multimedia tools are well-positioned to offer.

Research objective 3: Recommendations for Enhancing SPACE UTM English Courses to Support Higher MUET Achievement

In line with the third research objective to provide recommendations for enhancing SPACE UTM English courses to better support students in achieving higher MUET scores a detailed analysis of student feedback was conducted. This analysis integrates both frequency distributions and descriptive statistics.

Student Confidence and Course Impact

Table 7: Student Confidence in Sitting for The MUET Exam and Course Impact

	The course has increased my confidence to sit for the MUET exam.	The course has effectively supported the students' ability to express ideas clearly and coherently	The grading criteria for assignments and exams are clear and fair.	The feedback provided on assessments is fair and helps students understand their strengths and weaknesses.
Strongly Disagree	1.5	4.6	1.5	.8
Disagree	4.6	25.4	23.8	23.8
Neutral	29.2	44.6	43.1	50.8
Agree	42.3	25.4	31.5	24.6
Strongly Agree	22.3	4.6	1.5	.8

Most students expressed positive sentiments regarding the course's impact on their MUET readiness. Specifically, 64.6% of students agreed or strongly agreed that *"the course has increased my confidence to sit for the MUET exam."* Similarly, 70% either agreed or strongly agreed that the course *"effectively supported their ability to express ideas clearly and coherently,"* highlighting the effectiveness of the curriculum in improving communicative competence. Furthermore, a combined 74.6% of students affirmed that the *grading criteria* were *clear and fair*, while 75.4% felt the *feedback provided was fair and useful* in identifying strengths and weaknesses. This underscores the course's potential to build assessment literacy among learners, which is crucial for high-stakes tests like MUET.

Balanced Skill Development and Course Structure

Table 8: Student perception on skill development and course structure

	The course assessments are balanced across all four skills necessary for the MUET exam.	The course structure encourages regular use of English outside of class.	The student would recommend this course to other students preparing for the MUET exam.
Strongly Disagree	.8	.8	.8
Disagree	3.1	6.2	3.1
Neutral	28.5	23.8	20.0
Agree	39.2	44.6	42.3
Strongly Agree	28.5	24.6	33.8

Responses regarding assessment balance across MUET's four skill areas (Listening, Speaking, Reading, Writing) were also favourable, with 67.7% of respondents agreeing or strongly agreeing that the course assessments were well-balanced. Additionally, 69.2% agreed that the course structure encouraged *the regular use of English outside class*, an essential feature for language acquisition and retention. Notably, 76.1% of students stated that they would

recommend the course to other MUET candidates, reflecting an overall high level of satisfaction.

Table 9: Correlation Between Overall Course Satisfaction and Students' Likelihood to Recommend the MUET Course

		The course assessments are balanced across all four skills necessary for the MUET exam.	The student would recommend this course to other students preparing for the MUET exam.
The course assessments are balanced across all four skills necessary for the MUET exam.	Correlation Coefficient	1.000	.751**
	Sig. (2-tailed)	.	.000
	N	130	130
The student would recommend this course to other students preparing for the MUET exam.	Correlation Coefficient	.751**	1.000
	Sig. (2-tailed)	.000	.
	N	130	130

The Spearman's rho analysis indicates a strong, positive correlation between students' perceptions that the course assessments are balanced across all four MUET skills and their willingness to recommend the course to others ($\rho = .751$, $p < .001$). This suggests that students who believe the assessment tasks effectively cover listening, speaking, reading, and writing are significantly more likely to endorse the course. The result is statistically significant, indicating a reliable relationship between the two variables.

Feedback and Resource Recommendations

Although personalized feedback was the least recognized strength in prior findings (see table 4), this was further affirmed in the current data: only 15% indicated receiving *personalized feedback*. However, 66% recommended the provision of *detailed feedback*, and 32% requested *one-on-one meetings*. Similarly, 23% suggested the need for *more frequent feedback sessions*. These figures highlight the urgent need to strengthen the formative feedback mechanisms within the course. In terms of supplementary resources which can be referred in table 5, the most frequent suggestion was for *more practice tests* (67%), followed by *online resources* (53%) and *extra tutoring sessions* (39%). These preferences reflect students' desire for both flexibility and depth in learning support.

Challenges and Areas for Improvement

Several challenges were reported in table 3, including the course's lack of *sufficient practice tests* (65%) and *inadequate explanations* (32%). Additionally, 23% believed that some course content was outdated, while 13% thought it was *not fully aligned with MUET requirements*. These highlight specific targets for course review and curriculum modernization.

Use of Multimedia Tools

In Table 6, multimedia tools were recognized positively, with 56% agreeing that they enhance *flexible learning*, while about half the respondents indicated that such tools improve *engagement* (51.5%), offer *interactive opportunities* (50.8%), and provide *diverse resources* (44.6%). These findings support integrating more digital and multimedia-enhanced instructional strategies into the course design.

Overall, the findings show that, while the majority of students believe the SPACE UTM English courses are beneficial and impactful, significant improvements can be made in three key areas: (1) expanding the scope and frequency of practice-based assessments, (2) providing more targeted and personalized feedback, and (3) updating and diversifying learning resources with modern multimedia tools. Addressing these issues will strengthen the course's ability to assist student success on the MUET.

Conclusion

In conclusion, the findings indicate that while students generally view the courses as relevant and supportive, particularly in enhancing speaking and writing skills, key areas require attention. These include outdated content, insufficient practice materials, and limited personalized feedback. By integrating student-driven insights and aligning with Expectancy-Value Theory, the study underscores the need for curriculum enhancement to boost learner confidence and MUET readiness. Improvements in course design, feedback practices, and multimedia integration can better support students' academic and language development goals.

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EFFECTIVENESS OF THE '*NOTE MAKING, NOTE TAKING & READING SKILLS*' WORKSHOP FOR DIPLOMA IN CIVIL ENGINEERING STUDENTS AT POLITEKNIK SULTAN AZLAN SHAH

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Abstract: *The implementation of Continuous Quality Improvement (CQI) in education is crucial for ensuring that academic programs remain responsive to students' needs and evolving educational standards. CQI involves a systematic approach to evaluating and refining teaching methods, curriculum, and learning environments to enhance student learning outcomes. By fostering a culture of continuous improvement to enhance student learning outcomes. By fostering a culture of continuous improvement, educational institutions can achieve higher efficiency, better resource utilization, and improved student performance. Therefore, the Department of Civil Engineering at Politeknik Sultan Azlan Shah (PSAS) organized a workshop titled "Note Making, Note Taking & Reading Skills' as part of its CQI initiative for the Diploma in Civil Engineering program. The workshop aimed to enhance students' abilities in effective note taking and reading strategies, aligning with the Program Learning Outcomes (PLO). A total of 38 students participated in the workshop, which comprised three sessions: The Learning Styles, Reading Skills, and Techniques for Note Making and Preparation. The evaluation analysis indicated a significant improvement in students' understanding and confidence, with mean scores ranging from 3.78 to 4.00, reflecting a high level of effectiveness. Furthermore, the course pass rates increased to 87.5%, and 59.4% of students who joined the workshop showed an improvement in their Grade Point Average (GPA). These findings emphasize the effectiveness of the workshop in strengthening students' learning skills and contributing to the achievement of the program's Learning Outcomes.*

Keywords: *Continuous Quality Improvement, Note-Taking Technique, Program Learning Outcomes*

Introduction

Continuous Quality Improvement (CQI) has become an essential component of academic program development and quality assurance in higher education. The principles of Total Quality Management require a cyclical process and data-supported process to assess, plan, implement, and evaluate instructional strategies and curricula to meet the educational standards and diverse students' needs (Tam, 2010). (Ismail & Zulkifle, 2024), CQI involves a cyclical process of assessment and evaluation, which informs improvements in teaching and learning activities. Similarly, the implementing CQI enables an organization to evaluate and enhance the work processes within the organization and leads to better performance (Noer, 2019). A study conducted at Kolej Kemahiran Tinggi MARA reveals that factors such as knowledge, commitment, and empowerment influence the effectiveness of CQI practices and suggests that

a strong understanding of CQI principles can lead to substantial improvements in teaching quality and student performance (Lyssa Daud, 2020). The elements of CQI should be incorporated in all the academic programs offered, in which the improvements required in program objectives, program outcomes, and course learning (Latif & Nor, 2021). Apart from that, the research conducted at the Department of Electrical, Electronic & System Engineering, Faculty of Engineering & Built Environment, Universiti Kebangsaan Malaysia proves that the CQI has significantly improved their students' learning (Misran, Mokri, Husain, & Zaki, 2011). Therefore, this study documents a CQI initiative carried out at Politeknik Sultan Azlan Shah (PSAS), where a workshop focusing on note making, note taking, and reading skills was introduced to improve students' learning, preparedness, and confidence in the final examination.

Rationale of the Study

The Note Making, Note Taking & Reading Skill workshop was implemented by the Diploma of Civil Engineering (DCE) program following the findings of the final examination results of the past session. The results were quite worrisome, as there was a total of 38 students who had repeated various courses. Students failed courses such as Contract and Estimating, Mechanics of Civil Engineering Structure, Geotechnical Engineering, Theory of Structure, and several other courses. Therefore, a workshop to learn the learning techniques was planned and carried out as a measure of continuous improvement and to minimize the course failure among the students. The workshop aims to guide students to enhance their note taking, note making, and reading skills. Apart from that, this workshop also aimed to increase students' motivation and self-confidence to further ensure that students' minds are prepared in preparation for the final examination in session 1 2022/2023. The CQI was carried out to enhance the students' performance and to improve the program's learning outcomes as well.

Note Taking, Note Making & Reading Skills

Note-taking is a passive process where students record the information during lectures or presentations. It involves jotting down key points, ideas, and facts as they are presented. This process helps in retaining important information and serves as a reference for future study and review. According to (Hamat, Alias, Mahlan, Shamsuddin, & Ahmad, 2024), note taking is essential for capturing the essence of the lecture and ensuring that critical details are not missed. It involves combining and recalling ideas that students learned from reading or lectures. Guided Notes techniques used in note taking help students to be fully engaged in course content during lectures, as they must actively respond to the lecturer's content by listening, seeing, thinking, and writing to finish their guided notes (Hamat, Othman, & Zahari, 2022).

Meanwhile, note-making is an active and concentrated process, occurs after reading books or notes provided by lecturers or even after reading other relevant resources. This process involves synthesizing and organizing information in a way that makes sense to the student. Note making process allows students to add their thoughts, interpretations, and connections to the teaching materials. This process helps in a deeper understanding and long-term retention of the content. (Hamat, Alias, Mahlan, Shamsuddin, & Ahmad, 2024). The article also highlights that note taking is a faster process with minimal time and effort, whereas note making demands more time and energy. However, the extra time and effort invested are worthwhile, as note making results in thorough and structured notes.

Reading skill is considered one of the important indicators of being literate (Kamal J I Badrasawi, 2020) and to enhance the reading skills, reading strategies are important (Sutthisan & Kongsoongnoen, 2017). Reading also influences a lot, especially for students, since they need to search for information and knowledge through reading (Mokalu, Oroh, & Tuerah, 2022). Reading skills require active mental engagement and rely on prior knowledge, such as understanding the words, phrases, sentences, and familiarity with the subject matter (Ibrahim, 2006). The problem with students' reading skills is comprehension; students are unable to understand the meaning of the text, and they are unable to focus. Thus, they have difficulty understanding the purpose of the text (Aritonang, Lasmana, & Kurnia, 2018).

Methodology

This study uses the Plan-Do-Check-Act (PDCA) Cycle Model introduced by Edward Deming in 1950. This cycle model showed the steps required to carry out the CQI in an organization. The model comprises planning (plan), implementation (do), evaluation (check), and improvement (act), (Latif, Hamzah, & Nor, 2021). The target of this study is students who failed the course in session 2 2021/2022. The analysis of the effectiveness of this workshop is divided into two (2) phases. The first phase is an effectiveness evaluation based on a questionnaire, while the second phase for the effectiveness evaluation is based on the results obtained from the final examination of session 1 2022/2023. The results were compared, and the students' achievement in Grade Point Average (GPA) was analysed. This method is adapted from the study conducted at the Faculty of Medical Technology, Teikyo University (Goto, 2022).
As for the first phase, the data collection for this study was carried out through a questionnaire developed by the *Unit Latihan dan Pendidikan Lanjutan* (ULPL), PSAS. The form is a standardized evaluation form used to evaluate the activities carried out by the unit and used by other activities or workshops conducted. The study respondents were students who had attended the workshop. The questionnaire instrument was divided into three main sections:

- **Section I**: Program information
- **Section II**: Demographics
- **Section III**: Feedback on Program Effectiveness

The third section was further divided into three sub-sections covering: speaker evaluation, program implementation evaluation, and the program's effectiveness on participants. The analysis was conducted by distributing a set of surveys to program participants, which were measured using a 4-point Likert scale, 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree. The Likert scale is adapted from (Nee & Yunus, 2020). Meanwhile, the mean score was adapted from (Norhanisha Binti Yusof, 2017) and interpreted as follows:

Table 1: Mean Score Interpretation

Mean Score Range	Interpretation
1.00 – 2.32	Low
2.33 – 3.65	Moderate
3.66 and above	High

Analysis And Discussion

The PDCA cycle model is shown in Figure 1. The study consists of four (4) steps. Step 1 is the planning phase, where the Diploma of Civil Engineering has planned to carry out a CQI process to improve the performance of students, focusing on students who failed the courses during the 1 2022/2023 session examination. Therefore, a workshop on learning techniques, which comprises note making, note taking, and reading skills, was planned. The facilitators were among the lecturers from the Department of General Studies. Phase two (2) was the implementation of the planned workshop for the students. The workshop was held at the Department of Civil Engineering. All the targeted students attended the workshop. The third phase was the evaluation (check) phase. During the phase, analyses were carried out using the questionnaire and the GPA achieved for the semester. The fourth phase is the improvement phase, which consists of recommendations based on the findings and effectiveness of the workshop.

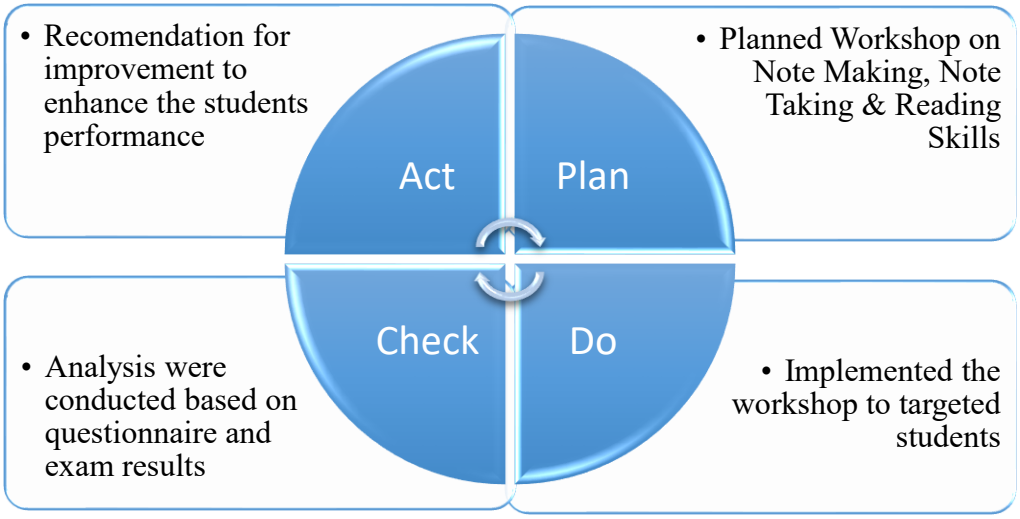


Figure 1: Plan-Do-Check-Act (PDCA) Cycle Model

Demographic

Analysis of the demographic section revealed that out of 38 course participants, 27 were male students while 11 were female students. The gender analysis shows that male students are more prone to fail courses compared to female students. Of the 38 students, 2 % are from the second (2nd) semester, 53% from the third (3rd) semester, and 32% were from the fourth (4th) semester. Meanwhile, 13% of the participants were from the fifth (5th) semester. It can be summarized that most of the students failed their courses during the 3rd semester. The least was during the 2nd semester. Additionally, the preliminary analysis found that 76% (29 students) failed one course, while 24% (9 students) failed two courses. 56% of the students are from the 4th semester, and 44% are from the 5th semester. Figure 2 shows the analysis of the percentage of students who failed by semester and according to their gender.

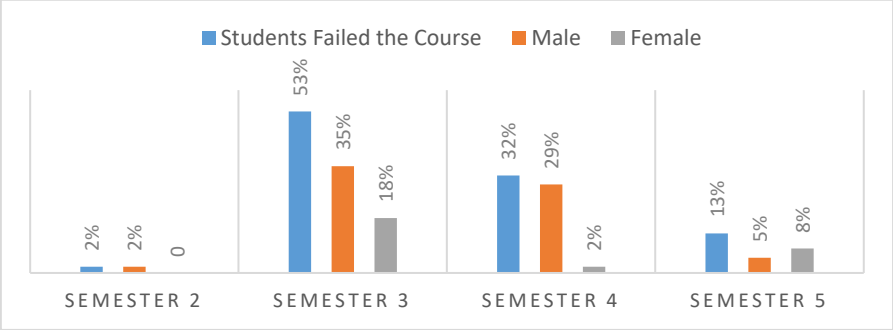


Figure 2: Percentage of students who failed courses by semester and gender

The gender analysis again showed that out of 9 students who failed more than one course, six (6) were male students while only three (3) female students failed more than one (1) course. Figure 2.0 shows the percentage of participants by gender, while Figure 3.0 shows the percentage of students who failed one or more courses.

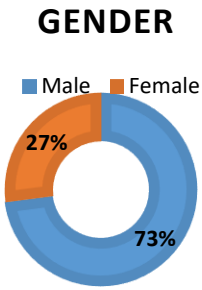


Figure 3: Percentage of Workshop Participants by Gender

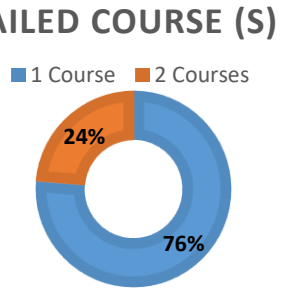


Figure 4: Percentage of Participants and Number of Failed Courses

Analysis Based on Workshop Effectiveness Questionnaire

The third section of the questionnaire is related to participants' feedback on the implementation and effectiveness of the workshop. The data obtained from the respondents were analyzed using the Statistical Package for the Social Sciences (SPSS) Statistics 23 software. Table 2 shows the mean score analysis obtained from this study regarding the evaluation of program objectives and speaker assessment.

Table 2: Evaluation of Objectives and Speaker Assessment

Evaluation Item	Mean Score	Std.Deviation
Program objectives achieved:		
i. Guiding students to identify important notes during teaching and learning sessions.	4.00	0.00
ii. Guiding students to prepare brief notes based on teaching and learning sessions.	3.89	0.33
iii. Providing motivation and self-confidence further strengthens students' mental preparation in preparation for exams.	3.89	0.33

Program content is appropriate	3.89	0.33
Effective and impactful speaker delivery	4.00	0.00
Effective use of teaching aids	3.89	0.33
Teaching methods/techniques enhance understanding	4.00	0.00

The mean score for the first item, guiding students to identify important notes during teaching and learning sessions, is 4.00. This indicates a strong level of agreement among participants that the program successfully helped them in recognizing key points during lessons. A mean of 4.00 reflects a high satisfaction level, suggesting that the strategies or frameworks introduced during the session were practical and easy to apply. The second item was guiding students to prepare brief notes based on teaching and learning sessions. The item received a mean score of 3.89. While still positive, this slightly lower score than the first item implies that although the guidance was effective, there may be room for improvement. Students might have needed more structured templates or hands-on practice in summarizing lessons into concise notes. But the mean score still proves a high level of satisfaction from the students. The third objective is to provide motivation and self-confidence to further strengthen students' mental preparation in preparation for exams. The score, which is 3.89, suggests the program had a strong impact on students' emotional and mental readiness for exams. It implies that while the program did contribute positively to motivation and confidence, this aspect could be enhanced with more interactive or personalized encouragement strategies. According to the interpretation from Table 1, the objective of this workshop has been highly achieved, as the mean scores were above 3.66.

As for the Program Content Appropriateness, the mean score achieved was 3.89. Participants generally felt that the program content was relevant and suitable for their needs. However, the score reflects a possibility that some content may not have fully resonated with all students, possibly due to varying academic levels or prior knowledge.

The highest mean score was demonstrated for the effectiveness and impactful speaker delivery. This suggested that the speakers were well-received, engaging, and clear in their delivery. Their communication style likely facilitated understanding and maintained participant attention, which is crucial for program effectiveness. The teaching aids used throughout the workshop also scored 3.89, which is also interpreted as high. Overall, based on the data obtained shows that the techniques of note-taking, note-making, and reading skills were successfully enhanced.

Table 3: Program Implementation Analysis

Evaluation Item	Mean Score	Std.Deviation
Suitable venue	3.67	0.71
Smooth program planning and execution	3.78	0.44
Appropriate time allocation for each session	3.56	0.88

Table 3 shows the analysis results for program implementation. The study found mean scores ranging between 3.56 and 3.78. This score indicates a moderate level of satisfaction with the venue. While participants found the venue generally acceptable, the rating suggests that certain

aspects could be improved. The activities were conducted in the classrooms. Since the score identified a slight drop, there seems to be room for improvement in the future for the facilities. The planning and execution score reflects a generally positive mean score. This shows that the workshop was well organized and planned. However, the allocation for the workshop duration is to be reconsidered as the mean score also rates at 3.56. This shows an average score for the interpretation table.

Table 4: Program Effectiveness Evaluation Analysis

Evaluation Item	Mean Score	Std.Deviation
Increased knowledge/understanding compared to before	4.00	0.00
More confident in applying what was learned	3.78	0.44

Table 4 shows the overall program effectiveness. The analysis showed the highest mean score of 4.00 and a standard deviation of 0.00 for the item; increased knowledge related to note making, compared to before. Students also gave a high mean score regarding their increased confidence in applying the new knowledge gained through the workshop. Overall, the analysis using the questionnaire instrument recorded very encouraging results.

Analysis Based on the Final Examination Achievements

The study continued with analysis after students completed their final exams for the session. The post-workshop evaluation included an analysis of students' final exam results, GPA to measure the effectiveness of the program in contributing to academic success. The analysis of final exam results showed that 28 students successfully passed their courses. Unfortunately, 4 students had to repeat the course for the second time. Six (6) students didn't continue their studies due to various reasons. Therefore, the respondents for the analysis based on exam results were carried out only 32 students. Among the 28 students, 8 were female while the other 20 is the male students. This shows that the passing rate among male students was higher compared to female students, with 91% of male students passing, while the passing rate of female students was 80%, as shown in Figure 5. This is consistent with the findings of research performed by researchers from the International Islamic University Malaysia (Kamal J I Badrasawi, 2020) where male students performed better than female students.

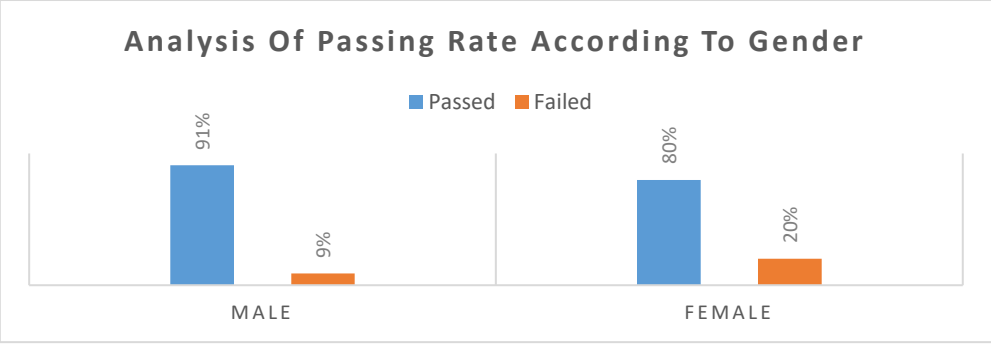


Figure 5: Analysis of Passing Rate According to Gender

Overall, the study found that **87.5%** of students who attended the Note Making, Note Taking & Reading Skills Workshop successfully passed their course. This indicates the workshop's potential influence on academic performance, particularly in developing students' skills in note taking, reading comprehension, and study techniques. The analysis of the Grade Point Average

(GPA) also showed positive outcomes, with **59.4%** of students showing a rise in their GPA. This is another significant outcome. The assumption that can be drawn from the results is that students applied the knowledge they learned through the workshop. This also implies that the content and skills taught are applied to real academic tasks.

Conclusion

In conclusion, the implementation of the Note Making, Note Taking & Reading Skills Workshop as part of the CQI (Continuous Quality Improvement) approach is appropriate. This is because the workshop was found to help students improve their skills, which in turn helped improve their GPA and successfully pass their courses. Therefore, the workshop shall be continued for the following semesters as well, not only for the Civil Engineering program, but also for other programs in the Civil Engineering Department, which are the Building Services Engineering program and Quantity Surveying program. However, based on the findings from the questionnaire, the duration allocation for this workshop shall be reviewed as it only scored a moderate value. The comments observed suggested that the duration for the workshop, and for each session shall be extended. It is also suggested that the workshop be held at the beginning of every semester so that the students will have more time to prepare themselves. It shall not only target students who fail the courses but can also be carried out for all the students as the CQI, which will contribute to enhancing students' performance and the performance of the program as well.

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ENHANCING MOBILE INTERFACE INTERACTION DESIGN FOR THE ELDERLY IN BEIJING: ADDRESSING ACCESSIBILITY, USABILITY, AND CULTURAL NEEDS

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Abstract: *The rapid proliferation of mobile technology has dramatically reshaped daily life across all age groups; however, the elderly population often struggles with accessibility and usability challenges in mobile applications. This study investigates the critical role of interface interaction design in enhancing the digital experiences of elderly users in Beijing, China. Through a combination of quantitative surveys involving 200 senior participants and qualitative interviews with 7 experienced interface designers, the research identifies the physical, cognitive, and emotional barriers that older adults face when using mobile touchscreen devices. Results highlight that while some elderly users adapt enthusiastically to digital technologies, many experience difficulties due to poor motor skills, impaired vision, and limited digital literacy. The findings reveal that features such as simplified navigation, customizable font sizes, voice-activated assistance, and culturally sensitive design elements significantly improve user satisfaction and engagement among seniors. Correlation analysis underscores the importance of voice control integration and intuitive design to reduce cognitive load and foster greater technology acceptance. Based on these insights, the study offers actionable recommendations for developing elderly-friendly mobile applications that prioritize inclusivity, ease of use, and user empowerment. This research not only addresses existing gaps in elderly-centered interface design but also advocates for a user-centered, iterative design approach to bridge the digital divide and promote digital inclusion among Beijing's aging population. Future research directions suggest deeper exploration into emotional connectivity, personalized learning supports, and cross-cultural adaptation of mobile interfaces for senior citizens globally.*

Keywords: *Elderly Mobile Interface, Interaction Design, Usability, Accessibility, Digital Inclusion*

1.Introduction

Firstly, the lack of understanding about the use of interface interaction design and research for using the design for elderly mobile products. Interface interaction design to create audiovisual and interactive representations of different mobile products, which is necessary for elderly people to improve their experience regarding the use of mobile products and applications. Interface

interaction design takes a multifaceted approach to increasing robustness and decreasing and resolving interface segments. The interface interaction design ensures mobile product specifications based on the requirements of different mobile products and applications for people from different age groups. The problem is crucial as it raises considerations based on different groups of elderly people and their use of different mobile product specifications with the advancement of interface interaction design. In Beijing, China, currently elderly people have difficulties using apps.

It is a problem because there are not many mobile product specifications for elderly people from different age groups: 60–65, 65–70, and above 70. The lack of understanding and information about the use of interface interaction design and digital experience of elderly people creates gaps in mobile product specifications. Interface designs help address attractive product designs for users and sharing usability and consistency (Fitzgerald, 2021). On the other side, interaction designs ensure feedback-oriented approaches to the users that can guide the users to use the mobile application in an interactive way where both computers and humans interact regarding information (Cardello, 2023). A lack of understanding about both variables can create problems in segregating applications suitable for the elderly.

It is still a problem because there was not much research and study regarding the research topic. All the previous research and activities were not sufficient to deliver adequate information regarding the topic. It has created knowledge and information issues for those who want to know about the use of interface interaction design to improve the digital experience of elderly people. The specific objective of study are as follow:

To assess the preferences for mobile interfaces among Beijing's elderly interconnected to accessibility requirements and cultural nuances inclusively.
To investigate several existing interface paradigms developed for interaction design in the context of elderly people, to understand weaknesses and constraints of existing design.
To provide effective recommendations for improving interface design such as changing font size for elderly users in mobile applications.

2. Literature Review

As a result of their remarkable proliferation around the world, mobile devices have evolved into an irreplaceable component of modern life. They enable users to rapidly access a wide range of services and information, making them an indispensable component of modern life. While it is true that the mobile revolution has had a huge impact on people of all ages, it is of the utmost importance to take into consideration the unique requirements and perspectives of the senior population, particularly when it comes to the design of user interfaces for mobile applications. This discussion highlights the need of taking into account the specific requirements of the elderly population when developing mobile applications and conducts an in-depth analysis of how the elderly population perceives touchscreen experiences present in mobile devices.

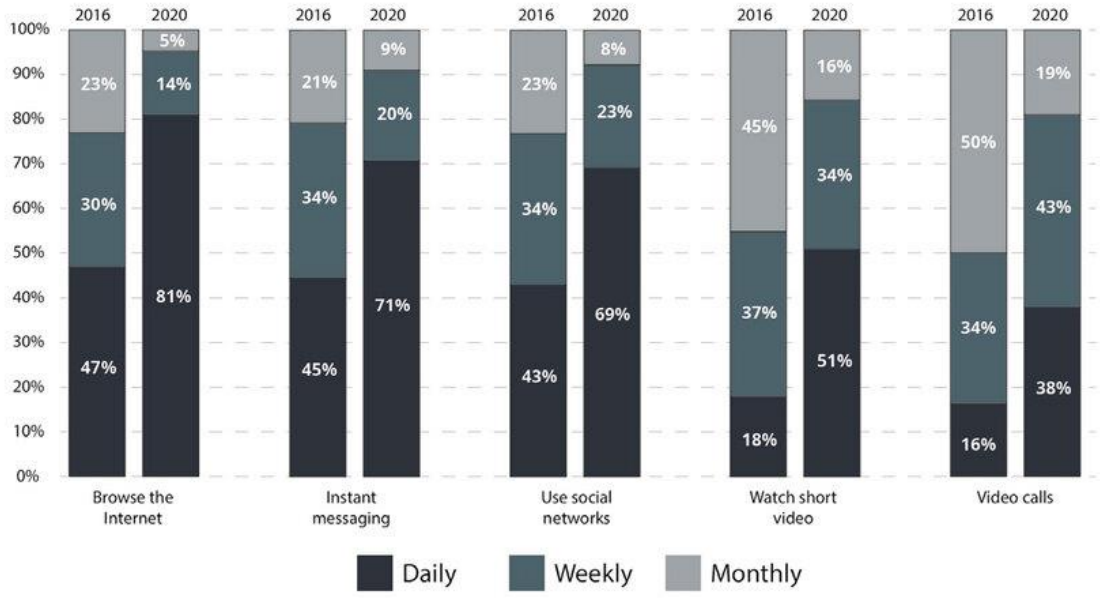


Figure 1: Elderly using Smart Phone

When it comes to using mobile devices with touch screens, elderly folks frequently face a number of challenges. Alterations in physical, cognitive, and sensory functioning that are associated with aging are mostly to blame for these challenges. One of the most significant challenges that older users encounter is the difficulty in performing the precise touch motions that are required to operate current touchscreen interfaces. This is because motor skills tend to decline with age. In addition, a significant number of elderly people may experience difficulties with their vision, which can make it challenging to see small type or differentiate between various computer icons. Last but not least, cognitive decline may make it more difficult for a person to learn and retain complex navigational patterns, which are typically seen in a variety of mobile applications (Mohd Hassan et al., 2021).

The dispositions of elderly persons toward mobile technology may range from excitement to dread, depending on the circumstances. According to Ferreira et al. (2021), there are individuals who are ready to accept new technologies because they recognize the potential benefits that may be gained from utilizing these technologies to contact with loved ones, gain access to information, and participate in a variety of activities. The use of touchscreen technology, on the other hand, might be disturbing for a substantial portion of the elderly population due to their lack of experience with technology, concerns regarding security and privacy, and the likelihood of experiencing frustration when navigating intricate interfaces.

On the other hand, the experiences that elderly people have had in the past can have a significant impact on how they feel about digital technology that uses touch screens. It's possible that those who have previously had a positive experience with user-friendly interfaces will be more open to using mobile items. Some individuals, on the other hand, may be less ready to accept new applications if they have previously experienced applications that were difficult to use or poorly designed.

To what extent older individuals are able to make use of touchscreen technology will be determined by their level of expertise and their willingness to learn. The adoption of new technology is something that some elderly folks are willing to accomplish, and they exhibit genuine curiosity and enthusiasm in order to study the prospects that mobile devices present. They are ready to devote the appropriate amount of time and effort to themselves in order to acquire knowledge about and implement these technologies. According to Al Shehri et al. (2022), a sizeable portion of the elderly population may be hesitant to use them because they are concerned about the possibility of making mistakes and they do not have faith in their ability to utilize these devices in the appropriate manner. It's possible that these individuals are concerned about accidentally pressing the wrong buttons, getting lost in intricate interfaces, or having their privacy and security compromised. It is necessary to have an awareness of these particular traits in order to design mobile applications that are able to respond to the diverse requirements and attitudes of senior users. This in turn helps to create a digital environment that is more welcoming to this demographic.

According to the findings of the study that was conducted by Li et al. (2021), the design of mobile applications that are fashioned for older citizens have to prioritize simplicity. It is possible to significantly enhance the user experience by reducing the amount of clutter, utilizing typefaces that are legible, and providing navigation that is clear. In order to accommodate any vision issues that may arise, the size of the components of the user interface, such as icons, buttons, and text, should be enlarged. It is possible that older people will have less confusion if the design is consistent. This could include design elements such as navigation patterns and the positioning of common capabilities. It is possible that elderly users would find it simpler to comprehend and make use of the application if it is provided with help options and instructions that are easy to understand. (Avioz-Sarig et al., 2021) Research has shown that providing users with both visual and audio feedback for their activities within the application might potentially boost their confidence and reduce the number of errors they make. By providing elderly users with the ability to alter the font size, contrast, and other components of the application's interface, it is possible to empower them to personalize the application to meet their specific requirements.

Some elderly people are enthusiastic about touch screen technology, while others are cynical about it. These feelings range from delight to cynicism. It is essential to develop mobile applications that are not only user-friendly but also cater to the specific requirements of this group in order to fulfil the objective of ensuring their participation in the digital world. By putting an emphasis on simplicity, clarity, and user assistance, designers have the ability to create interfaces that make it possible for elder consumers to successfully interact with mobile goods (Zuhana et al., 2022). To effectively make recommendations for boosting the user experience and quality of life for older users in the digital age, interface interaction design and research for mobile applications in the context of the elderly population in Beijing, China, must take these issues into account.

Despite the fact that the older population's attitudes regarding touchscreen technology continue to be complex and diverse, the adoption of touchscreen technology among the elderly population has consistently increased over the past decade. Numerous older people believe that mobile touchscreen devices are associated with increased levels of independence as well as enhanced

communication with their family and friends. The lack of familiarity with the technology, on the other hand, frequently results in uneasiness and resistance. These negative attitudes can be further exacerbated by the design of user interfaces that fail to take into account age-related cognitive and physical limits. These limitations include deteriorating vision, diminished motor abilities, and memory lapses. In a study conducted by He et al. (2021), it was discovered that older persons have a better acceptance rate for touchscreen goods that feature simpler navigation and provide immediate, unambiguous feedback. This finding highlights the value of inclusive design.

Cognitive load and usability are two important characteristics that play a significant role in determining how those who use touchscreen devices feel about them. Users who are older have a tendency to have feelings of being overwhelmed and discouraged from continuing to utilize interfaces that are cluttered or overly complex. Interfaces that are built with minimalism, large icons, and easy movements, on the other hand, result in more positive attitudes and improved utilization rates. The findings of Zhang and Li (2023) indicate that senior participants were more willing to explore new mobile applications when they perceived the design to be friendly, approachable, and adapted to their specific requirements. Their findings highlight the fact that great user experiences have a direct influence on the propensity of elderly folks to accept digital technologies in their day-to-day life.

The elderly's earlier exposure to technology is another important component that plays a role in shaping their perspectives. People who have even a little amount of prior experience using computers or cellphones tend to have a higher level of self-assurance and are more willing to adapt to newer digital devices. On the other hand, people who have never used touchscreen gadgets before are likely to find them strange and daunting. This demonstrates the significance of educational support and training in the process of cultivating trust in technological capabilities. Not only can guided learning sessions and peer assistance greatly enhance older individuals' competence, but they also significantly boost their motivation to engage with touchscreen technology, according to Wu et al. (2022). Therefore, efforts to create adequate digital literacy programs should go hand in hand with the design of products that are user-friendly.

In addition, the elderly are influenced by social influence and emotional value when it comes to their sentiments about touchscreen mobile gadgets. The ability to communicate with loved ones through messaging applications, social media, and video calling platforms has been reported by a significant number of elderly people as a source of greater sentiments of inclusion and connectivity. The initial opposition to technology is frequently overcome by these societal benefits, which ultimately results in a more positive attitude toward technology. Especially among elderly users, a recent study conducted by Chen and Sun (2020) demonstrates that perceived social usefulness had a higher impact on technology acceptability than ease of use alone. This was especially true for the technology. Based on this, it appears that putting more of an emphasis on the relational benefits of mobile touchscreen devices may be a more successful way to motivate people than concentrating solely on the functionality of these gadgets.

Lastly, the emotional connection that exists between older users and the equipment they use is a significant factor in the formation of attitudes that are maintained over time. An increased sense

of self-efficacy and a heightened sense of autonomy can be the result of a sense of accomplishment that comes from acquiring new digital abilities. Enhancing user happiness and fostering a stronger emotional connection can be accomplished through the use of devices that promote personalization. These devices may include font sizes that can be adjusted, voice commands, and customization possibilities. A study conducted by Liu et al. (2024) discovered that elder users who experienced a strong emotional connection to their electronic gadgets exhibited higher levels of engagement and lower rates of abandonment. Because of this emotional link, the initial learning curve can be transformed into a gratifying experience, thereby transforming mobile goods into meaningful tools that can be used in day-to-day life.

2.1 Conceptual Framework

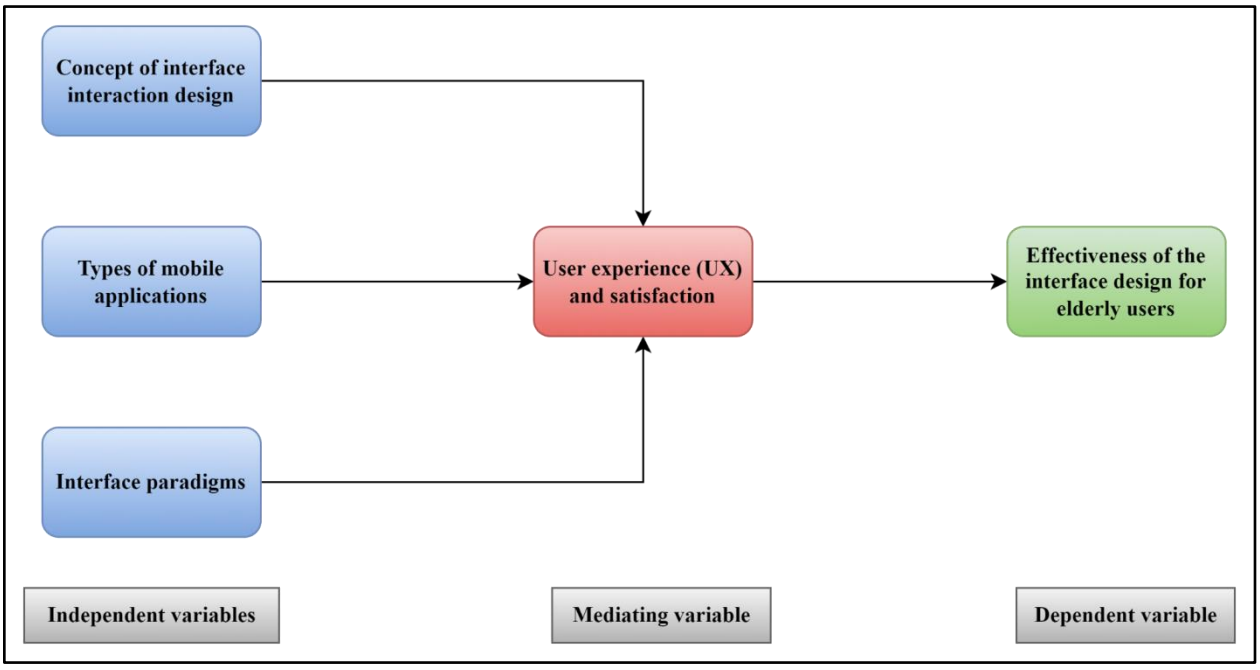


Figure 2: Conceptual framework

(Source: Self-created)

3. Research Methodology

The best option for the study of mobile product interface interaction design for Beijing, China's senior population is to choose an exploratory research design. The research objectives are aligned with its adaptability, user-centeredness, and ability to uncover unknowns, which facilitate the generation of context-specific insights and user-centred recommendations that are essential for improving the usability and efficacy of mobile applications for the elderly.

The best options for the study on mobile product interface interaction design for the senior population in Beijing, China are to use the survey and interview technique for primary data collection to get quantitative and qualitative data. This approach provides objectivity, generalizability, efficiency, cost-effectiveness, organized insights, consistency, and dependability,

all of which are in line with the goals of the research (Wang et al., 2023). This particular and dynamic environment enables the research to offer evidence-based suggestions for improving interface design, which in turn improves the usability and efficacy of mobile apps for senior users. The number of the 200 participants to be involved in the quantitative survey was set based on both statistical consideration and practical constraints. An appreciable sample group is the 200 used for qualitative research and qualitative analysis to study the likes of the Beijing seniors in mobile phone interface design. This sample size is the middle ground between the requirement of a large dataset to have a sufficient representation and the practical limitation of resources and time. In addition to this, the choice of 7 interface designers with experience working on qualitative research through interviews draws upon their expertise in the field.

In the context of the study on mobile product interface interaction design for Beijing, China's older population, selecting appropriate software for statistical analysis is essential. SPSS is appropriate for performing statistical analysis of the collected quantitative data, whereas thematic analysis is appropriate for analyzing qualitative data (Murana & Rahimin, 2021). Some compelling reasons for utilising SPSS for statistical analysis in this study are covered in the next section.

Results and Discussion

4.1 Quantitative Data Analysis

Correlations

		I am comfortable with pastel colours for the phone theme or background.	I prefer bright colours as my mobile phone themes or backgrounds.	I prefer larger texts on my mobile phone as it makes reading easier.	I sometimes face difficulties in navigating specific application due to different icons and colours.	I appreciate mobile applications that provide a variety of interface customization options.	I prefer to use messages, video calling, social media and health applications.	I often use Google Assistant as a voice assistant.	I prefer to get a tutorial regarding the use or accessibility features of my phone.	Calendar and weather notes are the most beneficial built-in apps.	There are several built-in apps present that I never used and took unnecessary storage.	Phone, messaging, camera and calendar are the most effective built-in apps.	Which built-in apps on your phone do you use the most?	Are there any built-in apps that you never use?	Would you like to remove or replace any of the built-in apps which ones do you prefer?	What type of apps do you prefer using and why? Apps that require type or apps that use voice commands?	Do you find the default icon size on your phone easy to tap, or would you prefer them to be larger/smaller ?
I am comfortable with pastel colours for the phone theme or background.	Pearson Correlation	1	.018	-.113	-.088	.032	-.117	.017	-.049	.024	-.038	-.113	-.083	-.008	-.026	.055	.031
	Sig. (2-tailed)		.798	.112	.218	.656	.098	.809	.491	.735	.595	.111	.241	.910	.714	.435	.661
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
I prefer bright colours as my mobile phone themes or backgrounds.	Pearson Correlation	.018	1	.001	.106	.123	-.017	-.073	.050	-.121	.047	.055	-.134	.096	.033	-.013	.007
	Sig. (2-tailed)	.798		.991	.134	.082	.816	.306	.481	.087	.507	.440	.058	.175	.639	.853	.919
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
I prefer larger texts on my mobile phone as it makes reading easier.	Pearson Correlation	-.113	.001	1	.027	-.075	.029	.044	-.051	-.103	.050	-.113	.041	-.014	-.017	-.003	.025
	Sig. (2-tailed)	.112	.991		.705	.289	.681	.538	.475	.148	.482	.112	.567	.844	.812	.961	.730
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
I sometimes face difficulties in navigating specific application due to different icons and colours.	Pearson Correlation	-.088	.106	.027	1	.000	.016	-.046	-.015	.065	-.030	.068	.033	.087	-.093	-.036	-.009
	Sig. (2-tailed)	.218	.134	.705		1.000	.817	.519	.835	.358	.678	.337	.638	.221	.192	.609	.903
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
I appreciate mobile applications that provide a variety of interface customization options.	Pearson Correlation	.032	.123	-.075	.000	1	-.009	-.059	-.064	.105	-.035	.041	.079	.068	.046	.094	.055
	Sig. (2-tailed)	.656	.082	.289	1.000		.909	.403	.368	.139	.622	.569	.268	.341	.515	.184	.441
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
I prefer to use messages, video calling, social media and health applications.	Pearson Correlation	-.117	-.017	.029	.016	-.009	1	.152*	-.139*	.023	-.005	-.049	.006	-.073	.025	-.026	-.017
	Sig. (2-tailed)	.098	.816	.681	.817	.909		.031	.049	.749	.946	.490	.928	.302	.726	.716	.814
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
I often use Google Assistant as a voice assistant.	Pearson Correlation	.017	-.073	.044	-.046	-.059	.152*	1	-.151*	.065	.085	-.089	.131	.006	.066	.174*	.042
	Sig. (2-tailed)	.809	.306	.538	.519	.403	.031		.033	.364	.230	.212	.064	.935	.354	.014	.554
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
I prefer to get a tutorial regarding the use or accessibility features of my phone.	Pearson Correlation	-.049	.050	-.051	-.015	-.064	-.139*	-.151*	1	-.111	-.029	.010	-.026	.082	-.007	.014	.036
	Sig. (2-tailed)	.491	.481	.475	.835	.368	.049	.033		.118	.686	.889	.710	.250	.921	.841	.612
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Calendar and weather notes are the most beneficial built-in apps.	Pearson Correlation	.024	-.121	-.103	.065	.105	.023	.065	-.111	1	.015	.012	.034	.046	-.050	-.044	-.081
	Sig. (2-tailed)	.735	.087	.148	.358	.139	.749	.364	.118		.830	.861	.629	.514	.484	.533	.252
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
There are several built-in apps present that I never used and took unnecessary storage.	Pearson Correlation	-.038	.047	.050	-.030	-.035	-.005	.085	-.029	.015	1	-.001	.043	-.025	.021	-.033	-.071
	Sig. (2-tailed)	.595	.507	.482	.678	.622	.946	.230	.686	.830		.990	.545	.726	.763	.640	.315
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Phone, messaging, camera and calendar are the most effective built-in apps.	Pearson Correlation	-.113	.055	-.113	.068	.041	-.049	-.089	.010	.012	-.001	1	-.093	-.030	.086	.126	-.006
	Sig. (2-tailed)	.111	.440	.112	.337	.569	.490	.212	.889	.861	.990		.190	.674	.225	.075	.936
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Which built-in apps on your phone do you use the most?	Pearson Correlation	-.083	-.134	.041	.033	.079	.006	.131	-.026	.034	.043	-.093	1	-.014	.005	.012	.128
	Sig. (2-tailed)	.241	.058	.567	.638	.268	.928	.064	.710	.629	.545	.190		.845	.942	.869	.070
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Are there any built-in apps that you never use?	Pearson Correlation	-.008	.096	-.014	.087	.068	-.073	.006	.082	.046	-.025	-.030	-.014	1	-.007	.102	-.033
	Sig. (2-tailed)	.910	.175	.844	.221	.341	.302	.935	.250	.514	.726	.674	.845		.917	.153	.642
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Would you like to remove or replace any of the built-in apps which ones do you prefer?	Pearson Correlation	-.026	.033	-.017	-.093	.046	.025	.066	-.007	-.050	.021	.086	.005	-.007	1	.137	.059
	Sig. (2-tailed)	.714	.639	.812	.192	.515	.726	.354	.921	.484	.763	.225	.942	.917		.052	.404
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
What type of apps do you prefer using and why? Apps that require type or apps that use voice commands?	Pearson Correlation	.055	-.013	-.003	-.036	.094	-.026	.174*	.014	-.044	-.033	.126	.012	.102	.137	1	.027
	Sig. (2-tailed)	.435	.853	.961	.609	.184	.716	.014	.841	.533	.640	.075	.869	.153	.052		.701
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Do you find the default icon size on your phone easy to tap, or would you prefer them to be larger/smaller?	Pearson Correlation	.031	.007	.025	-.009	.055	-.017	.042	.036	-.081	-.071	-.006	.128	-.033	.059	.027	1
	Sig. (2-tailed)	.661	.919	.730	.903	.441	.814	.554	.612	.252	.315	.936	.070	.642	.404	.701	
	N	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200

*. Correlation is significant at the 0.05 level (2-tailed).

Figure 3: Correlation Analysis

(Source: SPSS)

The cross-tabulation results of the correlation analysis conducted with the help of SPSS reveal the detailed patterns of the various interpersonal user preferences and several behaviours related to the usage of mobile phones among the elderly people of Beijing. The analysis of the results has revealed most of them as having low coefficients thus implying that most of the user preference variables do not exhibit strong interdependence.

The most interesting result is a positive relationship between the use of messages, video calls, social networks, and health applications and the regular use of Google Assistant as a voice assistant (r =.152, p =.031). This implies that elderly users who are actively engaged in the use of mobile apps in areas of communication, health and others will also be responsive to voice assistants such as Google Assistant. This is in line with the observation that voice assistance makes it easy for the elderly to control mobile devices, especially in the use of health or social applications.

Similarly, there is also a negative relationship between the relative frequency of using messages, video calling, and social networking sites and the need for tutorials about the use or availability of features of the phone (Correlation Coefficient = -.139, Significance Level = 0.049). Based on this,

there is the reason that elderly users who use social and communication apps may not often require tutorials related to the phone as they become confident in handling it. The negative correlation shows that those people who are at ease with the initial twelve apps do not need as much help since they are already familiar with the main aspects of a mobile experience.

Surprisingly, the results reveal a low association of the decision made about choosing bright colours as mobile phone themes and other factors. For example, a preference for bright colours has little correlation with the difficulties in using icons and colours to navigate between various applications (r =.106, p =.134) This shows that elderly users' colour preferences will not prevent them from facing hurdles in the navigation of applications. This is a very surprising outcome since personal preferences cannot dictate the other aspects of the usability of a given mobile interface.

Another significant and large effect size is identified between the users who use Google Assistant often and the choice of the applications that are voice-controlled instead of typing (Cohen's d = 0.174; p = 0.014). This implies that the older users who do not like the idea of typing instead of using voice for creating applications are likely to use these voice assistants, this supports the use of voice interface for enhancing the mobile experience of the older users.

In this regard, based on the correlation data, one can highlight several important connections, and these are the connections with the usage of communicational applications, tutorials and voice assistants. As the findings indicate, most relationships are quite weak, but voice-activated features are identified as the most important factor which can improve usability for elderly users. Thus, the results suggest that when designing interfaces for mobile applications for this population, voice-based input and output should be prioritized because this may meet the needs and preferences of this educationally disadvantaged population to a greater extent by providing tutorials to ensure that they are capable of inputting into the mobile interfaces via voice commands.

4.2 Qualitative Data Analysis

Theme 1: Elderly attitude with touch screen experience in mobile products

The use of touchscreen mobile devices among the elderly population has become a significant topic of discussion, primarily due to the interplay of physical, cognitive, and emotional factors that shape their interaction with such technologies. Many elderly individuals face challenges such as reduced manual dexterity, impaired vision, and cognitive disorders, making it difficult to execute gestures, navigate through interfaces, or interpret icons on touchscreen devices. These obstacles often lead to frustration and anxiety, further impacting their willingness to engage with mobile technology.

Theme 2: Touchscreen accessibility and engagement with the elderly

The theme "Accessibility and interaction with elderly through touch screen" presents an ever-growing problem for elderly users of mobile touchscreen devices. Many seniors face physical and cognitive constraints, such as poor motor control, impaired eyesight, and declining cognitive abilities, which can make interaction with such technology challenging. The lack of elderly-

friendly interface designs exacerbates these difficulties, discouraging engagement and causing frustration.

Theme 3: Concept of Interaction Design

Interaction design is a critical strategy in developing human-computer interaction (HCI) systems that provide meaningful, intuitive, and user-centered experiences. At its core, interaction design focuses on bridging the gap between users and technology, ensuring a smooth and engaging connection. It aims to mimic real-life interactions in technology as closely as possible, facilitating intuitive use and emotional engagement.

Theme 4: Interface interaction design suitable for elderly mobile products

Designing interface interaction for elderly mobile products presents numerous challenges across cognitive, physical, sensory, and psychological domains. Elderly users often face limitations such as memory loss, attention deficits, and impaired dexterity, which can lead to errors or delays in interaction. An effective design must address these constraints by simplifying interactions and making the user journey more intuitive.

Theme 5: Notion of different paradigms related to interfaces that have been developed in the interaction design

Interaction design for elderly users is a crucial component of user experience (UX) and human-computer interaction (HCI). Over the years, various paradigms have emerged to create interfaces that are both accessible and intuitive for elderly users, who often face cognitive and physical impairments. Among these is the user-friendliness paradigm, which emphasizes the importance of simplicity, cost-effectiveness, and error-free interfaces. This paradigm minimizes the cognitive load on elderly users by presenting information in manageable quantities and using real-life analogies to make systems easier to understand.

5. Conclusion

The findings of the research emphasize once more how essential it is to develop mobile interfaces that take into account the mental, physical, and emotional requirements of users who are of a more advanced age. Discovering practical ways to make interfaces more accessible and user-friendly is the goal of this study. This is accomplished by conducting an investigation into the preferences of users and conducting an analysis of the shortcomings of existing paradigms. In light of the findings, it is abundantly obvious that iterative, user-centered techniques that actively involve feedback from senior citizens in the design process are of the utmost significance. Additionally, the research highlights the larger cultural and socioeconomic issues that have an effect on the adoption of technology among the elderly, and it advocates for designs that are inclusive in order to assist in bridging the digital gap. In addition, the research acknowledges the importance of the aforementioned elements. In spite of the fact that the findings provide useful information that can be utilized to improve the user experience, they also bring to light the significance of ongoing research and collaboration across disciplines in order to provide solutions to ever-evolving problems and make use of emerging technology. In conclusion, but certainly not least, this chapter

serves as a rallying call for academics, designers, and legislators to make diversity and accessibility in the digital sphere their top concern.

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FACTORS INFLUENCING WOMEN'S ENTRY INTO ENTREPRENEURSHIP IN MALAYSIA

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Abstract: *Women entrepreneurs are individuals who initiate, organize, and operate businesses while navigating various economic, social, and cultural challenges. Globally, their role in driving innovation, creating employment, and contributing to economic growth has gained increasing recognition. In many developing and emerging economies, including Malaysia, women entrepreneurs are becoming key players in transforming traditional gender roles and empowering communities. Despite facing barriers such as limited access to capital, societal expectations, and work-life balance issues, many women continue to break through these challenges with resilience, creativity, and determination. Their entrepreneurial journeys are often influenced by a by a complex interplay of internal and external factors. Encouraging women's participation in entrepreneurship not only enhances gender equality but also strengthens national development. Therefore, this study aims to identify the factors that drive women's involvement in entrepreneurship in Malaysia. The findings reveal that experience, financial status, business succession, contribution to the family, and domestic responsibilities are among the main enablers drive women to venture into entrepreneurship. The implications of this study are important for shaping inclusive and sustainable economic development strategies.*

Keywords: *Factors, Motivations, Entrepreneurship, Women Entrepreneurs*

Introduction

Entrepreneurship has long been recognized as a vital contributor to economic growth. In Malaysia, the participation of women in this field has shown positive trends. Women are increasingly moving beyond traditional roles and venturing into businesses, contributing to job creation and income generation. Despite their contributions, women entrepreneurs still face various challenges. Therefore, understanding the driving forces behind their decision to become entrepreneurs is crucial. These factors can serve as a guide for government policies, educational institutions, and NGOs to support the growth and sustainability of women-owned businesses.

The role of women in entrepreneurship is not only crucial for fostering inclusive economic growth, but also for addressing social inequalities and empowering communities. Women

owned businesses often introduce diverse perspectives, innovative solutions, and community-oriented values that benefit the broader economy. In Malaysia, efforts to promote gender equality in entrepreneurship have been strengthened through various government initiatives and support programs. However, challenges such as limited access to capital, insufficient business networks, and socio-cultural expectations continue to hinder women's full participation in the entrepreneurial ecosystem. As such, there is a pressing need to understand the personal, economic, and institutional factors that drive and sustain women's entrepreneurial activities in the Malaysian context.

Literature Review

Entrepreneurs are individuals who identify market opportunities and take initiative to manage businesses, characterized by innovation, risk-taking, and resilience (George, Shubhashree, & Latha, 2024). Women entrepreneurs, in particular, are described as assertive, persuasive, and capable of overcoming challenges (Bashir, 2024). Although women-owned businesses are growing globally, they remain understudied despite their presence across various industries (Ahmad & Ali, 2023). Women are most active in sectors like healthcare, education, personal services, and retail, while remaining underrepresented in high-tech fields (European Commission, 2013).

In Malaysia, women-owned businesses represented 20.6% of all enterprises in 2022, with most operating in the services sector (Department of Statistics Malaysia, 2022). The Covid-19 pandemic has further influenced their sectoral focus, particularly toward beauty and health industries. Government agencies such as SME Corp, INSKEN, and the Women Development Department, along with initiatives by AIM, provide training and financial assistance to support women's entrepreneurship (Embong & Rusdi, 2021)

Despite growing interest, women entrepreneurs remain underrepresented in entrepreneurship literature. Cardella et al. (2020) found that research has emphasized limitations faced by women, especially in developing countries (Gautam & Mishra, 2016), while topics like motivation and work-life balance are less explored. In Malaysia, research remains limited compared to Western nations (Embong & Rusdi, 2021). Hence, understanding the factors influencing women's entry into entrepreneurship is critical for designing targeted support systems that encourage participation and promote gender equality in entrepreneurship.

Methodology

This study employed a qualitative approach, using semi-structured interviews and document analysis to explore the experiences of ten women entrepreneurs in Malaysia. A purposive sampling method was used to select participants who met specific criteria: they must be the owners of small and medium-sized enterprises. The study focused on women-owned businesses in Kelantan and Sabah. Kelantan was chosen for its strong tradition of entrepreneurship rooted in socio-economic culture (Sahad et al., 2018), while Sabah was selected due to its notable economic growth of 5.4% between 2016 and 2022 (Department of Statistics Malaysia, 2022). These locations provided meaningful insights into the motivations behind women's entrepreneurial involvement.

Results and Discussion

The study involved ten women entrepreneurs aged between 33 and 67 from Kelantan and Sabah, operating in sectors such as food and beverage, tourism, education, and jewellery. Most participants had educational qualifications ranging from PMR to degree level, and some inherited their businesses while others started their own.

The findings identified five key factors influencing women to pursue entrepreneurship:

Experience

The experience gained by women entrepreneurs before venturing into entrepreneurship sparked their interest in business activities and led them to choose the entrepreneurial path. This is supported by Xi et al. (2018), who stated that work experience significantly influences entrepreneurial entry by enhancing knowledge and skills, thus motivating individuals to start a business.

Financial Status

Women entrepreneurs are highly inclined toward entrepreneurial activities to improve their financial situation by generating greater earnings. This is supported by Ardiansyah (2024), who stated that financial challenges and the desire for higher income motivate women to pursue entrepreneurship as a means to achieve financial stability and support their families, especially when conventional jobs offer limited earnings.

Business Succession

Business succession, often involving the transfer of ownership within families or to trusted individuals, motivates women to become entrepreneurs. This aligns with Nguyen et al. (2024), who found that successor traits and prior involvement significantly influence successful business transitions and entrepreneurial decisions.

Contribution to the Family

The motivation to contribute to the family financially drives many women into entrepreneurship. They choose to become entrepreneurs to improve the financial well-being of their family members. This supports Setyoningrum and Herdawan (2022), who found that women seek economic independence through entrepreneurship.

Domestic Responsibilities

Domestic responsibilities, especially childcare, motivate women to pursue entrepreneurship due to the flexibility it offers. This supports Li and Tong (2023), who found that entrepreneurship allows women to balance work and family through greater time autonomy and flexibility.

Conclusions and Future Research

This study reveals that Malaysian women entrepreneurs are primarily driven by five key motivational factors: prior experience, financial status, business succession, contribution to the family, and domestic responsibilities. Financial motivations and the desire to support and care for family members are especially influential, prompting many women to leave conventional

employment for more flexible and financially rewarding entrepreneurial paths. Business succession also plays a vital role, particularly in family-run enterprises where the next generation continues the legacy. These findings highlight the importance of entrepreneurship as a means for women to achieve financial independence, personal fulfillment, and work-life balance.

The study further emphasizes the need for a supportive entrepreneurial ecosystem, including access to financial assistance, skill-building programs, and inclusive government policies to empower women entrepreneurs and enhance their business sustainability. It underlines that women not only contribute to household income but also play a significant role in economic development, job creation, and social progress.

For future research, it is recommended to explore the challenges faced by women in maintaining and scaling their businesses, such as limited access to funding, societal expectations, gender discrimination, and market constraints. Comparative studies across different regions, industries, and age groups would provide a deeper understanding of varying entrepreneurial motivations and obstacles. This will help in developing targeted interventions to further strengthen the role of women in the entrepreneurial landscape.

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THE DETERMINANTS OF LUXURY BRAND STORIES ON ONLINE REPURCHASE INTENTIONS AMONG GEN Z IN CHINA

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Abstract: *The rise of Gen Z as a dominant consumer segment and the rapid expansion of e-commerce have prompted luxury brands to adopt innovative storytelling strategies to engage and retain this digitally savvy audience. This study explores the impact of luxury brand stories on online repurchase intentions among Gen Z consumers in China, emphasizing the role of narratives in shaping emotional connections, trust, and loyalty. Using a qualitative research approach, this study conducted in-depth interviews with Gen Z consumers who have previously purchased luxury brands online. The findings reveal that authentic and emotionally engaging brand stories significantly influence repurchase intentions by fostering a sense of trust and alignment with personal values. Narratives that highlight sustainability, inclusivity, and cultural relevance were found to resonate strongly with Chinese Gen Z consumers, who prioritize both ethical considerations and social identity in their purchasing decisions. This research contributes to the literature by offering nuanced insights into how luxury brand storytelling drives consumer loyalty in the digital age, particularly within the unique socio-cultural context of China. The study provides practical recommendations for luxury brands seeking to refine their storytelling strategies to cultivate lasting relationships with Gen Z consumers and enhance their competitive positioning in the online market.*

Keywords:
Luxury Brand, Brand Story, Online Repurchase Intention

Introduction

The rise of e-commerce has revolutionized the luxury industry, providing unprecedented opportunities for brands to connect with consumers in the digital sphere. Among these consumers, Generation Z (Gen Z)—comprising individuals born between the mid-1990s and early 2010s—represents a dynamic and influential market segment. With a global population estimated at over 2 billion, Gen Z is characterized by its digital nativity, social consciousness, and distinct consumption behaviors (Vardeman, 2024). This generation's affinity for online platforms and preference for personalized experiences make it a pivotal demographic for luxury brands.

One of the most effective strategies luxury brands employ to establish emotional connections with consumers is storytelling. Brand stories, defined as narrative frameworks that convey a brand's heritage, identity, and values, play a critical role in shaping consumer perceptions and fostering brand loyalty (Kim, 2019). In the luxury sector, storytelling serves as a means of

reinforcing exclusivity, authenticity, and aspirational appeal, aligning with the symbolic value consumers often associate with luxury products (Merlo et al., 2024). Previous research highlights that emotionally resonant narratives can influence purchase intentions by strengthening consumer-brand relationships (Huang et al., 2022). However, the role of brand stories in driving online repurchase intentions among Gen Z remains underexplored.

Online repurchase intentions are a key indicator of customer loyalty in the digital marketplace. Unlike first-time purchases, which may be influenced by promotions or novelty, repeat purchases often signal deeper trust and engagement with the brand (Mandagi & Sondakh, 2022). For Gen Z consumers, whose purchasing decisions are influenced by values such as transparency, inclusivity, and sustainability, luxury brands must craft narratives that resonate on both emotional and ideological levels (Ganassali & Matysiewicz, 2021). This generation's preference for meaningful, authentic, and purpose-driven brand interactions underscores the importance of leveraging storytelling as a strategic tool.

This study aims to investigate the impact of luxury brand stories on the online repurchase intentions of Gen Z consumers. Specifically, it examines how the dimensions of brand story shape consumer attitudes and behaviors in the digital context. Grounded in established theoretical framework, which is the narrative communication theory (Ganassali & Matysiewicz, 2021), this research seeks to elucidate the mechanisms through which brand stories influence online repurchase intention.

By addressing the intersection of brand story and Gen Z consumption behavior, this study contributes to the growing body of literature on luxury branding in the digital age. Furthermore, it offers practical insights for luxury brand managers and marketers striving to cultivate long-term relationships with a generation that values both tradition and innovation.

Literature Review

There are five points will be discussed in LR, which are luxury brand, brand story and online repurchase intention.

Luxury Brand

Luxury brands have long been associated with exclusivity, high quality, and symbolic value. Defined as products or services that provide more than functional utility, luxury brands offer consumers an experiential value that reflects prestige, status, and self-expression (Jebarajakirthy & Das, 2021). According to previous research, luxury brands are characterized by six key attributes: craftsmanship, exclusivity, heritage, premium pricing, iconic design, and a strong brand identity (Creevey et al., 2022). These attributes create a unique value proposition that distinguishes luxury brands from non-luxury counterparts and fosters emotional attachment among consumers (Atkinson & Kang, 2022).

In the context of luxury branding, emotional and symbolic dimensions are pivotal. Unlike utilitarian brands, luxury brands rely heavily on their ability to evoke emotional responses and create aspirational lifestyles. This emotional connection often stems from the perceived rarity and superior quality of luxury products, as well as their ability to serve as a marker of social distinction (Kumagai & Nagasawa, 2022). Research indicates that consumers perceive luxury

brands as a means to enhance self-image and convey social status, particularly in emerging markets like China, where luxury consumption is deeply intertwined with cultural and social norms (Khan et al., 2022).

The proliferation of e-commerce has transformed the way luxury brands interact with consumers, presenting both opportunities and challenges. Digital platforms have become critical for luxury brands to maintain their relevance and appeal, particularly among younger generations. Studies show that luxury consumers now expect a seamless omnichannel experience that combines traditional brand values with modern digital convenience (Bao et al., 2024). However, the digitalization of luxury retailing has raised concerns about maintaining exclusivity and brand integrity in an environment characterized by mass accessibility (Banister et al., 2020).

China has emerged as a global leader in luxury consumption, accounting for a significant share of the market. This trend is driven in part by the rising purchasing power of younger generations, particularly Gen Z. Known for their digital fluency and affinity for online shopping, Chinese Gen Z consumers have become a key demographic for luxury brands seeking to expand their presence in the e-commerce space(Jain et al., 2023). However, engaging this cohort requires brands to balance tradition and innovation, ensuring that digital strategies align with the aspirational values central to luxury branding (Manfreda et al., 2023).

Brand Story

Brand stories are a fundamental element of modern marketing, defined as narrative frameworks used to communicate a brand's identity, values, and heritage (Kaczorowska et al., 2024). Unlike conventional marketing messages, which focus on promoting product attributes, brand stories aim to evoke emotional engagement and foster a deeper connection with consumers. They provide a cohesive narrative that not only enhances brand recall but also humanizes the brand, making it relatable and memorable (Hong et al., 2022).

The digitalization of luxury branding has significantly transformed how brand stories are communicated and consumed. Digital platforms, such as social media and brand websites, offer unique opportunities for storytelling through immersive and interactive formats, including videos, live events, and user-generated content (Woodside & Fine, 2019). Studies indicate that digital storytelling enhances consumer engagement by making luxury brands more accessible and relatable, particularly to younger generations like Gen Z (Dessart & Pitardi, 2019). Gen Z consumers, who are digital natives, demand authenticity and purpose in brand narratives. Luxury brands are increasingly integrating themes of sustainability, inclusivity, and innovation into their storytelling to align with the values of this generation (Dhote & Kumar, 2019). For example, campaigns that highlight sustainable sourcing or charitable initiatives not only enhance the brand's image but also foster a sense of shared purpose with consumers (Bendell & Kristal, 2023).

Online Repurchase Intention

Online repurchase intention refers to a consumer's willingness to make repeat purchases from an online retailer or brand. This concept has become a critical focus of e-commerce research, as retaining existing customers is more cost-effective than acquiring new ones (Phan Tan,

2023). Online repurchase intention is influenced by various factors, including customer satisfaction, trust, perceived value, and the overall quality of the online shopping experience (Sun et al., 2022).

Studies have identified trust as a cornerstone of online repurchase behavior. Trust mitigates the inherent risks of online transactions, fostering confidence in the brand or retailer. Research highlights that when consumers perceive a brand as trustworthy, they are more likely to engage in repeat purchases, even in a highly competitive online marketplace (Hasan & Pattikawa, 2022). Satisfaction, derived from positive prior experiences, also plays a pivotal role in driving online repurchase intentions. Satisfied customers are more likely to develop loyalty and exhibit lower price sensitivity, further enhancing their likelihood of returning to the same brand (Anshu et al., 2022).

Research Methodology

This study aims to deeply analyse the impact of luxury brand stories on the online repurchase intentions of Gen Z consumers in China. Gen Z, having grown up in a digital era, exhibits distinctive and complex consumption behaviors shaped by multicultural influences and the internet. Compared to quantitative research, the interview method enables researchers to delve into Gen Z's perceptions, understanding, and emotional responses to luxury brand stories. This approach uncovers the deeper motivations and thoughts underlying their behaviors, providing rich and detailed firsthand data, which is crucial for uncovering the underlying mechanisms of the research problem.

The target participants were Chinese Gen Z consumers aged 18–25 who had purchased luxury goods online at least once in the past year. This criterion ensures that the participants have direct experience with online luxury shopping and can provide valuable insights based on their real-life experiences. A combination of purposive sampling and snowball sampling was employed. Initially, potential participants meeting the sampling criteria were identified through social media platforms (e.g., Weibo, Xiaohongshu) and luxury brand-related forums. These individuals formed the initial sample and were interviewed. Subsequently, recommendations from the initial participants were used to expand the sample, ensuring a more diverse and representative group. Ultimately, 30 participants were selected for the interviews. A semi-structured interview guide was meticulously developed based on an extensive review of domestic and international literature and in-depth discussions with experts in luxury brand marketing. The guide covered topics such as Gen Z's sources of awareness about luxury brand stories, memorable brand story content, the role of brand stories in shaping brand image, the influence of brand stories on online luxury purchases, and their impact on repurchase intentions. The open-ended nature of the questions encouraged participants to freely express their views. The interviews were conducted via online video conferencing and facilitated by professionally trained interviewers. Before each session, participants were given a detailed explanation of the research objectives, process, and confidentiality principles to ensure their full understanding and voluntary participation. Each interview lasted 60–90 minutes, was audio-recorded with consent, and transcribed within 24 hours to ensure the accuracy and completeness of the data.

Results

This chapter presents the findings derived from the thematic analysis of interviews conducted with Gen Z consumers in China. The analysis reveals several key themes that illustrate the influence of luxury brand stories on online repurchase intentions. These themes include authenticity and trust, emotional engagement, cultural relevance, and digital storytelling impact.

Authenticity and Trust

Luxury brand stories build trust through authenticity. Participants consistently emphasized the importance of authenticity in brand narratives. Stories that showcased the brand's history, craftsmanship, and values were perceived as more credible and trustworthy. For example, Participant A stated: "When a brand shares its history, like how it started and grew, I feel connected and trust the quality more."

Authentic narratives were found to enhance consumers' confidence in the brand, reducing perceived risks associated with online shopping. Trust, in turn, was a significant factor influencing their decision to repurchase.

Emotional Engagement

Brand stories evoke emotional connections that drive loyalty. Emotional engagement emerged as a powerful driver of repurchase intentions. Participants described how compelling stories made them feel valued and inspired, creating a sense of attachment to the brand. Participant B noted: "I remember a campaign where they shared stories about their artisans—it made me feel proud to own something so unique."

The findings suggest that emotional resonance fosters a deeper relationship with the brand, encouraging repeat purchases despite premium pricing.

Cultural Relevance

Narratives that align with Chinese cultural values resonate deeply with Gen Z consumers. Participants highlighted the appeal of brand stories that reflect traditional Chinese elements or celebrate cultural heritage. For instance, Participant C shared: "I loved how the brand incorporated Chinese motifs in their designs and explained the meaning behind them—it made me feel connected to my roots."

Furthermore, participants valued stories that aligned with contemporary values such as sustainability and inclusivity, indicating that culturally relevant and socially conscious narratives enhance consumer loyalty.

Digital Storytelling Impact

The medium of storytelling significantly influences consumer engagement. Participants emphasized the importance of how luxury brand stories are delivered. Gen Z consumers, being digital natives, preferred interactive and visually engaging formats such as short videos, social

media posts, and live streams. Participant D explained: "When I see a story unfold in a video or live stream, it feels more real and exciting—it makes me want to engage with the brand more."

Digital platforms were found to be critical in amplifying the reach and impact of luxury brand stories, making them accessible and relatable to younger audiences.

Integration of Themes and Repurchase Intentions

The interplay of authenticity, emotional engagement, cultural relevance, and digital storytelling creates a holistic impact on online repurchase intentions. Participants indicated that when brand stories embody these elements, they are more likely to feel loyal to the brand and repurchase online. Participant E summarized this sentiment: "A brand story that feels genuine and meaningful stays in my mind. It makes me want to support the brand again, especially if the story aligns with my values."

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THE ROLE OF ISLAMIC PROPAGATION SOCIETY INTERNATIONAL (IPSI) IN GUIDING TO EFFECTIVE MOSQUE TOUR: A PERSPECTIVE OF ISLAMIC *DA'WAH* INTERPERSONAL COMMUNICATION TO NON-MUSLIM TOURISTS

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Abstract: *This study investigates the role of the Islamic Propagation Society International (IPSI) in guiding effective mosque tours, focusing on the implementation of Islamic da'wah through interpersonal communication with non-Muslim tourists. With the increasing globalization and inter-religious interactions, mosques have the potential to act as influential platforms for fostering understanding between Muslims and non-Muslims. However, there is a lack of systematic research on how these interactions are facilitated during mosque tours and the role of organized institutions such as IPSI in this process. The primary objective of this study is to analyze the communication strategies as well techniques employed by IPSI in engaging non-Muslim tourists to ensure informative and respectful mosque tours that align with Islamic da'wah principles. Utilizing a qualitative methodology, the research involved semi-structured interviews with IPSI tour guides especially the President of IPSI, as well as observational studies of mosque tours to collect rich, contextual data on the interpersonal dynamics at play and document analysis from several reading material related to the study. Findings reveal that IPSI's approach to mosque tours emphasizes empathetic communication, structured engagement, and the addressing of misconceptions, which are crucial in creating a positive and enlightening experience for non-Muslim visitors based on several steps of mosque tour. The study highlights the effectiveness of personal narratives and interactive dialogue in enhancing visitors' understanding of Islamic beliefs and practices. The significance of this research lies in its contribution to the field of intercultural dialogue, showcasing how structured da'wah efforts can serve as a bridge to foster greater appreciation and respect among diverse religious communities. The insights gained from this study can inform future strategies for Islamic organizations aiming to enhance outreach and promote harmonious interfaith relations through educational tourism.*

Keywords: *Islamic Propagation Society International, mosque tours, Islamic da'wah, interpersonal communication, non-Muslim tourists, intercultural dialogue.*

Introduction

In general, inviting people to Islam is obligatory upon Muslims, but to invite non-Muslims to Islam is not an easy task. Thus, when it comes to interacting with non-Muslims, the right and

most appropriate da'wah strategy should be employed to make sure that the endeavours to spread the word of da'wah are well received and accepted by non-Muslims (Nur Suhada & Khazri, 2022). Preaching to non-Muslims should begin with an attempt to comprehend the core principles of their faith and cultural practices, especially taboos. Presenting a favourable image and exhibiting excellent behaviour that serves as a model or example of the dignity and greatness of Islam is another aspect of preaching with good character. It can eradicate the negative and discriminatory sentiments that non-Muslims have towards Islam. Additionally, establishing ties with non-Muslims seeks to promote a feeling of camaraderie, trust, and dedication to da'wah initiatives. It can also help to eliminate mistrust and scepticism about Islam and Muslims. It can also enthral the emotions and heart. In order to influence someone, trust is important.

Both preachers and individual Muslims must contribute and put forth effort in the effort to explain the distinctiveness of Islam (the content of da'wah) and the advantages that come with following it. Furthermore, all misunderstandings about Islam can be dispelled and clarified through da'wah initiatives. Instead of alienating non-Muslims, the da'wah efforts might draw their interest and attention to Islam. According to Ab Aziz et al. (2008), mosque activities are one of the things that are seen to have the ability to alienate non-Muslims from Islam. Mosques can serve as centres of da'wah not only in the context of reforming Muslims to improve the quality of their religious practices, but also in the context of *ummah al-da'wah*, which consists of non-Muslims who are frequently marginalised by mosque authorities. This is true even though mosques are primarily religious, social, and educational centres for Muslims with various committees including different layers of society (Mariam et al., 2021). Da'wah can be implemented to the target group through outreach based on the concept of *da'wah*, which is characterised by kindness and friendliness, as well as in mosques, while adhering to the laws, regulations, and guidelines established by Islamic law and religious authorities. What's more, when mosques are transformed into tourist destinations, not just to satisfy the demands of the travel industry, because of the values they hold, such as state and national mosques, mosques situated in key locations like government administration centres, and mosques with historical significance and striking artistic features. This issue necessitates the mosque's preparedness to host visitors, particularly non-Muslim visitors, not only by providing an explanation of the mosque's structure and history from an architectural standpoint, but also—and perhaps more importantly—how the mosque can function as a hub for introducing Islam to non-Muslim visitors, even in a short amount of time. The mosque's willingness to give missionary organisations and non-governmental organisations (NGOs) a place and chances to interact with non-Muslim tourists is another aspect of this commitment (Azarudin et al., 2019).

This article thus addresses the function of one of Malaysia's da'wah NGOs, the Islamic Propagation Society International (IPSI), which is headquartered in Penang, in leading successful mosque tours, emphasising the application of Islamic da'wah through direct interaction with non-Muslim visitors. The objective of this study is to analyze the communication strategies as well techniques employed by IPSI in engaging non-Muslim tourists to ensure informative and respectful mosque tours that align with Islamic *da'wah* principles.

Literature Review

1. Islamic Propagation Society International (IPSI), Malaysia

IPSI was established in 1st December 2004. It is a non-government, non-political organization, popularly known as IPSI (Penang). The primary concern of IPSI is to disseminate the word of Allah via the sincere promotion of the reading, understanding and practicing of the Holy Qur'an and As-Sunnah. IPSI devotes its activities in reminding mankind of his fitrah; the worship of the one and only God. IPSI struggles to deliver the message of Islam to people in their journey of life through its mosque tour, public lectures, seminars, forums, interfaith dialogues, street da'wah, table da'wah, exhibitions, and distributing various printed and electronic mediums. For the past three years IPS has enlightened more than 300 new Muslim converts through this noble work of the prophet SAW (Kamarudin Abdullah, 2014). The founder and the President of IPSI is Dato' Haji Kamarudin Abdullah. He was born in 1968 in a Christian Catholic family. He had reverted to Islam in his teens, when he was as young as 18 years old after reading the Qur'an. He then began traveling the world, passionately gathering Islamic Knowledge and actively involved himself in dakwah to the Not-yet Muslims at all levels internationally, frequently engaged in dialogue with Christian missionaries, atheists, agnostics and other beliefs for more than 30 years. Dato' Haji Kamarudin had studied under various Islamic scholars such as Ustaz Al-Hafiz Sheikh Abdul Hamid from Pakistan, the late Sheikh Ahmed Deedat and Sheikh Rafeek Hassen of South Africa, Dr. Abu Ameenah, Bilal Philips of Qatar, Dr. Zakir Naik of India, Dr. Fadel Soliman in Egypt and Dr. Danial bin Zainal Abidin from Penang.

There are some IPSI's da'wah activities, such as Awareness Through Mosque Tour (ATMT) Programme, Charity by visiting the indigenous villages, Organizing al-Quran classes every week and Conducting Shahadah and counselling sessions. As far the ATMT is concerned, it is one the most effective da'wah method employed by IPSI since it's early days. It has become a daily routine for IPSI to provide free mosque tour to tourists at Masjid Kapitan, Pulau Pinang. Masjid Kapitan Kling is one of the heritage building in Penang gazette by UNESCO. With the status given, the mosque opens its doors to thousands of tourists from all over the world to visit the mosque. Most of them are not-yet-Muslims. IPSI take the opportunity to spread the message of Islam while giving free tours to the tourists. Some of them come without any prior knowledge about Islam. Most of them walk out of the mosque with at least a little bit of knowledge about Islam. This opportunity also taken by IPSI to clear misconception about Islam through Q&A sessions in every tour. Physically, IPSI has shown a tremendous achievement in conveying the message of Islam to non-Muslims in Malaysia, where Masjid Kapitan Keling, Penang becomes its basis for attracting non-Muslim tourists to come. Every day the mosque has average 50-80 non-Muslim visitors. Every single non-Muslim visitor is entertained by a Muslim volunteer to explain about the history of the mosque which was built about 200 years ago as well as the teachings of Islam, and finally presented to them a copy of English translation of the Holy Qur'an and pamphlets about Islam and Christianity from an Islamic perspective.

The following are IPSI mission:

1. To spread the message of Islam to the Non-Muslims through proven methods such as Mosque Tour, Street Da'wah through dakwah pamphlets, handing out free Qur'an translations, through the mass media and various other methods
2. To care for the New Muslims by providing the needful such as counseling sessions, Islamic Classes and others
3. To work together with other bodies and Government Agencies, Non-Governmental Organizations, and other Dakwah Organizations to raise the efforts of Dakwah entirely

2. Interpersonal Communication

Interpersonal communication is face-to-face communication between people. It focusses on the process of meaning-making, establishing the exchange of ideas through face-to-face communication with another person (Hashim, 2001). Interpersonal communication also refers to a process of simultaneous interaction between two known persons where they mutually influence each other with a view to managing relationships. The definition of interpersonal communication is determined not just by the number of people who communicate to one another but also by the quality of the communication itself (Nadvi, 2014). According to Zulkefli, S. Salahudin, and Rosmawati (2020), interpersonal communication has a number of characteristics, such as involving two or more people (either in small or large groups), having a close distance between the two parties, allowing both the source and the recipient to exchange information during the conversation, and using both verbal and nonverbal cues to convey information. The aims of interpersonal communication are very diverse, but essentially interpersonal communication aims to create mutual understanding between the parties involved in the communication (Dafrizal et al., 2023)

Interpersonal communication in Islam, however, is universal and free from any prejudices based on race, color, language, religion, culture, or nationality (Khalil, 2016). Sebab itu, menurut Subhan dan Basuki (2023) berpendapat human Values as the essence of interpersonal communication, encompassing honesty, justice, respect, empathy, compassion, trust, and transparency. The teachings of the Quran inspire individuals to prioritize these fundamental human values in their interactions, fostering harmonious coexistence and mutual understanding. The Islamic perspective on interpersonal communication places a strong emphasis on the various types of relationships and their dynamics. These relationships involve the reciprocal exchange of ideas and viewpoints, creating an environment of free and conducive communication based on mutual admiration, endurance, and belief, such as parent-child relationships and the dynamics of teacher-student relationships (Nadvi, 2014). Islam teaches that relationships with others should be founded on mutual respect and kindness, even when faced with unjust treatment (Subhan & Basuki, 2023). Islam advises Muslims to communicate to one another in the most appropriate way such as selection of proper words, good conduct and generosity towards others (Nadvi, 2014).

In managing interpersonal communication, there are three elements of Islamic-based communication, namely (1) the adab of the communicator, (2) content, and (3) communication etiquette in fostering meaningful and respectful interactions (Abu Hasan et al., 2022; Khalid & Ahmad, 2021). These elements provide a comprehensive framework for effective and meaningful communication (Subhan & Basuki, 2023). In terms of *adab* which is the Islamic etiquette of good manners and character, holds great importance in interpersonal communication. Adab embodies noble virtues through praiseworthy words and actions, reflecting the goodness of one's character as a Muslim and serving as an act of worship towards Allah Taala. Within Islam, *adab* plays a crucial role in communication, requiring individuals to interact respectfully and considerately, upholding the Islamic code of conduct and ethics (Afifi & Kurniawan, 2021). Islam provides various guidelines for interpersonal communication, especially in speech. Firstly, one should speak with kind words and discuss good matters; otherwise, it is better to remain silent. Secondly, in terms of speaking manner, one should employ a gentle and unhurried tone. Thirdly, when someone else is speaking, active listening, attention, and refraining from interrupting their speech are important. Fourthly, when

communicating with someone older or of higher status, it is crucial not to interrupt or cut off their speech (Subhan & Basuki, 2023).

The term *al-da'wah al-fardiyyah* refers to interpersonal communication in the context of *da'wah*. A planned, structured, or unplanned communication process between the preacher and the listener is what it is. One of the most important methods used by the Prophets to spread the message of da'wah is this communication. Preachers that interact with their audience on a personal level employ the da'wah approach through *al-hikmah*, *al-maw'izah al-hasanah*, and *al-mujadalah bi allati hiya ahsan*, claim Zulkefli, S. Salahudin, and Rosmawati (2020). The method is predicated on verse 125 of Surah Al-Nahl. Using the *al-hikmah* approach to da'wah, the preacher must be able to communicate effectively. This includes knowing when and how to speak with the mad'u, adapting the language and topic of the conversation to the *mad'u*'s level of intelligence, and having the discernment to change the *mad'u*'s thoughts and emotion. *Al-maw'izah al-hasanah*, on the other hand, is the method by which preachers give the addressee sound counsel, whether in the form of reminders, good news, cautions, or threats. Furthermore, the preacher employs a persuasive communication strategy in the hopes that the audience would understand the message well enough to practise it and think critically and actively. Preachers can also inspire the audience to think more critically and eventually become a force for good by giving them clear examples and insights. The preacher uses the *mujadalah* approach while deciding whether to argue with the mad'u. To get to the truth about the topic under discussion, the debate must be done in the best possible way while adhering to particular ethics and regulations.

3. Islamic Da'wah

The term da'wah is used in many contexts. The word da'wah is a noun derived from the verb da'a. Its infinitive noun or verbal noun is du'a and da'wah, literally meaning, desire for God as stated in the Holy al-Quran (al-Baqarah, 2: 186). It can mean an appeal for aid or call for help as Allah said in the Holy al-Quran (Hud, 11: 13). It can also mean an appeal to God or prayer as the Holy al-Quran says (Luqman, 31: 32). The word of da'wah gives the meaning as al-nida' or invitation. The word da'wah also gives the meaning of an inquiry or al-talab.

Zaydan (1993), meanwhile, gives the meaning of da'wah as the "call" to Allah, as Allah says in the Holy al-Quran (Yusuf, 12: 106) which means "say: This is my way, I call on Allah with sure knowledge, I and whosoever follow Me". So what is meant by "call to Allah" is the call to His religion and that is Islam. This is because Allah claims that religion with Allah is Islam as His say in the Holy al-Quran (Al 'Imran, 3: 19). Islam, in fact, is the object of the da'wah and its reality and is indeed the first basic or root of da'wah. According to Abdullah (2023) in Islamic terminology, da'wah is an invitation extended to humanity by the prophets. From the Islamic point of view the religion of all the prophets is Islam, and each prophet has his own da'wah. Prophet Muhammad's da'wah was the last da'wah among the prophets, it is commonly known as the Islamic da'wah. The word "invitation" is including admission, inviting, request and call to come to Islam as faith and as a way of life. According to Sohirin (2008), the work of da'wah as aimed at calling others with his words and deeds to the divine message and to observe the shari'ah. In detail, Sohirin (2008) suggests the definition of da'wah is, first, obeying Allah and put into practice His norms in the daily life without hesitation as stated in the Holy al-Quran (6: 162-163); second, the acceptance to the religion which Allah had provided for the whole universe, in which He sent down His teachings through the revelation

as preserved in the form of the al-Quran and elucidated through the Sunnah or tradition of the Prophet Muhammad. This can be referred to the Holy al-Quran (Al 'Imran, 3: 85); third, the general rules and comprehensive constitution pertaining to matters of life and the methods of human behaviors which been prescribed by Allah to His Prophet in which He ordered him and his followers to convey it to the whole of mankind. This mainly relies on the Holy al-Quran (al-Nisa', 4: 65). It can be summarized that da'wah means the call into unity of Allah confirming testimonial witnesses, implementing the methods of Allah on earth through the saying and deeds and to make behaviors of mankind be based on divine norms. It also means calling others into Islam, calling Muslims to put their religion into practice and establishing the Shari'ah on earth through the concept of enjoining goodness and eradicating evil deeds to attain the real happiness in this world and the hereafter (Sohirin, 2008).

Foundation of da'wah consists of four pillars which are Islamic missionary (da'ie), those call to Islam (mad'u), da'wah content (mawdu' al-da'wah) and da'wah methodology (uslub al-da'wah) (Zaydan, 1993; al-Bayanuni, 1995).

According to Zaydan (1993), in the context of da'wah, a preacher is someone who is crucial in bringing the teachings of Islam to the community. Mustafa (2007), Abdullah Nasih 'Ulwan (1988), and Burhanuddin et al. (2018) state that a preacher is a good person who serves as an ethical and moral role model for the community. They must also be of higher quality and able to translate and interpret issues pertaining to Islamic preaching so that the community can follow their example. A preacher who is credible can win over the target audience's trust, particularly among non-Muslims. This element pertains to the preacher's proficiency in all facets of da'wah and the demographics of the intended audience (Abd Hadi et al. 2017). Preachers must also possess a variety of knowledge, including knowledge based on Islamic principles, such as aqidah or tawhid, fiqh and usul al-fiqh, tafsir al-Quran, hadith, and akhlaq; knowledge based on language and literature; knowledge based on history; knowledge based on science and technology; knowledge based on human or social sciences, such as economics, psychology, and communication; and knowledge based on contemporary issues, such as the situation of Muslim minorities in non-Islamic nations (al-Qaradawi, 1986). The development of a preacher's personality is crucial, according to Nurul Izzah and Razaleigh (2020), and it is based on both internal and exterior qualities that a preacher ought to have, such as superior morality, knowledge, patience, neat appearance, and so forth. In keeping with the goals of Islamic preaching, a preacher's personality acts as an attempt to alter societal values.

According to Abdullah (2023) mad'u or those called to Islam are all human beings in general without any exception. This statement is based on the Holy al-Quran (al-A'raf, 7: 58; Saba', 34: 28). The types of those called to Islam are divided into five categories based on gender (male, female, hermaphrodite), age level (child, teenagers, elderly person), religious beliefs (muslim, non- believers, hypocrites), religious practice (those who wrongshimself, those who are moderate, those who are foremost in good deeds; based on the Holy Quran – Fatir, 35:32) and social status (leader, layman) (Zaydan, 1993; al-Bayanuni, 1995; Bani Amir, 1999; al-'Amusy, 2005; al-Rahili, 2007).

The da'wah content or the real object of the invitation to Islam is to proclaim it as the religion of God which was brought by Prophet Muhammad, and the Quran is the book of God which is for all mankind and forever (Abdullah, 2023; Zaydan, 1993).

There are three fundamental concepts of methodology applying in da'wah that are based on the Holy Quran (al-Nahl, 16: 125), namely, first, the invitation with wisdom (al-hikmah); second, goodly counsel (al-maw'izah al-hasanah); third, argument in a gracious manner (mujadalah bi allati hiya ahsan). According to al-Bayanuni (1995) these fundamentals are known as *ummahat al-asalib* which is an essence of approach in preaching. In addition to these are based on Allah's word in the Holy al-Quran, they are practical in nature according to Muslim preacher, da'wah messages as well as target group. For instance, a wise (hikmah) preacher must select and deliver their teachings according to the importance of the da'wah topic, tailoring their sermons to the audience's background and intellectual aptitude since preaching style and method adhere to this philosophy. *Al-maw'izah al-hasanah*, on the other hand, considers the addressee's psychology when preaching. According to Zulkefli, S. Salahudin, and Rosmawati (2020), this method focusses on the *mad'u*'s internal components, including their emotions and intellect, as well as how to persuade them to change their behaviour based on a positive outlook and stable emotions.

4. The Role of Mosques in Conveying the Message of Dawah to Non-Muslims

The mosque serves as a hub for Islamic community, education, and worship. According to Mohd Ridhuwan et al. (2019), the mosque institution is also the primary pillar in promoting a society with high moral standards, morally upright actions, peaceful neighbourhood connections, and the application of Islamic beliefs. The educational establishment nearest to the community is the mosque, claim Adel et al. (2008). This makes the mosque organisation an excellent venue for giving community members—Muslims in particular—direct advice through study sessions that are held every day and every week. The idea of the guidance program must be broadened, though, not just for Muslims who regularly visit the mosque. Members of the mosque committee must also come up with ways to use the mosque as a venue for introducing Islam to non-Muslims, whether they are nearby or tourists who come to the mosque for tourism-related reasons. Therefore, in the context of non-Muslim tourists, according to Kamarudin (2025) it is obligatory upon every Muslim to spread the word of Islam to as many people as possible. There is an avenue that provides tremendous opportunity to do da'wah to an 'attentive' audience. It is called as 'attentive' simply because the audience is actually the one who comes to the da'i or preacher and expects the da'i to educate him/her about Islam, or at least, about artifacts that relate very closely to Islam. The avenue is mosque tours. Tourists flock to a beautiful or an historical mosque to admire the building, take photographs, and learn more about it. This golden opportunity should be taken to convey Allah's message. A well-planned tour of a mosque will give ample time and occasion for the tour guide to give a general overview of the religion, and for the tourist to ask questions. Therefore, the tourists will leave the mosque with better understanding of Islam.

Dawah to non-Muslims also serves as a guide for mosque committee members on how to conduct authentic dawah to the target audience in order for the mosque to fulfil the notion of rahmah li al-'alamin, which is defined by kindness and mercy. Mosque study sessions also influence how Muslims think about sharing their faith with non-Muslims, whether it is through personal da'wah or by taking part in outreach initiatives like da'wah bi al-hal. For example, a mosque can interact with nearby non-Muslim populations, like the indigenous people, by implementing social and welfare initiatives. The mosque's studies here focus on the topic of da'wah methodology with regard to non-Muslims. The members of the mosque committee should start a wise partnership with the da'wah bodies of government agencies, non-

governmental organisations, and scholars who are actively preaching to non-Muslims in the field. Mosques should also be "friendly" to the non-Muslims in the neighbourhood by hosting feasts during Islamic holidays like Eid celebrations and "customers" days. These events should not only highlight the mosque's activities during its operating hours but also set up booths or information stalls about Islam, specifically for non-Muslims, provide pamphlets or reading materials about Islam that are appropriate for the non-Muslims' level of understanding, and give them a chance to see what is inside the mosque.

Nonetheless, the execution of such initiatives must be done with caution and in accordance with the regulations established by the religious authority. The prohibition on non-Muslims attending mosques must also be considered from an Islamic point of view. In this context, the Sharia viewpoint on non-Muslims attending mosques is being discussed by Malaysia's religious authorities as following:

1. Mufti of Federal Territory's Office through Irsyad Al-Fatwa 271 with title "The Ruling for Non-Muslim Entering the Mosque" (https://muftiwp.gov.my/en/artikel/irsyad-fatwa/irsyad-fatwa-umum-cat/2793-irsyad-al-fatwa-271-hukum-non-muslim-masuk-ke-dalam-masjid) berpendapat on this matter, we divide it into two issues:

*1.**Non-muslim entering the grand mosque al-Haram***

The majority of Islamic scholars forbid non-muslims from entering the grand mosque al-Haram. They cited Allah's words in the Quran (al-Tawbah: 28).

*2.**Non-muslim entering other mosques***

There are two opinion:

i.First opinion is permissible.

This is the opinion of the majority of Islamic scholars and jurists, some of them includes Mazhab Hanafi, Mazhab Maliki, Mazhab Syafi'e, Mazhab Hanbali etc . Non-Muslims are permitted to enter mosques, whether it's for visiting or for tourism. The visit must be for good intentions such as to learn more about Islam and the visit must be approved by Muslims (the mosque's management).

ii.Second opinion is forbidden

This is opinion of Imam al-Nawawi, Umar Abdul Aziz, Qatadah and Imam Malik. Imam Mawardi quoted an opinion from Imam al-Muzani that states that non-Muslims are forbidden to enter a mosque because they are always in an impure state ritually. Imam al-Buhuti from Madhab Hanbali said, it is forbidden for non-Muslims to enter mosques even with the permission of Muslims which is this based on Allah's word in the holy al-Quran (al-Tawbah: 18).

From these discussion, the Mufti of Federal Territory, Malaysia rightly concluded that non-Muslims are permitted to enter mosques except for the grand mosque al-Haram. This is based on the opinion of the majority of past and contemporary Islamic scholars which is in line with citations from al-Qur'an and al-Sunnah. This view celebrates our multicultural society as well

as the relationships between religions in our country. The Mufti also cited the decision made by Majlis Fatwa Kebangsaan Bagi Hal Ehwal Ugama Islam Malaysia Kali Ke-90 committee on 1st March 2010 when they conferred under the title "The Ruling for Non-muslim Tourists Entering Mosques and Main Praying Area Inside the Mosque". The conference decided that non-muslims are permitted to enter mosques and main praying area of the mosque, but they must have permission from the mosque's management and they must take care of their conduct and behave in a way that will not tarnish the sanctity of the mosque. However, any form of praying or worshipping by non-muslims inside a mosque is forbidden. This is the view that's been implemented by muslim societies around the world including Malaysia. Malaysia's mosques are famous tourist's attraction for their beauty and architectural design. Nonetheless, manners inside mosques must be observed and the mosque's management team must be vigilant, making sure there's no misdemeanours and undesirable behaviour in mosques or in mosques' grounds.

2. The Perak state fatwa gazetted on September 29, 2014, regarding the ruling on non-Muslim tourists entering mosques and the main prayer areas within mosques, states that non-Muslim tourists are permitted to enter mosques and prayer areas with the condition of obtaining permission from the mosque management. Their actions and demeanour, which are usually restrained and polite, do not compromise the mosque's sacredness. It is forbidden for non-Muslim tourists to pray or meditate in the mosque in a way that could stir up controversy, though, in accordance with their religious customs.
(https://mufti.perak.gov.my/images/perkhidmatan/koleksi_umum/warta_kerajaan/pelancong.pdf)

3. As a guide for all Muslims and non-Muslims, Selangor State offers the GUIDELINES FOR THE USE OF MOSQUES AND SURAUS IN SELANGOR, which have been approved by the Selangor Islamic Religious Council. These guidelines cover the purposes of mosques and suraus, as well as the regulations, restrictions, and proper conduct when entering mosques.
(https://e-masjid.jais.gov.my/dashboard/listpekeliling)

PHis Royal Highness the Sultan of Selangor issued a directive on August 28, 2010, prohibiting non-Muslims from holding events or entering the main prayer halls of any mosque or surau in the State of Selangor. If someone is found to have insulted legitimate authority, disregarded, violated, or questioned the decree of the DYMM Sultan of Selangor, they may be prosecuted under section 12 of the Selangor Syariah Criminal Enactment 1995. If found guilty, they may face a maximum fine of three thousand ringgit, a maximum sentence of two years in prison, or both.

The 90th National Fatwa Council for Islamic Affairs' ruling on the law governing non-Muslim tourists' access to mosques and the main prayer areas within them states that non-Muslim tourists are allowed entry as long as they have permission from the mosque administration and behave in a way that does not desecrate the mosque and is always polite and under control.

Muslims perform prayers and participate in religious activities in mosques and prayer rooms. To prevent any miscommunications, non-Muslims must adhere to the following guidelines when entering mosques and surau:

1. Location Limit / Mosque and Surau Space Limit Lokasi

i) Non-Muslims are not allowed to enter the main prayer area. The meaning of the main prayer area is the prayer hall that, by common understanding, is the area for congregational prayers five times a day, which includes the imam's mihrab.

2. Adab When Entering a Mosque and Prayer Room

i) Verify that you are clean and devoid of any impurities.
ii) Must dress modestly and cover the body; apparel linked with other religions is not permitted.
iii) They must act civilly and refrain from speaking loudly.
iv) Avoid performing rituals or practices that are incompatible with Islam, such as meditation.

3. Fatwa of the Kelantan State Mufti Department In 2011

https://mufti.kelantan.gov.my/index.php/component/content/article/hukum-bukan-islam-memasuki-masjid?catid=9&Itemid=101

Since mosques in this state, including Masjid Muhammadi Kota Bharu, Masjid Jubli Perak Rantau Panjang, and Masjid Kampong Laut, have grown to be popular tourist destinations both domestically and abroad, guidelines governing the laws governing non-Muslims entering mosques must be established. They include non-Muslims. They travel to the mosque to witness the inside and exterior architecture's grandeur and carvings.

Other than the Al-Haram Mosque in Makkah Al-Mukarramah and the Haram region, non-Muslims are permitted entry into mosques as long as they have a specific reason and receive permission from the Islamic authorities.

The following requirements must be met for non-Muslims to enter the mosque:

1. With authorisation from the mosque's leadership.
2. They enter the mosque for a very good purpose.
3. Since the mosque is a hallowed place of prayer, they have to honour its sacredness.
4. When entering the mosque area, both men and women are prohibited from exposing their private areas.

Dr. Wahbah al-Zuhaili, on the other hand, writes in his book al-Fiqh al-Islami wa Adillatuhu (1/482) that the Maliki scholars believed that "non-Muslims should be prohibited from entering mosques even with permission from Muslims, except in cases of work-related emergencies." They are more professional in their work and the cost of labour is higher than for Muslims. The scholars of Syafi'i also allow non-Muslims to enter mosques, with the exception of the holy city of Mecca and Masjid al-Haram. According to the most genuine view, non-Muslims are allowed to remain in the mosque as long as they have the consent of Muslims, even if they are in a highly impure state.

Methodology Of the Study

This research uses a case study design and is qualitative in nature. The goal of the case study is to investigate in detail the phenomenon associated with the IPSI's da'wah initiatives through the Awareness Through Mosque Tour (ATMT) Program. Data was gathered by means of semi-structured interviews with the President of IPSI, direct observation of the ATMT outreach program at Masjid Kapitan Keling, Penang, and analysis of relevant materials, including IPSI-published books and brochures and articles about the outreach IPSI conducts through the ATMT program. The interview instrument is constructed based on the established goals, using the data gathered from the literature research and arranged in accordance with particular themes that support the goals of the study. In-person interviews with the IPSI President took place in the IPSI headquarters. Meanwhile, in order to obtain a comprehensive grasp of the ATMT programme by IPSI tour guide, the researcher employed direct observation, in which they did not actively engage but instead watched and methodically documented every individual. The researcher used field notes and video to document the research activities, utilising an unstructured observation approach to gather data. The process of data analysis is conducted in accordance with the chosen methodology. In order to analyse the data for the unstructured observation approach, it is presented narratively by summarising the information discovered in the field notes of direct observations and video recordings, as well as quoting discussions with the IPSI tour guide. Concurrently, the thematic analysis approach was used to examine the interview data as well as document data in order to determine the primary themes pertaining to ATMT program organized by IPSI. Thematic analysis enables researchers to find important patterns in the data and conduct in-depth examination of them in order to comprehend the role of the Islamic Propagation Society International (IPSI) in guiding effective mosque tours, focusing on the implementation of Islamic *da'wah* through interpersonal communication with non-Muslim tourists.

Finding of Study

This study emphasizes the role of the Islamic Propagation Society International (IPSI) in guiding effective mosque tours, focusing on the implementation of Islamic *da'wah* through interpersonal communication with non-Muslim tourists. According to Kamarudin (2025; nd), there are essentially four stages of mosque tour namely (1) before the tour, (2) start of the tour, (3) during the tour, and (4) after the tour.

1. Before The Tour

The tour guide have to have a personal checklist that should be done and kept in check at the beginning. Not only that, there are several basic steps before the tour. The first and foremost is of course sincerity (ikhlas) which is doing something for the sake of Allah alone, and not expecting any reward from anybody else. Next are good manners, humbleness, and patience. It is necessary to follow dress code provided by IPSI. Therefore, IPSI has a vest that every tour guide are required to put on in order to give a sense of confidence for the guests to see that they carry some sort of mosque authority. Because they will be doing a lot of walking and explaining, their clothing must be also be comfortable. Women preacher, in particular, must pay meticulous attention to their outfit, given the fact that they will be the center of their guests' attention for an extended period of time. As all endeavors, the tour guide have to supplicate to Allah so that He will put in "baraqah" into their task. One popular do'a or prayer is that of

Prophet Musa which should be practiced as well as recited by them before the tour especially at the beginning of speaking sessions. The do'a which is based on the Holy al-Quran (Taha, 20: 25-28) by means "My Rabb! Expand for me my breast, and make my affair easy for me, and release the knot from my tongue, that they may understand my speech". Then, before beginning the task, the tour guide have to take a deep breath, start to smile as a mean to greet the guests and try make each and every one in the group feel special. The important thing is recitation of the beautiful divine phrase which is Bismillah al-Rahman al-Rahim (In the Name of Allah (SWT) the most Benificent, the most Merciful, the Compassionate).

2.Start The Tour

In order to start the tour, the guide tour should understand several steps such as greeting and introductory, break the ice, get to know the guests, set the rules, explain the tour plan, and use simple words, Greeting guests warmly and genuinely is an important for a positive first impression, fostering a sense of welcome, and setting the stage for a memorable experience. Not only that, it shows respect and appreciation, develop trust, and make them feel valued and comfortable. In addition, the greeting is one of the essential functions of interpersonal communication and triggers ongoing conversation. The standard greetings used by IPSI tour guide such as "Hello! Welcome to Malaysia and to this beautiful mosque". But, if the guide tour can translate that to the native language of most the guests, then, all the better, for instance, say "Bon Jour" to a French, "Guten Tag" to a German" and "Ni Hau Ma" to a Chinese. It is a great greeting a long way in getting the attention of the guests.

It is important that the tour guide introduce him or herself to his/her guests. It is should be taken seriously simply because the tour guide will be the center of attention in the next few minutes, the guests would want to know more about the tour guide. By introductory, the tour guide tell his/her name, occupation and how he/she is affiliated with the mosque. An example of the greetings and introductory note would be "Hello! Good morning! Welcome to Malaysia and this magnificent Masjid Kapitan Keling, My name is Ahmad. I am a teacher by profession, and I am a volunteer in this mosque on weekends. Thanks for being here. In the next few minutes, I will be your tour guide. So, let's get started!"

The next step is break the ice by spending one minute getting to know the guests. The tour guide should ask them where they are from and relate to them. For example, if they are from Germany, say, "oh, I heard that's a beautiful country". If the tour guide have been to their country, say so and say good words about it. If the tour guide have not been there, they say, "I hope I will have the chance to go there someday". This way, the guests will feel appreciated. Not only that, the tour guide should ask them if they have ever visited a mosque before. This information will helps the guide tour determine the pace of explanations to them. The guide tour is suggested to try inject a little humor from time to time.

In order to avoid awkward circumstances later on in the tour, the guide tour have to say out all the rules upfront. For example, it is a good time to ask them to take off their shoes (if they have not already done so), and not take photo of worshippers doing their solat (prayer) in the prayer hall, and to ask the women to put on the robes available for them. The guide tour are required to give the reasons to these rules. If the guests break some the rules (except for the shoes rule) during the course of the tour, the guide tour should explain clearly to them and just remind them softly and gently with a big smile. This is important because the guests should be given

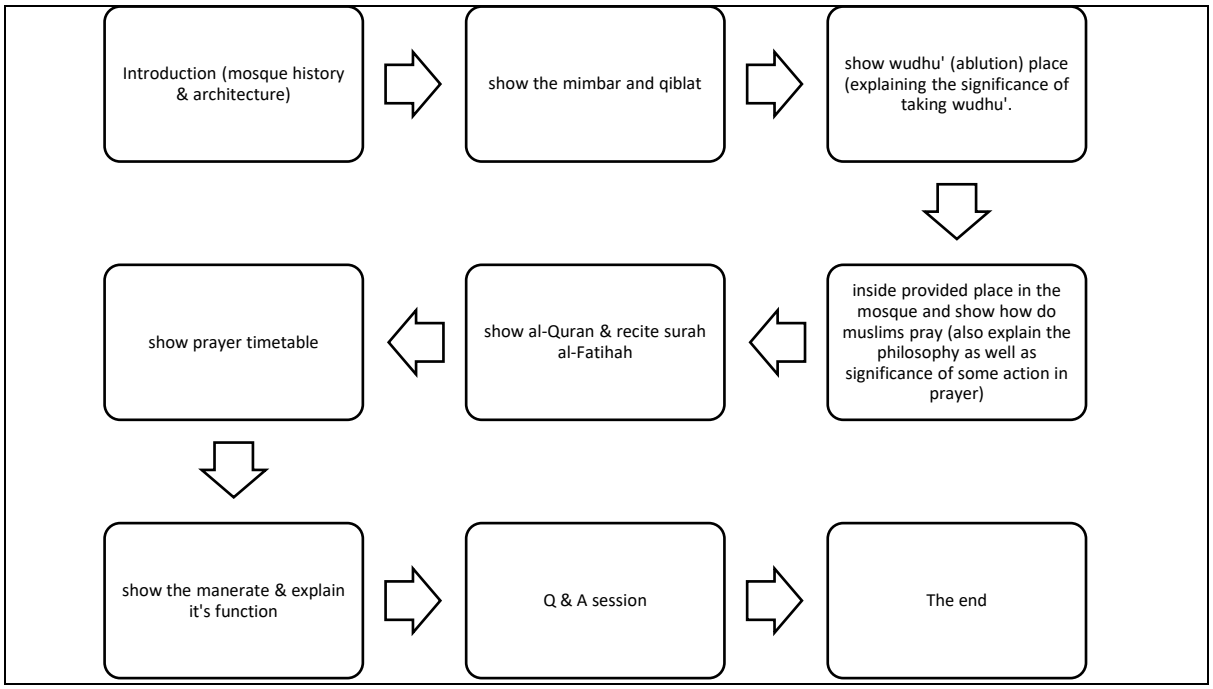
the impression that Islam is all about rules and regulations only as usually portrayed in the media.

The next step is explain the tour plan to the guests by telling them how long the tour will take. This is important because tourists normally want to optimize their time spent there. Not only that, by giving them some timing aspect of the tour will enable them to roughly budget for their next itinerary and they will no doubt appreciate their gesture. The guide tour should take the opportunity to explain also about the brochures and other literature available for them to refer to any time after the tour.

The guide tour should use simple and non-imposing language with the guests. It is important because the guests come from diverse backgrounds. Although it is tempting to use 'common' words such as "solat, taqwa, iman" etc, the guide tour should refrain from using them or use them sparingly, if have to. They should use the English translation instead, because once using words that the guests do not understand, it will make them bored. Even it will make them feel that they are not worthy of the tour because they do not know much about Islam to start with.

3. During The Tour

There are some items that should be introduced by the guide tour during the tour, such as the history and architecture of Masjid Kapitan Keling, divinity of Allah, Prophet Muhammad, the essence of Islam, the Holy al-Quran, the syahadah, the azan, the ablution, and the solat. The guide tour should get the information of these items from the authoritative source. In particular, from researchers' direct observation during the tour in Masjid Kapitan Kling, briefly we concluded the tour in action are based on several steps which shown as in following illustration:



4.After The Tour

Usually, in order to conclude the tour the guide tour should pay attention to several items, such as opening question and answer session, signing the guest book, providing light refreshment and giving gifts for the guests.

Therefore will probably be plenty of questions from the guests throughout the tour. It is customary to have a dedicated Q&A session at the end of the tour. If the guide tour need more time to answer some of the questions, request that the guest stay back, and let go of the rest who do not seem to be interested to know more.

A guest book is an invaluable record to have. It is a platform whereby guests express briefly how they feel about the tour. Some may want to give suggestions on how to improve the program. Therefore, the guide tour should take each response positively. The guide tour have to make sure the guests leave their contact information such as an email address and phone number. Through this approach, the guide tour may write an email to each of the address given to thank the guests and perhaps ask if they want to follow the mosque's FB page.

The guide tour may provide some drinks and light food for the guests at the end of the tour. In addition, before the visitors leave, the guide tour may give them books, booklets or brochures on Islam based on their seeming needs. Among booklets provided are "Jesus in Islam" and "Muhammad in the Bible" that should ideally be given to Christian visitors, for instance. Some very interested visitors should be given a copy of the Holy Quran.

According to Kamarudin (2025; nd), there are some do's and dont's in order to develop an effective mosque tour.

1. Do develop skills of a good tour guide.

The tour guide should develop linguistic skills especially in English, a friendly disposition, a broad-minded attitude and a sound religious knowledge in order to be a good tour guide. This is important because guests must feel welcomed and should be treated in a very friendly manner.

2.Do Answer Questions Well.

Usually people ask questions to get information on something they do not know, or to seek clarification on what they already know. Sometimes they have nasty motives like, to make a point in their favor, or to simply test tour guide knowledge. Therefore, the tour guide should accept all these motives and answer each one as cheerily as they can. However, tour guide should not to dwell too long on each question in order to avoid boredom. So that, tour guide is suggested to use simple language, good style, and clarity of expression when answering questions as well as inject humor from time to time. Not only that, the length and depth of each answer should be adjusted based on the time available, the background of the questioner and the interest he/she shows.

3.Do Learn Some Basic Words Of Guests' Language

The tour guide should learn some basic words of guests' language depending on their nationalities at least just simple basic greetings. However, the more he/she know, the better he/she stands in the eyes of the guests.

4.Do Learn As Much As Tour Guide Can About Guests' Faith

Apart from Islam, the other major faiths in the world are Christianity, Buddhism, Hinduism and Taoism as well as atheism. Therefore, the tour guide should study these religion. Like for instance, if the visitors are predominantly Christians, the tour guide may talk more about Jesus Christ and how similar Islam and Christianity are.

5.Don't talk about politics.

Some guests have the tendency to ask about how tour guide feel about the situation in some Muslim affairs such as in Palestine, Syria etc. At some time, they will associate Muslims with terrorism. Therefore, it is suggested that tour guide have to politely steer away from these subjects unless tour guide are very knowledgeable about them. Let say respectfully to the guests like "while the topic is interesting and should be discussed more, unfortunately, given the small amount of time available during this tour, it is better to focus on Islam rather than on Muslims" or "Yes, I totally agree with you. A lot of Muslims seem to be doing things they should not. I wish there is more time we can discuss this further. But this tour is only 30 minutes, so let's keep that topic on KIV (keep in view) for the moment. May be we can get back to it when time allows later on". However, tour guide should take action carefully because he/she will hurt their feelings.

6.Don't lie

The tour guide should not invent an answer if he/she are unable to answer a question. An Invention of such answer is pure lie. Otherwise, just say that "you don't know". So that, tour guide find the answer, if it is easy, do it later, and get back to questioner later.

7.Don't Criticize Your Guests' Beliefs, Habits Or Practices.

The tour guide should avoid criticizing guests' beliefs, habits and practices. Moreover, he/she should not say "I am right, you are wrong". Conversely, respect their standpoint no matter how much tour guide disagree with them. Not only that, the tour guide should avoid anything that could give the impression that he/she is trying to impose his/her ideas on them. The tour guide also does not react unpleasantly or rudely to anything that comes from the guests, He/she is suggested to remain cool at all times.

Conclusion

Based on the findings of this study, it can be concluded that the Islamic Propagation Society International (IPSI) plays a significant role in enhancing the effectiveness of mosque tours through its strategic use of Islamic da'wah interpersonal communication. The society's efforts in providing informative, respectful, and engaging interactions foster a welcoming environment that positively influences non-Muslim tourists' understanding of Islam. The findings highlight that personalized interactions, cultural sensitivity, and clear dissemination

of Islamic teachings are crucial in fostering understanding and positive perceptions among non-Muslim visitors. Consequently, IPSI's approach not only facilitates better religious and cultural awareness but also promotes mutual respect and intercultural dialogue. To maximize these impacts, ongoing training for guides and the development of tailored communication strategies are recommended, ensuring that mosque tours remain impactful in conveying authentic Islamic values to diverse audiences.

In term of implications for theory, the study suggests that integrating interpersonal communication frameworks within Islamic da'wah practices can improve engagement strategies, making religious outreach more impactful and relatable. Conceptually, the study advocates for structured training programs for guides to develop interpersonal skills and cultural awareness, thereby optimizing the preaching of Islam to non-Muslims in diverse contexts. For further research, it is recommended to explore longitudinal impacts of mosque tours on non-Muslim perceptions, the role of digital media in complementing face-to-face da'wah, and comparative studies across different cultural settings to generalize the effectiveness of such outreach methods. Overall, the study underscores the importance of interpersonal communication as a vital tool in Islamic da'wah efforts aimed at fostering mutual understanding and respect.

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ZEN AESTHETICS AND GUEST EXPERIENCE: EXPLORING THE ENVIRONMENTAL AND EXPERIENTIAL IMPACTS OF ZEN-INSPIRED DESIGN IN MODERN LEISURE RESORTS

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Abstract: *This study explores the influence of Zen aesthetics on the environmental design and guest experiences within modern leisure resorts. Rooted in the principles of simplicity, harmony, and mindfulness, Zen design offers a unique framework for enhancing guest satisfaction, emotional well-being, and connection with nature. However, the increasing commercialization of Zen aesthetics poses challenges in maintaining authenticity and philosophical integrity. Through an exploratory qualitative approach, this research investigates how Zen-inspired elements—such as natural materials, minimalist spatial design, and integrated nature components—are applied in resort environments and how they affect guest perceptions and experiences. A purposive sample of 20 participants, including resort managers and guests, was selected to provide insights through semi-structured interviews. Thematic analysis revealed five major research themes: the identification of key Zen design components, their role in attracting guests, their contribution to guest tranquility, their ability to foster human-nature connection, and the impact of Zen-inspired activities on guest engagement and well-being. Results indicate that Zen design successfully promotes calmness and introspection through elements such as open spaces, earthy tones, and meditative zones. Zen-related cultural practices—like tea ceremonies, calligraphy, and yoga—were found to enrich guest experiences and encourage cultural appreciation. Despite the positive impacts, the study highlights the need for balance between modern luxury amenities and traditional Zen values. Furthermore, it emphasizes the importance of integrating sustainable practices aligned with Zen philosophy. This study contributes to both academic literature and industry application by offering a conceptual framework that links Zen aesthetics to environmental psychology, design theory, and hospitality experience. Recommendations include designing with ecological awareness, preserving cultural authenticity, and curating immersive experiences rooted in Zen philosophy. Ultimately, Zen-inspired design emerges as a transformative approach for redefining the standards of sustainable and mindful tourism in the contemporary hospitality industry.*

Keywords: *Zen Aesthetics, Guest Experience, Tranquility, Nature Connection, Resort Design*

1. Introduction

The aesthetic of the surroundings in contemporary places that are influenced by Zen society has a number of significant issues that require to be solved. One of these problems is the threat of not being real and stealing from other cultures. Some people worry that Zen culture will be used in resort projects without an in-depth knowledge of or regard for its initial significance and historical context. This would imply that Zen values would be shown in a shallow way.

This encourages evaluating the aspects of Zen culture if it is becoming too commercialised and watered down, which could hurt the real experience it gives.

Modern vacation locations try to offer high-end rooms and cutting-edge amenities that might interfere with the straightforwardness and modesty of the Zen style (Xu et al., 2022). A big issue that requires to be solved is how to combine modern benefits with the Zen-inspired style and atmosphere in a way that works well.

Another problem is creating environments for peace and quiet. Zen society stresses the value of quiet reflection and tranquillity, but modern places frequently feature massive initiatives with a lot of tourists. In the middle of a busy hotel, it takes careful planning to make places where guests can go to relax and be alone. It is important to give people quiet, private places where they can feel the peace that comes with Zen ideals.

Also, one of the most important things to consider is associated with employing environmentally conscious design concepts and other eco-friendly methods. As stated by Huang & Liu, (2018), Zen culture puts a lot of emphasis on being in balance with nature, but some contemporary settings might not fully use environmentally friendly techniques. For a lodge to be built and run in an ethical manner, it needs to combine a Zen-inspired style with practices that are good for the natural world, like using reusable materials, installing energy-efficient structures, and encouraging ecological protection. It is important to deal with such issues if Zen society is to be successfully incorporated into the planning of modern vacation places. By recognizing genuineness, finding equilibrium between contemporary society and Zen appearance, developing tranquillity and privacy, and accepting viable practices, resort builders and architects may develop circumstances that honour the core principles of Zen tradition while giving guests an unforgettable and relaxing experience. The specific objectives of study are as follows:

- To examine the key design components derived from Zen aesthetics that are incorporated into the environmental design of modern leisure resorts.
- To identify effective components and factors derived from Zen culture that improve the environmental design of modern leisure resorts, aiming to enhance guest experience and satisfaction.
- To assess the impact of Zen-inspired environment design on the perceived tranquility and relaxation experienced by guests in modern leisure resorts.
- To analyze the relationship between Zen-inspired environment design and guests' connection with nature in modern leisure resorts.
- To investigate the influence of Zen-inspired activities and experiences on guests' engagement in mindful practices and their overall well-being in modern leisure resorts.

2. Literature Review

The scholars, out of their own artistic requirements for their living environment, would seek out artisans who understood their design intentions and aesthetic interests to create garden rooms and custom-made furnishings. The creations made by the literati had a refined lifestyle and a gentle temperament. The Changwu Zhi records and evaluates the artefacts of the Zen culture Dynasty from the perspective of literati aesthetics. Through years of compiling and researching objects and documents, in Long Objects: Material Culture and Social Conditions in Early Modern China, Kollege (2019) examines the exact date when the Long Objects was

written, sorting out the relationship between the Kao Pan Yishu, the Zunsheng Bajian, and the Long Objects, written from a sociological perspective, the author takes a unique view of the period's The book is written from a sociological point of view, with a unique perspective that compares the people, events, and objects of the period with the Europe of the time. The vivid and detailed descriptions in Coghlan's reference to the Long Story and its contemporaries allow the reader to imagine and depict exactly what it looked like even without the physical objects. This book is an interpretation of The Long Object, during which the depiction and imagination of Zen culture artefacts is quite informative.

According to Zeng (2021), Zen culture is frequently described as an approach that does not rely on language or characters. Nonetheless, the custom has resulted in a large number of texts. The work expands the topic of the Zen paradox by stressing the plethora of material goods present in diverse Zen traditions. Zen emphasizes awareness and freedom from material possessions, enabling individuals to view the outside world with a peaceful and dispassionate perspective. Zen's vastness is founded on the pursuit of philosophic disposition in feeling empty, representing the life pursued in the path of living awareness of everything on earth having nothingness; and concealing large thinking space that appears indifferent but contains rich intellectual content. This will come as expected for anyone who has considered the importance of representing material culture within Zen; within the religion of Buddhism, items are frequently considered as physical manifestations of all three jewels dharma, buddha, and sangha.

The materialistic aspects of Zen stated in the aforementioned group of articles can be thought of as a vehicle as well as a physical representation of the Buddha, the teachings of the Buddha (rags, temple construction, calligraphy, the beverage bowls along with utensils), and the members of the sangha (calligraphy, tea bowls, sculpture, and utensils, in addition to masters' robes along with staffs). Consequently, Zen materialistic products reflect the three precious stones, rendering abstract ideas and principles tangible through the objects that people meet every day. The present-day research on Zen culture artefacts has also achieved certain results, mainly divided into systematic artefact studies and specific artefact studies. The macroscopic studies grasp the development and meaning of Chinese artefacts as a whole, while the specific studies analyse the history, folklore, and aesthetics of a particular type of artefact.

Zen culture, stemming from the teachings of Zen Buddhism, is a multifaceted concept that encompasses philosophical, artistic, and lifestyle elements. At its core, Zen culture emphasizes simplicity, mindfulness, and a deep connection with the present moment. While often associated with Japan, Zen culture originated in China and has roots in ancient Chinese philosophy and aesthetics. One of the key aspects of Zen culture is its emphasis on non-verbal communication and the transcendence of language. Despite this, Zen has generated a rich body of texts and artistic expressions. This paradoxical nature is central to Zen philosophy, highlighting the tension between the material world and the pursuit of spiritual enlightenment. Zen encourages individuals to cultivate awareness and detachment from material possessions, allowing them to perceive the world with clarity and equanimity.

Zen culture is deeply intertwined with the arts, particularly calligraphy, painting, and tea ceremony. These artistic practices serve as vehicles for self-expression and spiritual exploration. Zen calligraphy, characterized by its spontaneity and simplicity, reflects the practitioner's state of mind and inner peace. Similarly, Zen painting often features minimalist landscapes or abstract representations of natural elements, inviting viewers to contemplate the beauty of impermanence and emptiness. The tea ceremony, or chanoyu, is another integral

aspect of Zen culture, embodying principles of mindfulness, hospitality, and harmony with nature. Through the meticulous preparation and serving of tea, participants engage in a ritualized form of meditation, fostering a sense of presence and connection with the surrounding environment. Each element of the tea ceremony, from the choice of utensils to the arrangement of the tea room, is imbued with symbolic meaning and aesthetic significance.

In addition to the arts, Zen culture encompasses various material artifacts and practices that embody its philosophical principles. For example, Zen temples are architectural marvels designed to create serene and contemplative spaces conducive to meditation and introspection. The layout of Zen gardens, with their carefully arranged rocks, gravel, and vegetation, reflects the harmony and balance inherent in Zen philosophy. Moreover, Zen culture places a strong emphasis on the value of simplicity and austerity in everyday life. This is evident in the design of Zen-inspired living spaces, which prioritize clean lines, natural materials, and uncluttered surroundings. By minimizing distractions and embracing simplicity, individuals are encouraged to cultivate inner peace and mindfulness in their daily lives.

However, the materialistic aspects of Zen culture, such as temple artifacts and ritual objects, serve as tangible manifestations of its abstract principles. These artifacts, including calligraphy brushes, tea bowls, and meditation cushions, not only facilitate Zen practices but also embody the sacredness and interconnectedness of all things. Therefore, Zen culture encompasses a rich tapestry of philosophical insights, artistic expressions, and everyday practices aimed at fostering mindfulness, inner peace, and spiritual awakening. By embracing simplicity, mindfulness, and a deep reverence for the present moment, Zen offers a transformative path to self-discovery and enlightenment in an increasingly complex and chaotic world.

The concept of Zen culture originates from the profound spiritual traditions of East Asia, particularly Japan, where Zen Buddhism flourished as a way of life emphasizing simplicity, mindfulness, and harmony with nature. Zen transcends religious practices, evolving into an aesthetic and philosophical guide that has profoundly shaped Japanese architecture, art, and daily living. It promotes detachment from materialism, a focus on the present moment, and a deep appreciation for imperfection and impermanence — notions encapsulated in the Japanese concept of "wabi-sabi" (Miller, 2022). This cultural backdrop offers a rich foundation for understanding how Zen informs the design and experience of modern leisure spaces.

Zen aesthetics are grounded in the belief that beauty lies in austerity and subtlety, a perspective that opposes the extravagance and ornamentation typical of Western luxury ideals. Within a Zen framework, natural materials, muted colors, and asymmetrical compositions are favored to evoke tranquility and introspection. Such principles are critical when designing spaces intended for leisure and retreat, where the environment must nurture a sense of mental clarity and emotional well-being (Cheng, 2023). This fundamental divergence from Western aesthetics positions en as a powerful counterbalance in the modern world’s increasingly sensory-saturated culture.

2.1 Conceptual Framework

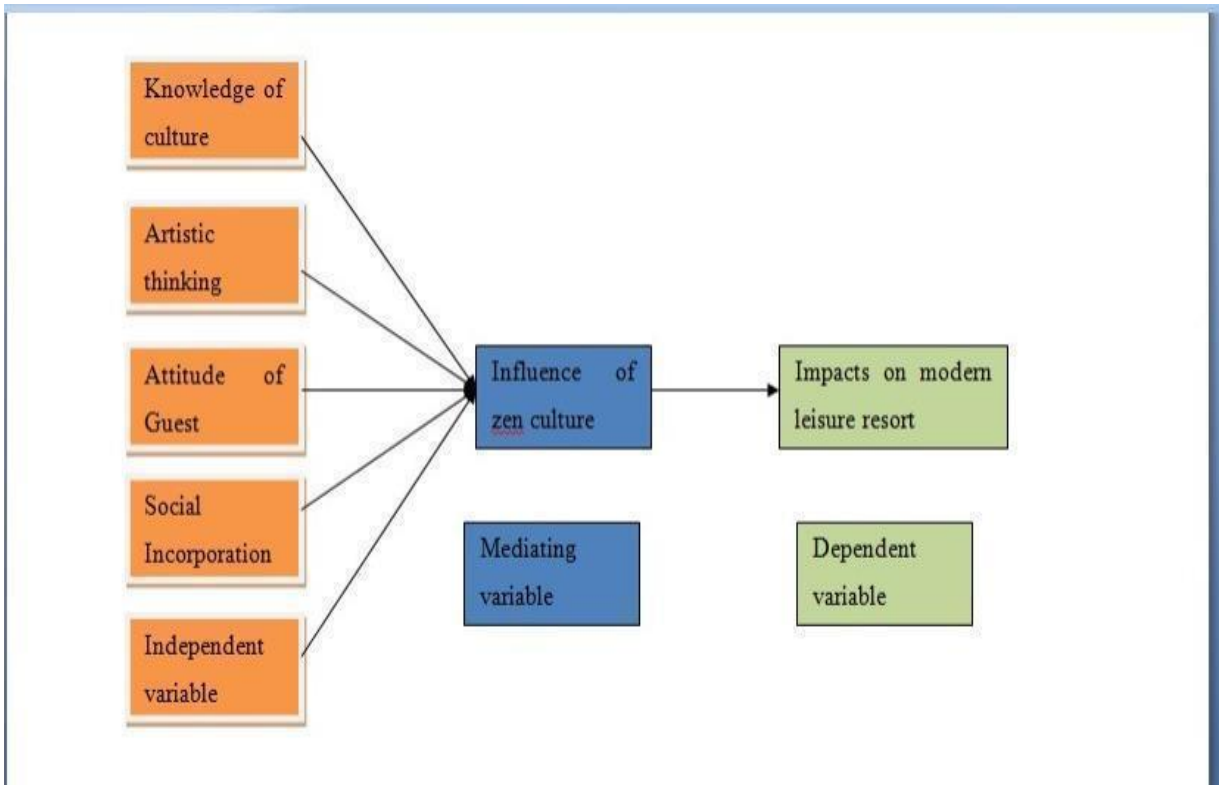
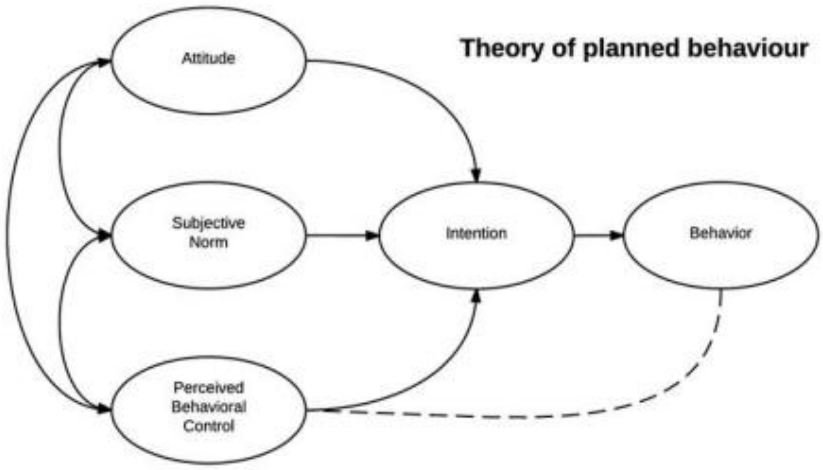


Figure 1: Conceptual Framework

(Created by the researcher)

2.2 Theoretical framework

Figure 2: Theory Of Planned Behaviour



(Source: Hagger, et al. 2022)

According to the theory of planned behaviour it has been identified three determined factors such as perceived behaviour control, attitude and subjective norms (Hagger, et al. 2022). Personal attitude depends on a particular behaviour. As per the personal attitude, all sums of

knowledge prejudice and attitude either go positive or negative. For example, the individual attitude such as smoking makes them feel good or keeps them in a relaxing mode. On the other hand, smoking tobacco may cost a lot of money and smell bad. The theory of planned behaviour explains all the behaviours over ability. It can successfully predict the wide range of drinking, smoking, substance and others. It distinguishes between three types of belief such as control, behavioural and normative. Behavioural intention refers to a motivational factor. Subjective normal refers to the belief that people approve of the behaviour. Therefore, Zen culture is seen in various modern leisure resorts.

3. Research Methodology

The exploratory research design has been used in the study. Exploratory research design is suitable because it can change easily and discover new things while being just right for understanding how Zen culture affects modern relaxation resorts nowadays (Wang, 2021). The focus on making guesses, being able to change how the researcher gets data and gaining a better understanding of tough things matches the goals of learning. Other types of designs, for example, those that explain and compare causes, might not have the same level of searching or idea-making needed in this research.

The target population for this study comprises two main groups: managers of leisure resorts that incorporate Zen-inspired elements into their design and amenities, and guests who stay at these resorts.

For this study, a total of 20 participants will be selected using purposive sampling. This includes 10 managers of leisure resorts that incorporate Zen-inspired elements into their design and amenities, as well as 10 guests who have recently stayed at these resorts. The sample size of 10 managers of leisure resorts is deemed appropriate as it allows for gathering insights from a diverse range of professionals with extensive experience in the hospitality industry. This number of participants is sufficient to capture a variety of perspectives and approaches to implementing Zen culture within resort environments, while also ensuring depth and richness in the data collected.

Thematic analysis has been chosen as the data analysis technique for this study due to its suitability for capturing and interpreting rich qualitative data obtained from interviews and observations. Thematic analysis involves identifying, analyzing, and reporting patterns or themes within the data, allowing researchers to explore the underlying meanings and experiences shared by participants (Braun & Clarke, 2019).

4. Results

Research Questions and Themes

Research Question	Themes Identified
RQ1: What are some significant design elements of Zen aesthetics?	1. Simplicity in Spatial Design 2. Integration of Natural Elements 3. Balanced Use of Light and Shadows

	4. Minimalistic Materials and Textures 5. Harmonious Arrangement
RQ2: How do Zen-inspired design components attract guests?	1. Creation of a Tranquil Atmosphere 2. Aesthetic Appeal 3. Guest Responses to Features 4. Support for Wellness and Mindfulness 5. Sustainability and Cultural Appeal
RQ3: What are the impacts on guest tranquility?	1. Spatial Tranquility Design 2. Natural Lighting & Open Spaces 3. Calming Meditative Areas 4. Nature-Integrated Relaxation 5. Holistic Guest Well-being
RQ4: How does Zen design connect guests with nature?	1. Fostering Guest-Nature Connection 2. Zen in Landscaping and Design 3. Indoor-Outdoor Complementarity 4. Personal Nature Experiences 5. Sustainable Nature Integration
RQ5: What are the impacts of Zen-inspired activities on guest engagement?	1. Diverse Zen Activities 2. Enhanced Guest Satisfaction 3. Guest Feedback 4. Emotional/Transformative Impact 5. Cultural Enrichment and Memory-Making

The findings from the study illustrate that Zen-inspired design in modern leisure resorts is multifaceted, combining spatial aesthetics with psychological and environmental harmony. RQ1 and RQ2 focus on the physical and experiential elements, showing how design principles like simplicity, integration with nature, and balance create environments that visually appeal to guests and support wellness. These components not only attract visitors through beauty and calmness but also contribute to the uniqueness and sustainability of the resort experience. Guests reported emotional satisfaction from aesthetically minimal spaces that blend seamlessly with the natural surroundings.

On the other hand, RQ3, RQ4, and RQ5 delve deeper into the experiential and emotional outcomes. Zen design fosters tranquility by using spatial harmony, natural light, and meditative zones to influence mood and stress levels. The connection to nature, both physical and symbolic, emerges as a consistent thread across themes—enhancing mindfulness and evoking deeper emotional responses. Meanwhile, Zen-based activities such as meditation, tea ceremonies, and art workshops deepen engagement by enriching guests culturally and spiritually. Together, these design and activity elements result in transformative guest experiences that foster loyalty, relaxation, and holistic well-being.

5. Discussion and Conclusion

The researchers came to the conclusion that environmental design that is influenced by Zen considerably improves the experiences of guests by promoting tranquility, mindfulness, and a stronger connection with nature. By placing an emphasis on simplicity, harmony, and cultural authenticity, Zen design is able to create settings that are transforming and resonate with modern tourists who are looking for leisure and for a better understanding of themselves. In order to satisfy the growing desire for travel experiences that are both meaningful and environmentally responsible, the findings highlight the significance of including natural materials, minimalist aesthetics, and wellness activities that have been carefully selected. The report also highlighted areas that could be improved, such as increasing cultural inclusivity, improving procedures that are sustainable, and adjusting to the preferences of a varied range of guests. While it was noted that the study had certain limitations in terms of its scope and methods, it does give a solid platform for future research on the global applicability of ideas that are inspired by Zen beliefs. The conclusion of this chapter is that it reinforces the potential of Zen-inspired design to reinvent the standards of modern leisure resorts. It also provides significant insights for industry stakeholders and advances scholarly discourse on the subject.

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Appendix I: QUESTIONNAIRE

The incorporation of Zen aesthetics in resort design promotes a sense of tranquility and relaxation.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

The use of natural materials such as wood, stone, and bamboo enhances the visual appeal and authenticity of the resort environment.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Zen-inspired design elements (e.g., minimalistic furniture, open spaces) create a comfortable and harmonious atmosphere.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Zen-inspired resorts effectively utilize natural elements (e.g., gardens, water features) to foster a connection between guests and nature.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

The spatial arrangement of Zen-inspired design promotes mindfulness and awareness of the surroundings.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

The simplicity of Zen interior design contributes to reducing stress and enhancing mental clarity.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

The presence of Zen-inspired meditation spaces and wellness areas positively impacts overall guest satisfaction.
Strongly Agree
Agree

Neutral
Disagree
Strongly Disagree
Zen gardens and landscapes (e.g., rock gardens, koi ponds) significantly enhance the aesthetic value of leisure resorts.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree
Activities such as yoga, meditation, and Tai Chi offered in Zen-inspired resorts contribute to guests' physical and emotional well-being.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree
Zen culture elements, such as tea ceremonies or calligraphy workshops, increase guests' engagement and cultural appreciation.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree
The integration of Zen aesthetics in resort design has a positive influence on guests' perception of resort quality.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree
The Zen-inspired environment in leisure resorts encourages guests to disconnect from daily stress and focus on self-reflection.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree
The overall layout and design of Zen-inspired resorts provide a balanced blend of luxury and tranquility.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree
The use of neutral and earthy color schemes in Zen-inspired resorts promotes a calm and peaceful environment.

Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

The incorporation of large windows and open spaces enhances the sense of openness and connection with nature.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Zen-inspired resorts effectively balance modern amenities with traditional aesthetics to create an authentic guest experience.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

The emphasis on sustainable and eco-friendly practices in Zen-inspired resorts aligns with guests' expectations of environmental responsibility.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Zen-inspired leisure resorts offer a unique experience compared to other types of resorts due to their focus on cultural and spiritual elements.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

The layout and design of Zen-inspired resorts positively influence guests' desire to revisit.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Overall, Zen-inspired design elements contribute to an enhanced sense of well-being and relaxation during the stay.
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

Interview Questions

RQ1: Significant design elements of Zen aesthetics facilitating environmental design

What specific design elements in modern leisure resorts do you believe embody Zen aesthetics?
How do you think principles such as simplicity, balance, and natural harmony influence resort design?
Can you provide examples of materials, textures, or spatial arrangements in your resort that reflect Zen aesthetics?

RQ2: Contribution of Zen-inspired design components to environmental design and guest attraction

How do Zen-inspired design elements enhance the overall atmosphere of the resort?
What aspects of Zen-inspired design do you think most effectively attract and retain guests?
In your experience, how do guests respond to features like Zen gardens, minimalist interiors, or water elements?

RQ3: Impacts of Zen-inspired environment design on tranquility

What role do Zen-inspired spaces play in creating a sense of tranquility for guests?
How do features like open spaces, natural lighting, or meditative areas impact guest relaxation?
Can you describe feedback or observations from guests about the calming effects of the resort's design?

RQ4: Connection between Zen-inspired design and nature

How does the resort's design foster a connection between guests and nature?
What Zen principles are reflected in the resort's landscaping or integration with the surrounding environment?
How do indoor and outdoor Zen-inspired elements complement each other in promoting a natural connection?

RQ5: Impacts of Zen-inspired activities on guest engagement

What Zen-inspired activities or practices are offered at the resort, and how do guests engage with them?
How do these activities contribute to the overall guest experience and satisfaction?
What feedback have you received from guests regarding activities like meditation, tea ceremonies, or Zen art workshops?

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A TWIN CASE STUDY ON THE EFFECTS OF WORDLESS VS. TEXT-BASED PICTURE BOOKS ON NARRATIVE COMPETENCE IN INDEPENDENT READING

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Abstract: *This study explored the impact of wordless picture books on the narrative abilities of preschool children, using a combination of quantitative and qualitative methods. The results show that after six weeks of intervention with wordless picture books, the experimental group of children showed significant improvements in the macrostructure of their narrative abilities, especially in terms of character emotions and behavior descriptions, as well as the completeness and logic of their narratives, outperforming the control group. The experimental group showed significant advantages in several dimensions, such as C, ATP, OUC, and R, with the most notable improvement in the R dimension, indicating that wordless picture books can effectively promote children's language expression and emotional communication. However, the study also has limitations, including a small sample size limited to twins, and future research should expand the sample range. Furthermore, there were no significant changes in the dimensions of internal reactions and internal plans, suggesting that wordless picture books have limited impact on these aspects.*

Introduction

Narrative competence is a crucial component of early literacy skills. With the growing popularity of picture books in children's education, increasing research has focused on their impact on narrative development. Picture books, especially wordless picture books, convey stories through images, stimulating children's creativity and language skills. As a result, they have become an important tool for promoting language development in young children(Pantaleo, 2023).

Although wordless picture books have shown certain advantages in fostering children's narrative competence, there remains debate about their effectiveness compared to traditional text-based picture books, particularly in independent reading settings in kindergarten. This study aims to compare the effects of wordless and text-based picture books on children's narrative competence in a kindergarten environment, focusing on differences in their impact on narrative macrostructure. By conducting this comparison, the study seeks to provide educators with empirical evidence for selecting appropriate picture books and contribute to existing research on picture book education.

Literature Review

As a core component of early literacy skills, narrative competence plays a crucial role in the fields of psychology, linguistics, and education. It refers to children's ability to narrate personal experiences or events in a coherent and logical sequence(Bowles et al., 2020) . This ability is essential for language development, supporting vocabulary expansion, sentence structure acquisition, and the advanced language skills necessary for reading and writing(Grolig et al., 2020 ; Murphy et al., 2022). Additionally, narrative competence is not only a strong predictor of academic achievement but also plays a key role in children's social development(Ralli et al., 2021 ; Sun et al., 2024)

Picture books are widely recognized as highly suitable for early literacy development, as they contain rich vocabulary and complex grammatical structures, exposing children to a more diverse language environment (Nation et al., 2022).The American Library Association defines children's picture books as works designed to provide a visual experience, using a series of images and text interactions to present complete storylines, themes, and ideas. Picture books support children's development in reading comprehension, language expression, aesthetic appreciation, and imagination. Moreover, picture book reading provides opportunities for children to communicate with peers or adults, thereby enhancing their language expression and promoting overall language development(Matulka, 2017;Paris & Paris, 2001)

As a unique type of picture book, wordless picture books tell stories entirely through images without any text. These books encourage children to articulate their own interpretations of the story, thereby expanding their vocabulary and narrative competence, which in turn supports language development (Goriot et al., 2024). Pantaleo, (2023) found that wordless picture books can enhance oral language skills, vocabulary, comprehension, book-handling abilities, dramatic expression, and visual literacy.

While wordless picture books can support children's language development(Chaparro-Moreno et al., 2017;Martínez-Carratalá, 2022)whether they offer a greater advantage over traditional picture books remains a topic of discussion, especially in the context of independent reading in kindergarten. In independent reading activities, children have a high degree of autonomy and flexibility. They can freely describe and comment on details that interest them, expressing their own perspectives and emotions. Additionally, they can engage in discussions with peers, which helps them better understand and internalize the story, ultimately improving their narrative competence.

Therefore, this study aims to explore the differences between wordless and text-based picture books in enhancing children's narrative competence in a kindergarten setting. By comparing these two types of picture books, the study will analyze how they influence children's narrative skills, with a particular focus on narrative macrostructure.

3. Research Methods

3.1 Participants

The participants in this study are a pair of monozygotic twin sisters. Twins share the same genetic background and typically grow up in similar environments. This high level of genetic and environmental consistency makes them ideal subjects for studying language development and other developmental characteristics (Seung & Holmes, 2005)).

The twins, named Nannan (older sister) and Beibei (younger sister), were both 5 years and 9 months old at the start of the experiment. They were attending the same senior kindergarten class at a public kindergarten and living with their parents. Their parents are both civil servants with a bachelor's degree or higher and place great emphasis on their children's language and cognitive development. Both children are in good health, have no apparent language development disorders, and are active, enjoy interacting with others, and show a strong interest in language expression.

Since Nannan and Beibei look very similar and are difficult to distinguish, this unique condition further maximizes the influence of genetic similarity on the experimental results. Before the experiment, neither child had been systematically exposed to wordless picture books or participated in any extracurricular programs related to picture book reading or narrative skills development. As a result, their prior experience with picture books was relatively limited, allowing for an effective evaluation of the impact of wordless picture books and traditional text-based picture books on their narrative competence.

3.2 Data Collection and Analysis

The data collection and analysis in this study consist of two phases: the baseline assessment phase and the experimental intervention phase.

In the baseline assessment phase, the researcher uses observational methods to record the twins' language organization and narrative performance during independent picture book reading to evaluate their level of narrative competence development.

In the experimental intervention phase, a pretest is conducted to establish baseline data on the children's narrative macrostructure. Then, one child is assigned to the wordless picture book group, while the other is assigned to the traditional text-based picture book group. They each receive a six-week reading intervention. After the intervention, a posttest is conducted to collect narrative competence data.

Data are collected using audio and video recording devices to ensure accurate documentation of the children's language behaviors and narrative performance. All recordings are transcribed and analyzed using the standardized scoring tool ENNI (Edmonton Narrative Norms Instrument), focusing on narrative macrostructure (story grammar)(Schneider et al., 2006). By comparing pretest and posttest data, this study evaluates the impact of different types of picture books on children's narrative competence and analyzes the relative effectiveness of the two reading approaches in supporting language development.

This study is part of a larger research project, and all procedures comply with ethical research guidelines. The participants' parents provided informed consent, and the research team ensures strict confidentiality of all data to protect participants' privacy and safety.

3.3 Reliability

To ensure the reliability of the experimental data, the processes of observation, transcription, and scoring were conducted independently by two researchers, followed by consistency checks.

In the observation phase, both researchers independently recorded the children's language behaviors and narrative performance. The records were then compared and discussed to ensure consistency.

In the transcription phase, the two researchers transcribed the recordings separately and then cross-checked them to ensure accuracy.

In the scoring phase, the researchers independently rated the children's narrative competence based on standardized scoring criteria, and inter-rater reliability was calculated. The final consistency results were as follows: observation consistency was 85%, transcription consistency was 93%, and scoring consistency was 93%.

If any discrepancies arose between the raters, they were resolved through discussion to ensure the objectivity and reliability of the scoring process.

4. Results

4.1 Analysis of Narrative Competence Stages

This study conducted three observations of children's reading behavior, each lasting 15 minutes. The focus of the observations was on the characteristics of children's verbal behavior during the process of reading picture books.

Verbal accompaniment behavior can be seen as a transitional stage in which children gradually shift from reliance on images to independent narration(Sulzby E, 1985). This process can be divided into the labeling stage, oral narrative stage, written language stage, and text-focused stage. Based on observations of Nannan and Beibei, both children were found to be in the oral narrative stage.

Nannan's narrative language while viewing the picture book *Phil* is as follows:

There is a little red fish tail on the cover. On the calm sea, there is a little red fish. When the sun is about to set, the little red fish calls the children to go home. At that time, the little fish above its tail follows it, swimming and swimming. The red fish mother notices that several little red fish have appeared. Then, after getting trapped by a piece of seaweed, a yellow fish stops in front of it. They glance at each other and then swim away. They swim to a place with green and pink rocks. The red fish blocks its own child. Then, the red fish encounters a large group of seahorses, one of which has the exact same color as it. Then, a crab comes over, and the red fish mother finds this place strange. Then, an octopus arrives, and the red fish mother swims away. The shark swims to the surface, and then the yellow fish and the red fish laugh together. Finally, many different kinds of little fish come out of the red fish mother's mouth.

Beibei's narrative language while viewing the picture book *Phil* is as follows:

There is a little red fish in the ocean. She swims and swims, but she doesn't know where she is going. Later, on the way, she discovers many other little fish. The red fish decides to go with them to a faraway place. Next to the seaweed, the red fish sees another little yellow fish. They look at each other, and then they swim to a large green rock. After that, the red fish starts swimming on her own again. She sees a group of seahorses approaching, and there are red ones among them. Then, a crab and an octopus appear, but the red fish is not happy at all. Finally, she sees a big shark. The little red fish quickly slips away. At that moment, she sees the yellow fish again. They are very happy. The red fish opens her mouth—ah! A whole school of tiny red fish swims out. Wow, so many little fish! She must be their mother.

The dialogue between Nannan and Beibei while viewing the picture book *Be Careful, There's Electricity* is as follows:

Nannan:(Pointing at the picture book) Look, this little pig is staring at the small black hole in the socket. Is he trying to stick his finger in?

Beibei: (Nods) Yeah! His eyes are wide open—he looks so curious! But isn't that dangerous?
Nannan:(Frowns) Right, my mom also said we shouldn't touch sockets. She said there's a monster inside. But... is there really a monster?

Beibei: (Touching his chin) Hmm... I've heard that too. But... could electricity really be a monster?
(They turn the page, and the book shows the mother stopping the little pig.)

Nannan: (Laughs) Look, the little pig's mom stopped him right away! Is she also saying not to stick his hand in?

Beibei:(Imitating the mother) Be careful! There's a biting monster inside! Hahaha, that sounds so scary!
(They turn the page, and the little pig in the book starts crying loudly.)

Nannan: (Laughing while pointing at the little pig) Hahaha! Look, he's crying so loudly! He looks just like you.

Beibei:(Unconvinced) No way! But... maybe the little pig is sad because he really wants to know what's inside the black hole?
(They turn the page, and the pig's father appears.)

Nannan:(Pointing at Pig Dad) Look, Dad is back! He seems like he's about to explain the secret of the black hole!

Beibei:(Imitating Pig Dad) "Actually, what lives inside the black hole isn't a monster—it's electricity."

Nannan: (Surprised) Oh! So there's electricity inside! But what exactly is electricity?

Beibei:(Continuing to imitate Pig Dad) "When the clouds in the sky thunder, the flashes of light are electricity—that's lightning."

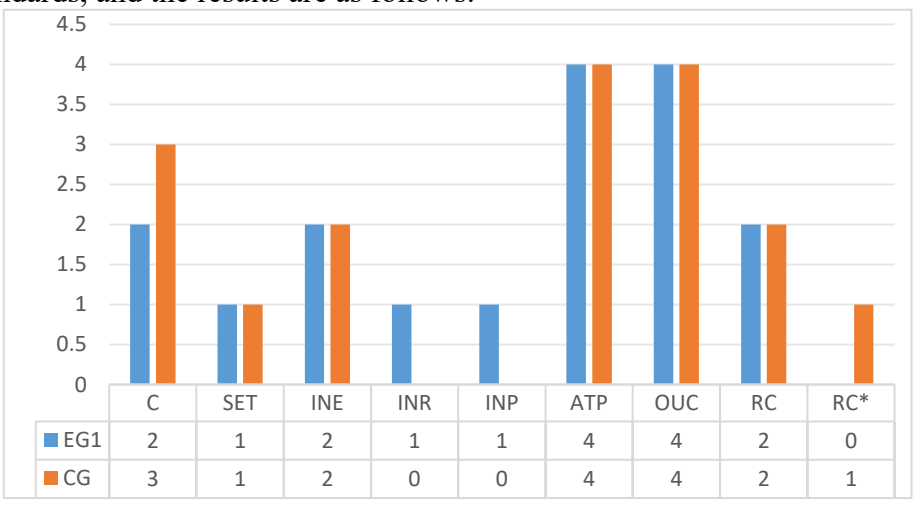
Nannan:(Nods) Yes, I've seen lightning before! It's so bright, like a streak of light flashing down from the sky!

During reading, Nannan and Beibei usually point at the pictures while using their own words to describe the story as they understand it. Although their retelling may differ from the original text in the picture book, they can grasp the content of the book and articulate it in their own words. They are also able to link the images to previous and subsequent content, constructing a coherent narrative, even if their storytelling is not entirely accurate.

From the children's narratives, it is evident that these stories have formed a complete narrative structure in their minds. This stage aligns with the oral narrative stage described by Sulzby (1985), where children begin constructing sentences and narrating stories, which contributes to the development of syntactic and pragmatic language skills. This stage highlights the importance of social interaction and storytelling in language acquisition (Ralli et al., 2021). During this phase, children construct and express stories through spoken language, demonstrating a transition from simple image labeling and commentary to more complex narrative structures.

4.2 Experimental Results and Discussion

The standardized assessment tool ENNI was used to evaluate the macrostructure of narratives (story grammar). Since this study used Story A3, the maximum possible score based on ENNI's scoring criteria and existing coding is 40 points. The breakdown is as follows: C = 4 points, SET = 1 point, IE, ATP, and OUC = 6 points each, IR and IP = 3 points each, and R = 11 points. Based on the ENNI scoring criteria, responses are categorized into "individual character responses" (8 points) and "joint responses" (3 points). This study strictly adhered to these scoring standards, and the results are as follows:



	C	SET	INE	INR	INP	ATP	OUC	RC	RC*
EG1	2	1	2	1	1	4	4	2	0
CG	3	1	2	0	0	4	4	2	1

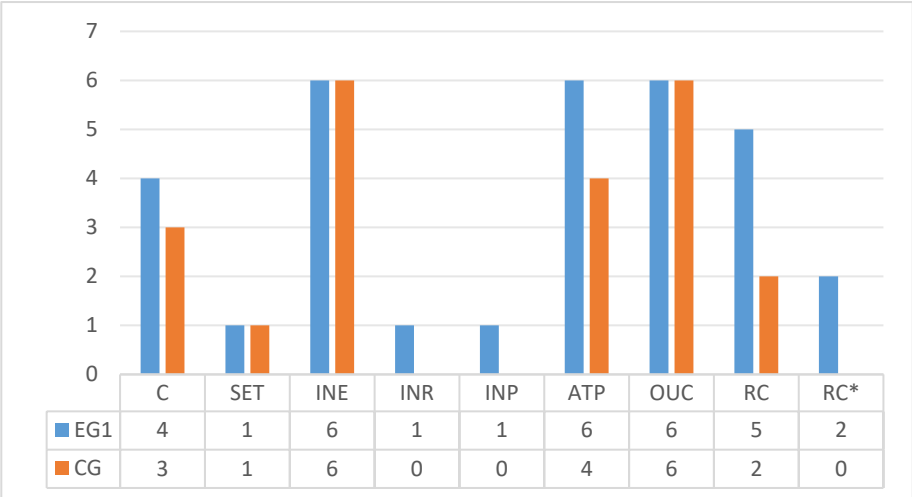
Figure 1: Pre-test Scores of Different Dimensions of Children's Narrative Competence

Before the experiment, a pre-test on the macrostructure of narrative competence was conducted on the twin children. Although differences were observed across different dimensions, the EG1 and CG groups showed similar overall levels. Both groups had identical total scores of 17, indicating similar overall performance. While EG1 scored higher in some indicators and CG scored lower in certain dimensions, the overall mean scores were 2.11 for both groups, with a median of 2 for each, suggesting no significant difference in overall competence.

After six weeks of reading intervention, the performance of the two groups of children changed. According to the descriptive statistical analysis of the post-test scores, there were differences in overall scores and score distribution between the EG1 and CG groups. The total score of the EG1 group was 32, higher than the 22 of the CG group, indicating that the EG1 group outperformed the CG group overall. The mean score of the EG1 group was 4.00, while that of the CG group was 2.75, showing a higher average score for the EG1 group.

In terms of the median, the EG1 group had a median score of 4, compared to 2.5 in the CG group, further demonstrating the advantage of the EG1 group in the middle range of scores. Additionally, the EG1 group scored in all dimensions, whereas the CG group exhibited greater score fluctuations, particularly in the INR and INP dimensions, where the CG group scored 0, revealing a significant difference.

Overall, the scores of the EG1 group were more stable, and their overall performance was stronger, while the CG group showed some inconsistencies in score distribution, particularly weaker performance in certain dimensions.



	C	SET	INE	INR	INP	ATP	OUC	RC	RC*
EG1	4	1	6	1	1	6	6	5	2
CG	3	1	6	0	0	4	6	2	0

Based on the above, reading intervention significantly improved the narrative competence of the EG1 group, showing a more balanced score distribution, while the CG group showed gaps in both the magnitude of improvement and score stability. This suggests that the reading intervention had a positive impact on the narrative competence of the EG1 group.

Specifically, let's look at the performance of the two children in the pre-test and post-test.

In the pre-test, for dimension C, EG1 children, although they recognized that the story had four characters, used pronouns like "they are together" when introducing the characters, failing to clarify their identities, so they scored 2 points. CG children, on the other hand, were unable to distinguish between characters three and four, mistakenly identifying them as the same character, and thus scored 3 points.

In the story grammar dimensions—IE (initiating event), ATP (attempt), and OUC (outcome), which are the three core macrostructure dimensions—each single episode scored a maximum of 2 points, and the total score for each core dimension was 6 points since the story consists of 3 consecutive episodes.

Data analysis shows that both children scored 2 points on each of the three dimensions (INE, ATP, and OUC), which is lower than their scores for ATP and OUC. This indicates that the children did not clearly describe the initiating event during the narrative, but their attempts toward the goal and the description of the final result were relatively complete. For instance, in Episode 1, both children focused more on the later part of the plot development and lacked a full description of the story's cause, a trend that continued throughout the narrative.

For example, in EG1's narrative:
"The giraffe was playing with the plane. Then the elephant also wanted to play, and the elephant was looking straight at it. Then the elephant grabbed the plane. The plane fell into the water."
This narrative clearly mentions the ATP (the elephant grabs the plane) and OUC (the plane falls into the water), but it does not narrate the initiating event, such as the deer playing with the plane or the deer showing the plane to the elephant.

In the INR and INP dimensions, each scored a maximum of 3 points. The children rarely mentioned these, with EG1 scoring 1 and 1, and CG scoring 0 for both. This shows that both children, especially those in the CG group, still have room for improvement in the internal response and internal planning dimensions.

For the character reaction dimension, the scoring system separates individual reactions (R) and collective reactions (R*), and this study analyzed both separately. According to the scoring standard, individual reactions describe each character's feelings or thoughts about the outcome and their physical reactions, with a maximum score of 7 points for this dimension. Collective reactions refer to the emotional or behavioral reactions of all characters at the end of each episode (for example, "they were all happy" or "they went to play together again"), with a maximum score of 3 points.

From the data analysis, the average score for R (M = 2) shows that most children could only focus on and express a small part of a character's emotions or reactions, indicating that they were limited in describing the psychological or behavioral aspects of individual characters. The average score for R* (M = 0.50) was significantly lower than R, suggesting that children had more difficulty expressing the collective reactions of characters. This may reflect that children still need to improve their ability to comprehensively express the shared emotions and behaviors of multiple characters.

After 6 weeks of intervention, the narrative samples of the two children are as follows:

EG1: One day, the little elephant and the giraffe played. Then the giraffe played with the plane. Then the elephant also wanted to play, and the giraffe followed the elephant to play this way. Then the elephant grabbed the plane. The giraffe was surprised. Then the elephant accidentally dropped the plane into the water. Then the giraffe was a little sad. Then the giraffe was very angry. The elephant said he accidentally dropped it into the water. Then the elephant's father came and asked how the plane got into the water. Then the little elephant said he accidentally dropped the plane into the water. Then the elephant's father went to get the plane but couldn't reach it. Then the giraffe was very sad. Then the elephant brought a stick to see if he could reach it. Then the elephant's mother brought a net to get the plane. She tried hard, and finally, she got the plane out and gave it to the giraffe. The giraffe was very thankful. Then the giraffe was very happy. The elephant and the little elephant didn't grab the plane anymore.

CG: One day, the giraffe had a little plane. He grabbed it to play. Then the little elephant accidentally dropped the plane into the water. Then the giraffe was very angry. Then he asked for help. Mr. Elephant came, and the little elephant said the plane fell into the water. Then Mr. Elephant tried to get it, but he couldn't reach it. Then the little plane floated farther away. He found a way to use a net, and after trying, the plane was pulled up and given back to the little giraffe.

From the above samples, it is clear that EG1 children involved all the main characters (giraffe, elephant, elephant's father, elephant's mother) and SET (one day), and performed well in multiple dimensions. Specifically, EG1 children scored full or near full marks in dimensions such as INE (giraffe playing with the plane, elephant's father came, elephant's mother came), ATP (grabbed the plane, elephant's father went to get the plane, elephant's mother got the plane), OUC (plane fell into the water, couldn't get the plane, giraffe got the plane back), and R (sad, accidentally, angry, happy, thankful). Additionally, EG1 children showed progress in internal responses (e.g., elephant also wanted to play), internal planning (e.g., elephant says he accidentally dropped the plane into the water), and collective reactions (e.g., giraffe was angry, elephant and little elephant didn't grab the plane).

The post-test samples from the control group (CG) show that after six weeks of experimental intervention, the children showed improvement in dimensions like C (e.g., little giraffe, little elephant, Mr. Elephant), SET (e.g., "one day"), and INE (e.g., "there was a plane," "Mr. Elephant came," "got a net"). However, there were no significant changes in the IR and R* dimensions, and even a regression in IP and R dimensions.

This data reflects that EG1 children displayed a more complete narrative structure, including cause, development, climax, and outcome, while the CG group's narrative, although improved, still lacked some key parts of plot development or internal logical connections. In terms of emotional improvement, EG1 children showed a greater depth and complexity of emotion. The EG1 story not only included emotions like "anger" and "sadness," but also "thankfulness" and "happiness," reflecting the emotional fluctuations that demonstrate their improved narrative competence. On the other hand, the control group's narrative, although improved, still lacked logical connections in the plot and character reactions. The emotional expression of CG children remained simpler, lacking the emotional layers and twists seen in the EG1 group.

5.Conclusion and Limitations

This study, combining quantitative and qualitative methods, explored the impact of wordless picture books on the narrative abilities of preschool children. The results show that after the intervention of wordless picture books, the experimental group of children showed significant improvement in the macrostructure of their narrative abilities under independent reading conditions, while the control group showed little change. The experimental group performed significantly better than the control group in several dimensions, such as C, ATP, OUC, and R, with the most notable improvement observed in the R dimension. This suggests that wordless picture books can effectively promote children's in-depth description of characters' emotions and behaviors during the narrative process, while significantly enhancing the completeness and logic of the narrative.

Overall, wordless picture books, as an effective educational tool, significantly improve the narrative abilities of preschool children, particularly in terms of the integrity and hierarchy of narrative structure. By providing open-ended and imaginative narrative contexts, wordless picture books greatly promote children's development in language expression and emotional communication. The results of this study provide important theoretical foundations and practical guidance for early childhood education and offer new ideas and methods for optimizing the cultivation of children's narrative abilities. In addition, this study thoroughly validates the excellent effects of wordless picture books in enhancing children's narrative abilities.

Although this study provides positive evidence of the impact of wordless picture books on improving the narrative abilities of preschool children, it also has certain limitations. First, the study only selected a group of twins as the research subjects, with a small sample size limited to the twin population, which may affect the generalizability of the results. Therefore, future studies could consider expanding the sample range to include more children from different backgrounds and with individual differences to enhance the representativeness and external validity of the research results.

Despite the clear advantages of wordless picture books over ordinary picture books in several dimensions, there were no significant changes in the INR, INP, and RC* dimensions between the two groups. This may suggest that the independent reading of wordless picture books has a limited impact on characters' internal reactions and internal plans, with relatively small improvements in the depiction of deep psychological aspects of the characters. Future research may need to explore deeper in terms of instructional design and intervention strategies. This study provides empirical support for subsequent course development and intervention research in this area.

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THE REPRESENTATION OF ALLEGORY IN ENGLISH UTOPIAN NOVELS

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Abstract: This article presents the use of allegory in English utopian fiction. It is to critique societal norms and convey utopian aspirations. It uses theoretical investigation, literary analysis, and interdisciplinary perspectives. This is to analyse how allegory in utopian narratives. Influential writers like Thomas More, William Morris, and Aldous Huxley use allegorical elements to critique modern society, romanticize other worlds. As well as to communicate complex philosophical and political concepts. The study provides a comprehensive framework for comprehension of allegory in English utopian novel. This study explores symbolism, critique, and visionary representation in English utopian novels. In examination of their diverse literary canon.

Keywords: Allegory; Utopian novel; Ideal society; Political allegory; Philosophical Allegory; Religious allegory; Cultural allegory; Dystopian novel

Abstract: данной статье представлено использование аллегории в английской утопической литературе. Это критика социальных норм и передача утопических устремлений. Он использует теоретические исследования, литературный анализ и междисциплинарные перспективы. Это проанализировать, как аллегория в утопических повествованиях. Влиятельные писатели, такие как Томас Мор, Уильям Моррис и Олдос Хаксли, используют аллегорические элементы для критики современного общества, романтизации других миров. А также для передачи сложных философских и политических концепций. Исследование дает комплексную основу для понимания аллегории в английском утопическом романе. В этом исследовании исследуются символизм, критика и визионерское представление в английских утопических романах. При рассмотрении их разнообразного литературного канона.

K e y w o r d s: Аллегория; Утопический роман;; Идеальное общество; Политическая аллегория; Философская аллегория; Религиозная аллегория; Культурная аллегория; Роман-антиутопия.

Utopia was first introduced by Sir Thomas More in 1516. It has a long literary history. English writers have used allegory to express social criticism and commentary. This influences utopian and dystopian fiction. Particularly English novels, which often use allegorical elements to represent societal ideals. “This emphasizes on conformity, uniformity, and the elimination of individuality and dissent. "Community, Identity, Stability" [1, p. 3]. Writers have employed allegory to explain difficult concepts and encourage critical thought. From More's "Utopia" to Aldous Huxley's "Brave New World" and beyond. “It had spoken as distinctly of the customs and government of every nation through which he had past”. [2, p. 213]. ”. [1, p. 21] These

books' continued popularity among readers and academic curiosity to highlight their significance in the literary canon. The examination of allegory, critique, and in English utopian novel raises a number of important issues and difficulties. The allegorical aspects included in these works nevertheless require a methodical analysis and interpretation despite the genre's depth and intricacy. Narrative techniques, imagery, and symbolic themes are employed in English utopian novels to express allegorical meanings. In some ways these symbols stand for society goals, abstract ideas, or criticisms of accepted norms. As noticed in the words “One of them glanced at him. Was that a kind of bestial derision that he detected in those blank grey eyes? "Hurry up!" he shouted more loudly, and there was an ugly rasp in his voice”. [1, p. 49]. It brings out deeper connotations. In English utopian novels, writers use allegory to comment on current social, political, and cultural structures. These topics or themes are frequently criticised, and these criticisms are represented symbolically. Imaginative depictions of different communities and futures can English utopian literature offer. “These three had elaborated old Major’s teachings into a complete system of thought, to which they gave the name of Animalism. Several nights a week, after Mr. Jones was asleep, they held secret meetings in the barn and expounded the principles of Animalism to the others. At the beginning they met with much stupidity and apathy”. [4, p. 15] Writers use allegory to challenge utopian and dystopia concepts, utilizing theoretical models and analytical techniques. Interdisciplinary perspectives from political theory, philosophy, cultural studies, and literary studies enhance understanding of allegorical components in English dystopian novels, influenced by historical and cultural backgrounds. As expressed in these words “It was very neatly written, and except that “friend” was written “friend” and one of the “S’s” was the wrong way round, the spelling was correct all the way through. Snowball read it aloud for the benefit of the others. All the animals nodded in complete agreement, and the cleverer ones at once began to learn the Commandments by heart”. [4, p. 21]. In examination of the allegory, criticism, and imaginative portrayal found in English dystopian novels. The significance of the results of this study has for current conversation and scholarship. It shows how they advance our knowledge of literature, society, and human thought. Through the approach of these inquiries and difficulties. This research aims to enhance our comprehension of English utopian novels. It is as platforms for metaphorical representation, critical analysis, and imaginative creativity. This is in illumination of their continuous relevance in the literary canon. It is clear through these words. “The forest of Burnham Beeches stretched like a great pool of darkness towards the bright shore of the western sky. Crimson at the horizon, the last of the sunset faded, through orange, upwards into yellow and a pale watery green”. [1, p. 54]

This study attempts to investigate the ideas of allegory, critique, and in English utopian fiction.

Significance of the study: Selection of Utopian Novels: The following novels are chosen that prominently features allegorical elements and themes related to utopian ideals and critiques. The selection was done for analysis based on the range of English utopian novels, from different historical periods, authors, and literary styles. In the comprehension of allegory and critique, in English utopian novels. It is crucial for comprehending literature, society, and human nature. In examination of allegorical components, we can improve literary analysis and critique, understand the principles, goals, and criticisms behind these utopian visions. “With their superior knowledge it was natural that they should assume the leadership”. [5, p. 24]. Allegory in English utopian novels serves as a tool for social and political criticism, offering insights into social, political, and cultural environments. It links literature, history, philosophy,

and sociology, and can be applied to modern society, addressing issues like social justice and technological advancement. “In so many Acts, Ordinance? Orders, Revolves, made of late in the compassed of but one or two lustrums’ that the cunning picklock of the law hath work enough to enucleate the sense and meaning of them”. [6, p. 20]. In the examination of the ideas of visionary representation, critique, and symbolism in relation to allegory in English utopian novels. It is important because it can enhance our comprehension of how literature can reflect, analyse, and recreate the world in which we live. This study explores the impact of allegory on comprehension of society, politics, and the human condition in English utopian novels. “While he got hungrier, while the train sat hour after hour on the siding between a scarred and dusty quarry and a shutdown mill, he had grim thoughts about the reality of hunger,” [9, p. 212]. It analyses allegory, critique, and imaginative depiction, revealing how these works challenge social standards and reveal deeper truths.

Research Objectives and Research questions through the lens of allegory, this study attempts to investigate the ideas of symbolism, critique, and visionary representation in English utopian fiction. It aims to comprehend how writers portray imaginative alternatives, challenge established societal systems, and communicate abstract ideas through the use of allegorical components. The goal of the study is to provide light on the ideological, and thematic elements of allegory in utopian literature. How do writers of English utopian novels use allegory to express allegorical criticisms of social institutions and norms? 2. How can English utopian novels provide social and political critiques of modern society through the use of allegorical elements? 3. What criticisms of the current social, political, and economic structures do writers of English utopian novels offer of these depictions, and how do they imagine idealised societies through allegory? 4. Which allegory themes and images are most frequently employed in English utopian fiction to convey both dystopian criticism and utopian ideals? 5. In English utopian fiction, how do writers use allegory to subvert traditional ideas of power, authority, and governance?

This study aimed to analyse allegorical, critical analysis, in English utopian novels through annotation and analysis. The method involves coding textual data and examining the frequency, distribution, and connections among these elements. Comparing and contrasting different narrative structures, themes, and characters from other literature is also conducted. The study explores allegory in English utopian novels using theoretical frameworks from literary theory, cultural studies, political theory, and philosophy. The research developed a theoretical framework to analyse allegory in utopian literature, using theories from literary studies, cultural criticism, and semiotics. They allegorical narratives, using approaches like psychoanalysis, Marxism, and postcolonial theory.

"Brave New World" by Aldous Huxley (1932): Huxley's theoretical framework explores dystopian literature, in analysis of the dehumanizing effects of scientific advancement and mass consumerism. It critiques societal control, conformity, and individual freedom in technologically driven cultures, drawing on sociological and psychological perspectives.

The research conducted an analysis the use of allegory in selected English utopian novels. This was to convey abstract ideas and concepts. This identified recur of symbols and motifs. It then examined their significance within the allegorical framework.

Discussion on how allegorical and examined how allegory in English utopian novels represents utopian, in analysis of idealized societies and their portrayal, and how these representations inspire hope and offer alternative perspectives on social organization. Use political theory, philosophy, and cultural studies to contextualize allegorical components in English utopian fiction novels.

Literary Significance: Each of these novels is composed of a significant literary value and has contributed substantially to the dystopian genre. "Utopia" by Thomas More is one of the earliest examples of utopian/dystopian literature and has been influential in formatting subsequent works. “The mind that judges and desires and decides—made up of these suggestions. But all these suggestions are our suggestions!" The Director almost shouted in his triumph. "Suggestions from the State." He banged the nearest table. "It therefore follows ..." [10, p. 21] Aldous Huxley's "Brave New World" is a classic dystopian fiction that explores societal control and individual freedom.

Interpretations: Allegories enable for layers of connotation to coexist within a single text. This supported different interpretations at once. This complexity deepens the analysis. It also makes it more difficult to arrive at a single, conclusive interpretation.

Overt vs. Covert Allegory: In utopian literature, some allegorical themes are more subtle or covert. While others are more obvious and easily recognized. In the analysis of covert allegory adds another level of complexity since it necessitates close attention to detail and may include finding symbolic links that are not immediately obvious.

Evolution of meanings: Over time, societal norms, values, and historical viewpoints can change. This leads to changes in allegorical interpretations. It is difficult to keep interpretations consistent over time because anything that was seen allegorically in one age may not be in another. Nevertheless, the difficulties in the research of allegory in utopian literature provided insightful comprehension. This is of the fundamental ideas, messages, and criticisms present in these works. To fully appreciate the metaphorical complexity of utopian works, close attention is to be paid to detail. It should have a concentrated awareness of historical and cultural circumstances. It could be open to multiple interpretations.

Selection of Utopian Novels: The following novels are chosen that prominently features allegorical elements and themes related to utopian ideals and critiques. The selection was done for analysis based on the range of English utopian novels, from different historical periods, authors, and literary styles.

Thomas More's "Utopia": (1516); Aldous Huxley's "Brave New World" (1932The researcher considered factors such as the popularity of the novels, their cultural significance, and their thematic relevance to the research objectives. The main points that were considered in the specific novels and their significance in investigating the use of allegory in English Utopian novels are as follows:

Critique of European society; Political philosophy; Religious satire; Renaissance literature; Social criticism; Humanism; Ideal society. An ethical endeavor whose goal is to provide a dignified life, in which there is no poor or beggar, although a person does not own anything,

everyone is rich, so what wealth is greater than a person living with a satisfied and reassured soul, as there is no private property, and the public interest is the justification for this feeling of security, safety, and happiness. And the last is a cry of protest against the oppression and tyranny that prevailed in Europe,
"Aldous Huxley's" "Brave New World" (1932): Totalitarianism; Social conditioning; Critique of modern society; Dystopian fiction; Technological control; Consumerism; Genetic engineering

Identification of Allegorical Elements: "Thomas More's "Utopia": Island of Utopia: The authors use allegories and metaphors in their works, contrasting perfect societies with dystopian futures. They depict the dominance of businesses, the dehumanizing consequences of eugenics, the persecution of women, and the restriction of reproductive rights. Biblical allusions and the exploitation of disadvantaged communities are also used to illustrate their themes. As noted in the words "Now, as it turned out, the Rebellion was achieved much earlier and more easily than anyone had expected. In past years Mr. Jones, although a hard master, had been a capable farmer, but of late he had fallen on evil days. [11, p. 17]. These allegories encourage readers to reflect on broader issues such as individual freedom, social justice, and utopian and dystopian societies. Interprets and analyses the identified allegorical elements within the utopian novels.

The study explores the use of allegory in English utopian novels by various authors from different eras and genres. Purposive sampling was used to select novels based on their significance, thematic relevance, and depth of analysis. The study used various data collection methods, including close reading, textual analysis, literature surveys, content analysis, historical and contextual research, interviews, surveys, documentary analysis, and comparative analysis, to identify trends, themes, patterns, and similarities in allegory usage in the genre. The larger sample size ensured more thorough data collection and analysis.

More's utopia is explored through allegorical narratives, critiquing Renaissance England's political structures. Huxley's dystopian vision warns against technological progress and societal conformity, highlighting anxieties about mass production and individual autonomy. Atwood's feminist dystopia explores gender oppression, religious extremism, and reproductive rights, while Ishiguro's novel questions human cloning ethics and life commodification. Through the allegorical depiction of a dystopian society where clones are bred for organ donation, the novel raises profound questions about identity, morality, and the value of human existence. This is seen in "Almost through the midst of the city ran the stately river Gudauri famous for his spring in curing many diseases. Upon this river within the walls flood fix stately strong bridges, so broad and so high that ships of good burthen might fail under them. [12, p. 75]. The researcher explored the allegorical meanings, thematic connections, and ideological implications of the allegorical representations and considered the cultural, historical, and intellectual contexts that shape the interpretation of allegory in utopian literature.

Qualitative methods to analyse the data collected from the utopian novels and engaged in thematic analysis to identify recurring allegorical elements, motifs, and allegorical representations. Analyzed allegorical elements in utopian literature, examining cultural, historical, and ideological contexts, revealing critiques of societal norms, governance structures, and human nature across different works.

Discussion of Results and Interpretation of Results

"Utopia" by Thomas More: More's "Utopia" shares similarities with earlier utopian works like Aquinas' "De regno" and Plato's "Republic". In examination of a perfect government, societal peace, and justice, while also establishing a reasoned island community. ‘Hold your peace!’ said the Cardinal; ‘this will take up too much time; therefore we will, at present, ease you of the trouble of answering, and reserve it to our next meeting, which shall be tomorrow, if Raphael’s affairs and yours can admit of it. But, Raphael,’ said he to me, ‘I would gladly know upon what reason it is that you [2, p. 18]

News from Nowhere by William Morris he is socialist writings of the 1880s and 1890s, especially his utopian novel News from Nowhere (1890), that are of interest here. News from Nowhere has long been recognized as the most important utopian novel of the nineteenth century, and it is the thematic content of Morris’s utopian vision that has captured the interest, but also the way Morris formulates a theory of utopia. It contains a “primary theory of utopia,” describing and communicating utopian visions, regardless of their content.(9, pp 87-101) He criticizes corruption and exploitation in capitalist society and focuses on socialism as an ideal economic and social system. Morris depicts an ideal society where justice and equality prevail.

"Brave New World" by Aldous Huxley: Huxley's "Brave New World" critiques societal control, totalitarianism, and personal freedom. This presents a novel dystopian future with hedonistic desires, materialism, and technological domination. This used psychology and science concepts for social -engineering and habituation.

The books "Utopia" and "Brave New World" significantly influenced dystopian and utopian fiction. This introduced themes like dehumanized mass consumption and technological domination. “We walked over the grass of the meadows under a flood of moon light, and soon came to the house, which was low, and built round a quadrangle big enough to get plenty of sunshine in it.” [7, p 238]

They also challenged popular utopianism and anarchism. To highlight social and political issues like authoritarianism, inequality, and personal freedom. The books sparked debates on government, moral dilemmas, and decentralised government, challenging traditional ideas.

Miscomprehension of s may result from interpreting allegory without considering the author's intent or historical context. As seen in “No offence, guest; no offence,' “said he;” but let me ask you; you like that, do you? C H is formula, put with such obstinate persistence, made us all laugh heartily; and even the old man joined in the laughter on the sly. However, he was by no means beaten, and said presently” [8, p. 220]. In analysis of allegorical aspects in unfamiliar language or cultural contexts can be challenging. The study may also overlook reader perception and response. This affects the comprehension of the material. Limitations like obtaining original materials, historical records, and secondary literature can hinder thorough analysis.

Conclusion and Summary of Key Findings:

The study highlights the significance of symbolism, critique, It suggests that these elements are crucial in creating diverse stories. This challenges readers about the potential and constraints of modern civilization, encouraging them to envision a better future. The study explores the allegorical elements of English utopian novels. It reveals their symbolic representations of utopian goals, social criticisms, and dreams of other worlds. The interdisciplinary approach, combines critical theory, literary studies, and cultural studies. This provides complex interpretations of recurrent themes. The research explores symbolism, critique, and visionary representation in allegorical frameworks in utopian literature. The findings could impact modern social and political discourse, revealing lasting themes and issues relevant to modern society. The study contributes significantly to literature.

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A CONCEPTUAL STUDY OF SOCIAL MEDIA USERS' PREFERRED SOCIAL MEDIA AFFORDANCES

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Abstract: *- Influencer marketing is booming, and it's a tool that almost all brands use to connect with their audience. With the advancement of social media platforms, there is so much that these platforms can do for influencers. Hence, to fully utilise the capabilities of social media, users' preferences need to be understood. Therefore, this research suggests using the MAIN Model as the framework and employing a quantitative research method to investigate the research questions.*

Keywords: *social media platforms, social media affordances, and influencer.*

Introduction

Social media influencer communication, or influencer marketing, is not new in Malaysia. According to Yapp, Yapp and Patrick (2024), influencer marketing identifies influencers within a market to ascertain the optimal alignment between a brand and an individual. Today, brands frequently hire influencers to connect with their target audience, and they appear well-suited for the Malaysian market, which consists of individuals from diverse backgrounds ("Why do you brand need influencers? Marketing in Malaysia", 2024).

According to a post by Feedspot ("Top 80 Instagram Influencers in Malaysia, 2025), the list consists of influencers from various backgrounds; from entertainers to religious teachers and from homemakers to business owners. Also, some have millions of followers. Hence, as the industry expands and thrives, there is no denying that influencers become a must-have promotional tool to ensure success (Yang, 2024). Additionally, social media users who engage regularly with their favourite influencers, directly and indirectly, are likelier to feel a strong sense of parasocial connection (Yapp, Yapp & Patrick, 2024).

With the availability of social media as a tool, there is a need for channels. Channels used for communication evolve as communication technology advances (Harif & Yusoff, 2022). The communication landscape in Malaysia has changed, where users highly rely on using social media to connect with almost anyone ("Influencers in Malaysia: The impact on digital landscape", 2024). According to a report published by DataReportal (Kemp, 2024) 2024, there were 33.59 million internet users in Malaysia and 28.68 million social media users; that is about 83.1 percent of the population. Social media platforms like Facebook, Instagram, YouTube, and TikTok each have over 10 million users nationwide, and the numbers are predicted to grow.

Harif and Yusoff (2022) mention that, as users are more tech-savvy these days and the advancement of social media platforms has also pushed information to be sent and received at a much quicker pace, there is a need to change communication strategies when using online

tools. Howe (2024) notes that influencers need to understand the audience's usage preferences to connect with the audience more easily. This implies that influencers as message senders need to fully understand how a platform functions and what their followers prefer before embarking on a series of influencing strategies.

According to Santos and Valenzuela (2025), social media affordances require activation by a user; the user will take charge of either utilising the platform as it is supposed to be or using it in ways that were not thought of earlier. The MAIN Model by Sundar (2008) states that social media consists of four affordances: modality, agency, interactivity, and navigability.

The first affordance, modality, constitutes the most prominent construct in digital media (Sundar, 2008). This affordance, for instance, fosters an environment in which users experience a sense of "being there," ultimately creating a sense of reality for users, despite not being there physically or during the actual time the message is posted. It gives users a sense of realness. Agency is the second affordance of the MAIN Model. It is one of the most common functions on social media, allowing users to become content producers.

Interactivity constitutes the third affordance. Two-way communication is enabled on social media platforms, allowing users to communicate with anyone. In addition, users can modify settings, such as privacy and preferences, to their liking (Sundar, 2008). Navigability is the last affordance by Sundar (2008). With this affordance, users are like " digital travellers." They can navigate to different websites, webpages, and apps. Sundar (2008) stresses that with this affordance, navigation is nonlinear, so users can explore without adhering to a predetermined path.

Problem Statement

Sundar and Marathe (2010) state that digital media have made it exceptionally easy to customise content based on user behaviours and/or personal preferences. There are numerous ways for social media influencers to engage their social media sites and drive the audience to believe in the messages. However, that might not be possible if social media influencers do not understand the audience preferences. Also, Vanninen, Mero and Kantamaa (2023) state that there is limited understanding of how organisations oversee the creation of influencer content linked to their commercial partnerships with brands.

Sundar (2008) MAIN Model can serve as the framework for investigating the issue. According to the model, social media has four affordances: modality, agency, interactivity and navigability. These four affordances have the potential to activate cognitive heuristics and facilitate a better understanding of users' motivations for utilising social media, as well as the reasons behind their preference for these heuristics. Hence, it is vital to understand the audience preferences for social media usage so that social media influencers have a deeper comprehension of what their followers prefer. Ultimately, it is easier to establish trustworthiness between the message sender and receiver.

Significance of Study

This study hopes to guide social media influencers' communication and foster a more meaningful relationship between influencers and their audience.

Research Objective

To investigate the social media users' preferred social media affordances.

Research Question

What are the preferred social media affordances of social media users?

Methodology

Quantitative research, specifically a survey questionnaire, will be used to investigate the problem. Since this research will examine users' preferred choices, the survey questionnaire will enable the researcher to collect a large amount of data.

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THE INFLUENCE OF SOCIAL MEDIA MOTIVATIONS ON POLITICAL ENGAGEMENT AMONG UTAR STUDENTS

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Abstract: *Social media is used to fulfilled certain purposes. Given that youths are digital natives and active users of social media, numerous research has been carried out to study the direct and indirect relationship between their uses of social media and its impact on political participation. Most of these studies tend to confirm to the findings of each other that there are direct and indirect relationships through mediating factors such as political knowledge between social media uses and political participation. However, some scholars argue that social media use may not as impactful towards youths' subsequent political engagement as proposed as youths use social media to gratify their certain needs. Applying Uses and Gratification theory and O-S-R-O-R model, this research aims to investigate the intricate relationship between social media motivations and political engagement among University Tunku Abdul Rahman (UTAR) students. The study employs a quota sampling technique via survey method to collect data from a sample of 100 UTAR students, exploring their motivations for using social media platforms and their subsequent impact on various dimensions of political engagement. With the use of statistical analyses, regression modelling and correlation analyses, the research provides detailed insights into the impact of social media motivations on this group's political engagement behaviours. The results will make a substantial contribution to current understanding of the changing influence of social media on university students' political participation. They will also bring impact to scholars and policymakers who aim to understand and take advantage of these dynamics in order to promote young people's political engagement.*

Keywords: *Social Media, Motivation, Political Engagement, UTAR*

Introduction

The emergence of Internet, which lead to the birth of social networking sites has brought about a paradigm shift in the way people connect and interact with each other, including how they get involved in politics. Citizens' political engagement is crucial in a democratic society. According to Putnam (2000, as cited in Coleman, S. & Freelon, D., 2015)., dynamic participation of citizens in political affairs indicates a strong and flourishing democracy. High rates of political and civic engagement enhance the probability of ordinary citizens' voices being acknowledged in important discussions, contributing a sense of legitimacy to democratic establishments (Richard, W. & Alexandra, C., 2018). The expansion and widespread use of the Internet and social media has opened a large window of opportunity for increased citizen participation in politics (Kamiloglu, F. & Erdogen, E., 2014).

According to Statista (2023)., about 65.7 percent of people worldwide are Internet users by October 2023, while social media users constitute to 61.4 percent of the world's total population. Numerous past studies conducted over years has indicated that social media tend to increase political engagement and participation among citizens. Diverse features of social media encourage more citizen participation in the political environment, facilitate digital transformation of political public sphere and create a new way of engagement via online. It acts as a new avenue for its users to access information from a variety of sources and of different viewpoints, engage in two-way communication and express their thoughts freely at low cost in time, money, and effort, as compared to hegemony conventional mass media (Kamiloglu, F. & Erdogen; Breuer, A. & Groshek, J., 2014). Given the effectiveness of social media in public sphere, political actors across the globe started to utilise it actively to share their political beliefs, intentions, and actions as well as their attitudes to everyday political and non-political events to their followers and, to the public (Kurt, H. & Karaduman, S., 2012). Malaysia's politics somewhat adhere to this digital shift in the political environment with political actors actively building their presence in social media to engage with the public (Lee, 2017). In fact, social media continues to play an important role in Malaysia's last few elections with great impact towards the changes of its political landscape (Nur Nadhirah & Safawi, 2018).

As the emergence of social media has brought about significant changes to political communication and led to a new way of engagement, many scholars have been concerning about how its uses may influence citizens' political engagement, particularly among the youths. Youths have been noted as among those who use social media heavily and early on (Rosyidah Muhamad, Rohana Ahmad & Jumadil Saputra, 2021)., who are thought to be more tech-savvy than older adults (Omotayo, F. & Folorunso, M. B., 2020). In Malaysia context, social media users constitute to 78.5 percent of the total population, while social media usage among youth takes up almost a fourth of the whole population of Malaysia, with 28.6% of users aged below 25 years old (Howe, S., 2023). Several studies conducted worldwide has shown that youths are generally less engaged in traditional politics than older generations (Delli Carpini, M. X., 2017)., exhibit reduced interest in politics, possess lesser political knowledge, show disengagement from social and political events, express more apathy, and generally display lower levels of political interest (Quintelier, E., 2007). The availability of social media lead to an increase in youth political participation as they start to use digital media to obtain political information (Rosyidah Muhamad, Rohana Ahmad & Jumadil Saputra, 2021). Countless research done between social media and youths' political engagement has shown positive relationship between its usage and engagement. However, on the other hand, there are also question raised in recent years on whether youths' political engagement is heightened or decreased via social media, as social media can be used for different purposes. Youths do not always use it for political purposes, and some may never use social media based on such motives (Knoll, J., Matthes, J. & Heiss, R., 2018). Voter turnout stands out as a crucial gauge of citizens' involvement in the democratic process, which is a key indicator of democratic advancement (Adigun, O. W., 2020). In this case, although the problem of low youth voter turnout internationally remains a concern until today, Malaysia has a surprisingly high turnout rate for young voters aged between 18 to 30 years old in GE15 last year, at a startlingly high rate of 75.6% ("Bernama", 2023). Lowering of voting age and automatic voter registration has produced more than 5 million first time voters (Gibaja, A. F., 2022), with voters aged between 18 to 40 years old comprising more than half of the electorate in GE15 ("Bernama", 2022).

As youths have grown to become a powerful political force (Gibaja, A. F., 2022), it is crucial to continue explore their social media usage and its impact on political sphere to guarantee governance that is both well-informed and effective in a democratic society.

Literature Review

Defining Youth

According to the Oxford English Dictionary (SOED, 1983, as cited in Jones, G., 2009), the Old English term 'youth' refers to the time between childhood and adulthood. There are manifold definitions for this term. It is generally accepted that youth is a stage of life marked by particular transitions in the legal, psychological, social, and physiological domains of life, as well as the transition from childhood to adulthood and from a dependent to an independent state ("UNFPA Indonesia", 2014 , as cited in, "UNESCO", 2013; "UNFPA", 2007; "United Nations", 2012). Youth identity, according to Ahn (2011), depicts people in their teens and 20s as members of a common social experience that is distinct from that of other age or cultural groups.

Youth and Social Media

Conventional media such as television, newspaper, radio and magazine has been an essential part of human life until Internet and social media come into play in mid-1900s. Wong et al. (2020, as cited in Obar & Wildman, 2015). define social media as "interactive computer-mediated technologies that enable the creation or exchange of ideas, information, career interests, and other expression mediums through virtual communities and networks". In general, social media refers to any digital tools or programmes that facilitate social interaction between people. Differ from traditional media, social media enables users to produce and consume information (Nesi, J., 2020), allowing the occurrences of two-way communication. Examples of social media include social networking sites (eg: Facebook, Instagram, Snapchat), text messaging and messaging apps such as Whatsapp, social gaming tools and YouTube. Due to its extensive accessibility and diverse opportunities offered, social media platforms has emerged as one of the most favoured forms of social behaviours (Kirchaburun, K., et.al., 2020).

Defining Digital Public Sphere

In recent years, the emergence of a digital public sphere has attracted the attention of scholars, who see it as a viable supplement to or even replacement for the well-established "old" public sphere—a crucial element of contemporary democracies (Schäfer, M. S., 2015). The idea of public sphere is first articulated by Jurgen Habermas, which in his book The Structural Transformation of Public Sphere describes the term 'public sphere' as "a realm of our social life in which something approaching public opinion can be formed," and into which "[a]ccess is guaranteed to all citizens" (Nichols, R., Nutter, N. & Moore, E., n.d.). In Habermas's conceptual vision, he established a platform where all citizens could assemble and participate in discussions of shared concerns, particularly on nation's socio-political issues, in an open and unrestrained manner. It stands as a crucial element of socio-political structure, serving as the arena where individuals convene as citizens to express their individual perspectives and influence the societal political institutions (Muhammad Zubair Khan, Ijaz Shafi Gilani & Allah Nawaz, 2012).

Social Media and Politics

Politicians and political parties across the globe have increasingly adopted various social media, such as Facebook and Twitter as political communication tools to connect with their electorates at low cost. Social media is frequently utilized by politicians to raise their public profile, interact with public through sharing both their public and private sphere of life, promote themselves by showcasing the ideas and policies they intend to implement, and held campaigns during elections (Enli, G. S. & Skogerbø, E., 2013; Manning, N. et al., 2016; Sahly, A., Shao, C. & Kwon, K. H.,2019). Effective use of social media during elections period has the potential to mobilize more citizens to engage and take action, including those who used to lack of interest in politics. One of the successful digital campaign examples will be Barack Obama's presidential campaign in 2008, which is also the first "social media election". The campaign makes use of multiple social media tools including website, Twitter, Facebook, Myspace, Emails and the Change.gov site (Cogburn, D. L. & Espinoza-Vasquez, F. K., 2011).

Youth and Political Participation

According to Salisbury (1975, as cited in Verba, S. & Nie, N. H., 1970). by utilizing a commonly observed definition, political participation involves "actions taken by individuals outside of the government sphere that aim to have an influence, either directly or indirectly, on the choice of government officials or their subsequent decisions and actions". Through political involvement, citizens can select and vote for those who create policies benefiting them. It also involves citizens to actively participating in discussions on socio-political and economic matters, which act as criteria for selecting future leaders (Omotayo, F., & Folorunso, M. B., 2020). Acknowledging that participation extends beyond just the electoral process (Verba, S., Schlozman, K. L. & Brady, H. E., 1995). such as voting and campaigning, traditional political participation encompasses a variety of activities including engaging in political discussions, composing and endorsing petitions, engaging in civil demonstrations, attending public consultations, contributing financially to elections, joining advocacy groups involved in lobbying, advocating for political causes, overseeing and reporting instances of electoral process violations (Omotayo, F., & Folorunso, M. B., 2020, as cited in, Abubakar, A. A., 2011; Gibson, R. B., et al., 2005).

The Relationship Between Youths, Social Media, and Political Participation

Given youths have been recognized as early adopters and active users of social media, numerous scholars have conducted research on the relationship between social media and youth political participation (Omotayo, F., & Folorunso, M. B., 2020). proposed theoretical extension of Technology Acceptance Model (TAM 2) introduced by Venkatesh and Davis (2020) and Social Cognitive Theory (SCT) developed by Bandura (1986) in their study to investigate how social media might influence youths' political engagement in Nigeria and Malaysia context. The hypotheses testing indicates a noteworthy and positive connection between perceived usefulness (PU) and perceived ease of use (PEOU) concerning the youths' engagement in political participation through social media, validated past studies which confirmed the importance of these two variables in forecasting ICT use and its impact towards political engagement (Borrero, J. D. et al., 2014; Cegarra-Navarro, J.-G., Garcia-Perez, A., & Moreno-Cegarra, J. L., 2014. Akter, S. & Islam, M. A., 2019).

Applications Of the Uses and Gratification Theory

According to Ruggiero (2009, as cited in, Wimmer & Dominick, 1994). Uses and Gratification Theory was first proposed in 1940s, which is when scholars started to wonder why audiences engaged in specific media behaviours like reading the newspaper or listening to the radio. The U & G Theory is often used by mass communication experts to investigate, clarify, and offer solutions to the questions of why individuals utilise particular media and what advantages or gratifications they experience as a result (Aisa Salihu Musa et.al., 2016). Since the emergence of new Information Communication Technology (ICT), U & G Theory has been massively used by scholars to examine users' gratifications for using social media. This theory holds relevance in the realm of social media due to its foundation within communications literature, which serves as a valuable tool in elucidating the purposes and behaviours associated with social media utilization (Whiting, A. &Williams, D., 2013). Scholars usually examined what motivates people to use social media based on five distinct needs as proposed by Katz et al. (1973): cognitive needs, affective needs, integrative needs, social integrative needs, and escapism.

Methodology

Research design

This study aims to examine Universiti Tunku Abdul Rahman (UTAR) students' purposes for using social media and its impact on their political engagement. Uses and gratification theory is applied in this study to provide more understanding on gratifications that youths seek from using social media and how these motivations might influence their possibility of taking part in political activities. Numerous previous studies grounded in the Uses and Gratification theory have advanced understanding of the diverse functions of social media—such as entertainment, guidance, and surveillance—in both directly and indirectly impacting the political involvement of young individuals. The study will be adopting O-S-R-O-R model as well together with U& G theory to provide a clearer picture on the relationships between different variables. The theory and model is apt for use in this context as varied motivations can result in distinct media exposures, thus fostering varying levels of engagement among youths. It will contribute new insights to the current body of literature by exploring how different motivations for using social media can lead to diverse degrees of political involvement among young people. This study will utilize a quantitative survey approach, employing Google Forms as the tool to collect data from UTAR students. The number of respondents for the sample will be calculated using Raosoft sample size calculator. Survey questionnaires will be purposefully crafted to address the research objectives and explore how the social media gratification needs of young individuals influence their engagement in politics. All instruments of the variables such as motivations, political knowledge and political activities will be adopted from past studies. With the exception of political knowledge, each variable is assessed using a 5-point Likert scale. This scale is well-suited for the study as it quantifies and visually represents the strength of various motivations, levels of news consumption, online and offline political activities, enabling broader implications drawn from the results.

Discussion

Correlation analysis

Pearson correlation analysis was conducted to understand the relationship between different variables in the research. In general, the analysis revealed a correlation coefficient of 0.22 ($p < 0.001$) between social media motivations and political engagement, indicating a weak positive relationship between two variables. This suggests that higher levels of motivations for using social media somehow associated with higher levels of political engagement among UTAR students.

Table 1: Pearson Correlations of Key Variables

	1	2	3	4	5	6	7	8	9
1.Guidance	-	-	-	-	-	-	-	-	-
2.Surveillance	-	-	-	-	-	-	-	-	-
3.Entertainment	-	-	-	-	-	-	-	-	-
4.Social utility	-	-	-	-	-	-	-	-	-
5.Social media news	0.48**	0.54**	0.35**	0.52**	-	-	-	-	-
6.Social media expression	0.31**	0.31**	0.17**	0.36**	0.59**	-	-	-	-
7.Political knowledge	0.15**	0.15**	0.09	0.05	0.12*	-0.04	-	-	-
8.Internal political efficacy	0.34**	0.29**	0.23**	0.39**	0.49**	0.61**	0.04	-	-
9.Online engagement	0.24**	0.16**	0.17**	0.34**	0.38**	0.58**	-0.06	0.45**	-
10.Offline engagement	0.16**	0.04	0.07	0.21**	0.33**	0.64**	-0.10	0.47**	0.75**

** $p < 0.01$, * $p < 0.05$

The range of Pearson correlation coefficients is -1 to 1, where a perfect negative relationship is denoted by a value of -1, a perfect positive relationship by a value of 1, and no relationship is indicated by a value of 0. Coefficients closer to -1 or 1 suggest stronger relationships, while coefficients close to 0 suggest weak relationships.

Table 1 reveals the strength and significance of the relationships between the variables. Surveillance (r=0.54), social utility (r=0.52) and guidance (r=0.48) motivations in using social media have a very highly significant relationship to social media news use. This discovery validates the concept that initial orientation (first O) or reasons impact the stimuli (S) or utilization of social media news. It implies that the interest to learn more about public servants, to stay informed and understand others' opinions on political affairs encourage UTAR students to access or consume news information from social media. Therefore, these findings support earlier research done by Cayas (2020) and Chen and Chan (2017)., in which an individual's inclination to stay politically informed and their proactive pursuit of information are likely to enhance their consumption of news on social media. Social media algorithm may also play a part here as people will be more likely to be exposed to related news when they regularly search for it (Lee & Xenos, 2020). Moreover, though correlation is not as strong as other motivations, entertainment motivation still showcases significant moderate positive relationship with social media news consumption (r=0.35), indicating that UTAR students' motive in using social media somehow still likely to enhance their consumption, maybe through incidental exposure.

However, the drive for entertainment overall does not predict UTAR students' political engagement, as it has no significant impact on other variables include internal political efficacy (r=0.23), social media expression (r=0.17) and online political engagement (r=0.16), presenting weak but significant positive correlation. Also, insignificant and weak positive relationship

exist between this motive with political knowledge (r=0.09) and offline political engagement (r=0.07). It suggests that the motivations for seeking entertainment on social media are not connected with an individual's political involvement, both online and offline, echoing similar conclusions reached by past scholars (Cayas, 2020; Chen and Chan, 2017). However, its weak but significant positive correlation with online engagement but not offline engagement validates findings by other past scholars (Matthes et al., 2019; Tan, 2020)., in which exposure to entertainment-focused material on social media was linked to an increase in low-effort online political engagement via incidental mode, but not offline.

With regard to mediating variables, UTAR students' consumption of news on social media shows a strong and positive association with their use of social media for political expression (r=0.59). This supports previous findings by researchers (Cayas, 2020; Chen and Chan, 2017; Abdul et al., 2017) which demonstrate that engaging with news on social media predicts political expression. Ali Salman et al. (2018) in their study contend that social media offers the benefit of disseminating political information over traditional media, enhance audiences' understandings on current political affairs, and empower more individuals to share their thoughts and have discussion on certain issue. It suggests that UTAR students' exposure to and consumption of relevant content on social media possibly lead to their subsequent political expression. Therefore, the continuous stream of responses, viewpoints, and critiques regarding government policy on social media is a result of users' desire to seek out information. Findings also indicate that significant and moderate to strong positive relationships exist between the social media news consumption with social media expression (r=0.59) and online political engagement (r=0.38). This supports the idea that access to political news information via social media can enhance political involvement via online as proposed by previous studies (Cayas, 2020; Chen and Chan, 2017).

Expression of political thoughts and engaging in political issue discussion via social media itself is already a way of online engagement. Vacarri et al. (2013) posited that social media's role in sharing political issues, inspiring communal motivation to take action, and minimizing the costs of collective action can lead to increased civic involvement. The increased use of social media has significantly boosted political involvement through the exchange of comments and opinions on political issues. These results highlight a clear connection between the dissemination of diverse political viewpoints on social media platforms and their ability to stimulate the engagement of young people in politics (Gil de Zúñiga, H. et.al., 2017; Masiha et al., 2018; Haslina Halim, Farah Lina Azizan & Bahtiar Mohamad, 2022). Therefore, UTAR students' exposure to news on social media will increase their probability of expressing societal issues or dissent on these platforms, providing them more significant opportunities for involvement in collective online political efforts. Moreover, the consumption social media news is observed to have a positive but weak and insignificant correlation with UTAR students' political knowledge (r=0.05). This finding supports Cayas (2020) and Chen and Chan (2017) findings in similar research, and other existing studies done by scholar (Haugsgjerd et al., 2023) which found negative relationship between social media news exposure and factual political knowledge. This can be due to the reason that information found on social media platforms may not always be reliable or comprehensive as compared to traditional media.
According to Thorson and Wells (2016)., social media is an environment that offers a set of "curated flow", as news through social media is not offered by professional news provider, also there tend to be less varied and informative selection of news content as news is typically

chosen based on recommendations from friends, algorithms, and personal preferences. Moreover, information in social media may be presented incompletely in isolation and indicate a displacement effect that makes people feel well-informed that they need not to search for other sources (Dreston & Neubaum, 2023). All these could potentially lead to misunderstanding and less in-depth knowledge, thus failing to offer a thorough political education among respondents.

Worth noting that the result shows a weak, negative and insignificant and relationship between UTAR students' use of social media to express political opinions and their political knowledge. This result conforms previous research done by Cayas (2020). and Chen and Chan (2017). which shows an absence of correlation exists between respondents' social media political expression and the political knowledge that they possess. It indicates that practicing freedom of expression or speech on social media may not reflect a substantial understanding of users on political matters. This might be due to echo chambers and political polarization environment created by social media, in which users tend to interact mainly with content that corresponds to their existing beliefs, instead of actively searching for a variety of viewpoints or factual knowledge. This behaviour can lead them to express strong opinions on social media without necessarily having in-depth and accurate political understanding. However, contrary to this result, some existing literatures present contrasting result, for instance Hopp & Kazmi (2023). study found that textual-based political expression, especially those with high levels of elaboration is positively and strongly associated with political knowledge.

Next, both consuming news (r=0.49) and expressing opinions (r=0.61) via social media has a moderate positive and significant relationship with UTAR students' subsequent internal political efficacy. The finding confirms research done by Cayas (2020). and Chen and Chan (2017)., indicates that participants' exposure to relevant news content and their confidence in expressing their thoughts on social media may have a positive influence on their perceived ability to comprehend and influence political processes. Similarly, this outcome emphasis on 'the news media as a crucial factor for political efficacy because it enables learning and understanding of significant political and social issues.' Therefore, the belief in one's ability to effect change in politics is linked to extensive consumption of news media and the expression of well-informed views on social media.

Surprisingly, given a good mean score in knowledge questions (M=3.75), UTAR students' political knowledge in general tend to have weak and insignificant relationship with social media motivations, and even weak negative relationship with some of the variables. Two motivations - Guidance (r=0.15) and Surveillance (r=0.15) own significant but weak positive correlation with political knowledge, while correlations with the other two motivations appears to be insignificant. It may imply that motives for using social media will not have any impact on UTAR students' political knowledge, and even there is, the minor influence will be on those who use social media to search for information and stay informed. Additionally, contrary to most previous literatures, findings show that UTAR students' political knowledge have weak, negative, and insignificant relationship with their consequent online (r=-0.06) and offline political engagement (r=-0.10). This may be due to a combination of factors such as disillusionment with the political situation and more aware of the time and resource constraints required as a result of deeper understanding, leading them to feel discouraged to involve in political activities.

The findings also indicate that engaging in online political participation has a highly significant correlation with offline political engagement (r=0.75). This supports the previous research by Cayas (2020). and Chen and Chan (2017). which suggests that increased online participation is predictive of active involvement in offline activities. This implies that taking part in collective political activities on social media is positively associated with offline political engagement. Therefore, individuals who are more actively involved in online political movements tend to be more engaged in offline political activities as well. On the other hand, direct correlation between various social media motivations and political engagement appear to be weak, except for social utility motive which have moderate positive relationship with online engagement (r=0.34). It validates Cayas (2020). and Chen and Chan (2017). study, indicates that increases in the desire to connect with others and share opinions via social media will lead to increases in online engagement. Nevertheless, even though the direct relationship is not prevalent, extensive use of social media for different needs may impact both online and offline political activism through other mediating factors such as consumption of news, expression of viewpoints, and cognitive processing of politics among UTAR students.

Conclusion

The adaption of the Cognitive and Communication Mediation Model of Chen and Chan (2017) in the Malaysia context has allowed this paper to provide a comprehensive analysis of the impact of social media motivations on political engagement among Chinese youths. Most previous studies on youths' political engagement in Malaysia setting tend to focus on public university students in which majority are Malay. Moreover, little focus has been given on how different social media motivations may influence youths' political engagement though they have significant precursor roles in determining which media behaviours people pay attention to. Significant and positive correlations between nearly all variables confirm social media's potential influence in fostering political engagement among UTAR students, both online and offline forms. One notable aspect of this research is the discovery that various motivations seem to have differ impacts on political engagement, either directly or indirectly via mediating factors. Weak relationship between motivations and engagement suggests that though social media motivations might play a role in encouraging youths' political engagement, the effects may not be strong enough to directly determine their subsequent engagement and may need to be strengthen via other mediating factors.

Overall, social media motivations (first O-orientation) exhibit weak positive direct relationship with UTAR students' political engagement (second R-responses), both online and offline. In addition, surveillance and entertainment motives in using social media even correlates insignificantly with students' subsequent offline engagement. This finding contradicts with Cayas (2020) study which indicates that surveillance motivations show significant impact on offline engagement, but validates past research done by Tan (2020) that surveillance need exerts negative direct on offline engagement. Tan (2020) research also found contradict result in which entertainment has a significant influence on users' online political engagement. Interestingly, social utility motivation displays a more moderate and significant relationship with online political engagement, further suggesting that UTAR students' motivations in using social media to involves in social activities or behaviour that

contribute to the well-being of society can positively result in their joining of political mobilization or other activities online.

This finding supports the study of Khodabandelou et al. (2014). which revealed that majority Malaysian students' social media use is strongly related to "interpersonal utility" in which they gained satisfaction from their interactions with peers, friends, family, and broader network. Thus, the affordance and convenience of social media features which allow easier interaction to facilitate a stronger correlation between social utility motivations to online political activities.

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FACTORS INFLUENCING SWITCHING INTENTION TO USE DRONE AMONG HIKERS IN LANGKAWI USING PUSH-PULL-MOORING (PPM) MODEL THEORY)

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Abstract: *The ecotourism sector is increasingly exploring technological innovations, with drone technology emerging as a significant tool for improving hiking practices. This study examines the factors influencing hikers' intention to adopt drone technology in ecotourism, specifically in the states of Langkawi, Malaysia. Utilizing the Push-Pull-Mooring (PPM) model, the research focuses on the push factor of technology anxiety, the pull factor of technology compatibility, and the mooring factor of inertia in shaping hikers' decisions to adopt drones. A survey of 246 hikers was conducted using non-probability convenience sampling, and data was collected through face-to-face interviews with the hikers to gather their perceptions, experiences, and attitudes toward drone technology. The findings reveal that technology anxiety, driven by concerns over the complexity and cost of drones, serves as a significant push factor, hindering adoption. On the other hand, compatibility, particularly the perceived fit of drones with existing hiking practices and systems, acts as a key pull factor, encouraging adoption. Inertia, or the resistance to change due to familiarity with traditional methods, emerges as a critical mooring factor, preventing hikers from making the switch to drones. The study's results provide valuable insights into the adoption process of drone technology in ecotourism activities. It highlights the need for targeted interventions that address both the psychological barriers (such as technology anxiety and inertia) and practical considerations (such as compatibility) to facilitate the transition toward drone adoption. The findings are significant for policymakers, ecotourism technology developers, and stakeholders aiming to promote the widespread integration of drone technology in Langkawi ecotourism sector.*

Keywords: *Compatibility, Technology Anxiety, Inertia, Theory Push-Pull-Mooring*

1.0 Introduction

1.1 Background of Study

Drone technology, especially unmanned aerial vehicles (UAVs), is transforming adventure tourism and ecotourism by enhancing experiences, safety, and sustainability. UAVs provide real-time aerial views, aiding hikers and adventurers in navigation and hazard detection, thereby improving safety and decision-making during expeditions.

Equipped with high-resolution cameras and sensors, drones can monitor wildlife, vegetation, and environmental changes without disturbing ecosystems. This non-intrusive approach supports conservation efforts and sustainable tourism practices.

Tourism operators utilize drone footage to create compelling promotional materials and virtual tours, offering potential visitors immersive previews of destinations. This strategy is both cost-effective and environmentally friendly compared to traditional methods.

In Malaysia, initiatives like the National Technology and Innovation Sandbox (NTIS) support the integration of drone technology across various sectors, including tourism. Companies are developing drones for tasks such as monitoring natural habitats and enhancing visitor experiences in ecotourism destinations.

In summary, drones are revolutionizing adventure tourism by offering unique perspectives, improving safety, and promoting sustainable practices. Understanding the factors influencing their adoption can help stakeholders effectively integrate this technology into tourism strategies. The use of drone technology in adventure activities, specifically unmanned aerial vehicles (UAVs), has rapidly progressed, becoming an essential tool in precision adventure tourism activities

1.2 Problem Statement

Malaysia's ecotourism sector, especially in Langkawi, still relies heavily on manual and labour-intensive methods for adventure activities like hiking and security monitoring. These outdated practices are inefficient, costly, and prone to error, making it hard to manage large-scale operations. Drones (UAVs) offer a promising solution by improving monitoring, reducing labour, and supporting sustainable practices through precise data collection.

However, despite these benefits, drone adoption among hikers remains low. Factors such as technology anxiety, resistance to change, and lack of awareness contribute to this slow uptake. This study uses the Push-Pull-Mooring (PPM) model to explore what drives or hinders hikers' intention to switch to drone technology. Addressing these factors is key to modernizing ecotourism and minimizing environmental impacts like trail overuse and biodiversity loss.

1.3 Study Objectives

The general objective of this study is to explore factors influencing switching intention to use drones among hikers using the push-pull-mooring (PPM) model theory. The aim of this study can be achieved by following the objectives below:

i. To identify the push factors that prevent hikers from switching intentions to use drones.
ii. To examine the pull factors that attract hikers towards switching intention to use drones.
iii. To investigate the mooring factors that influence hikers switching intention to use drones.

1.4 Study Research

i. What are the push factors that prevent hikers from switching their intentions to use drones?

ii. What are pull factors that attract hikers switching intention to use drones?
iii. What are the mooring factors that influence hikers switching intention to use drones?

1.5 Scope of Study

This study focuses on identifying factors that influence hikers' intention to adopt drone technology in Langkawi using the Push-Pull-Mooring (PPM) model. It targets full-time hikers familiar with traditional methods but with limited drone experience. A quantitative survey approach will be used to assess push factors (e.g., technology anxiety), pull factors (e.g., compatibility), and mooring factors (e.g., inertia). While findings are specific to Langkawi, they provide valuable insights into technology adoption in ecotourism.

1.6 Significance of Study

The study benefits hikers by highlighting how drone technology can enhance efficiency, reduce costs, and improve sustainability in ecotourism. It also supports tech companies in developing user-friendly drones and training programs. Ultimately, the findings can help modernize ecotourism practices, boost hiker productivity, and guide policy and technological development for a more sustainable adventure tourism sector.

1.7 Definition of Term

Table 1: Definition Of Term

NO	TERM	DEFINITION	SOURCES
1.	Compatibility	Compatibility related to user experience with new technology that aligns with previous technology causes familiarity in using that technology.	Thi Khanh Chi & Hoang Nam (2023); Wang et al. (2017)
2.	Inertia	Inertia is a person's behaviour that shows an unchanging pattern or an individual's resistance to change even though the available alternatives are better.	Dogra et al. (2023)
3.	Technology anxiety	Technology anxiety can be defined as a person's feeling of being very nervous, worried, uncomfortable, or confused about the adopted technology and has the potential for adverse effects if using it.	Lenz et al. (2023)
4.	Switching intention	Switching intention is the consumer's desire to behave based on their previous attitude towards the object and behaviour.	Anggraini et al. (2022)

2.0 Literature Review

2.1 Push-Pull-Mooring (PPM) Model Theory

The Push-Pull-Mooring (PPM) theory, originally developed in the context of migration studies, has been widely adopted to explain the factors influencing individuals' decisions to switch from one service, technology, or practice to another. (Nayak et al., 2022) This framework is particularly useful in understanding behavioural shifts in various domains, including technology adoption, consumer behaviour, and ecotourism practices. The PPM model comprises three key components: push factors, pull factors, and mooring factors, which collectively explain the dynamics of switching behaviour (Lenz et al., 2023).

Push factors are the negative aspects of an individual's current situation that drive them to seek alternatives. In the context of ecotourism practices, these factors may include inefficiencies in traditional methods, such as labour-intensive tasks, poor security monitoring, and time constraints, which often result in reduced productivity and increased costs for hiking activities. These limitations create dissatisfaction and frustration, compelling hikers to explore new technologies like drones as potential solutions (Lenz et al., 2023). Similarly, in the context of technology adoption, push factors might include the limitations or inefficiencies of existing technologies that prompt users to seek more advanced or efficient alternatives (Dogra et al., 2023).

Pull factors, on the other hand, represent the attractive elements of the alternative option that draw individuals toward it. In adventure activities, the precision, efficiency, and advanced capabilities of drone technology, such as crop health monitoring and act as strong pull factors. These benefits address the limitations of traditional methods, offering hikers a more effective and accurate way to manage their trekking activities more efficiency. In other contexts, such as consumer behaviour or technology adoption, pull factors might include the perceived benefits, ease of use, or enhanced features of a new product or service that make it more appealing than the current option (Wang & Shin, 2022).

Mooring factors are the personal, social, or situational elements that either facilitate or hinder the switching process. These factors can include resistance to change, cost concerns, lack of technical knowledge, or established social norms. In the case of drone adoption, mooring factors such as high costs, regulatory concerns, and a lack of familiarity with the technology can act as barriers to adoption (Lenz et al., 2023). In other scenarios, mooring factors might include an individual's self-efficacy, motivation, or the influence of peer behaviour, which can either encourage or discourage the transition to a new technology or practice (Dogra et al., 2023).

The PPM framework provides a comprehensive lens for understanding the complex dynamics of switching behaviour, whether in the context of ecotourism technology adoption, consumer behaviour, or other domains. By identifying the push, pull, and mooring factors specific to a given context, researchers and policymakers can develop targeted strategies to facilitate smoother transitions and enhance the adoption of new technologies or practices.

2.2 Hypothesis Development

This section describes the independent and dependent variables in more detail and clarity. The independent variables use in this study for pull factors is compatibility. For mooring factor is inertia and push factor are technology anxiety. The dependent variable used is switching intention.

2.2.1 Compatibility (Pull factor)

Compatibility, defined as the uniformity and accuracy of service drones, plays a crucial role in the adoption of drone technology, particularly in adventure activities (Thi Khanh Chi & Hoang Nam, 2023). It is strongly associated with user experience, as familiarity with previous technologies enhances ease of use and encourages adoption (Wang et al., 2017). Additionally, compatibility related to self-efficacy and lifestyle positively influences individuals' attitudes toward drones, fostering a stronger intention to integrate them into daily practices (Sham et al., 2023). This alignment between users' needs and technological functionalities enhances the likelihood of acceptance, especially when it facilitates a smoother transition from traditional methods.

In the ecotourism sector, compatibility also enhances the perceived value of drones by improving functionality, such as providing detailed data on finding trail and security through remote monitoring. Hikers can utilize drones to gather sensitive information, such as unsafety areas, and high-risk management data, without compromising privacy (Thi Khanh Chi & Hoang Nam, 2023). The ease of integrating drone technology into existing practices can significantly influence switching intentions, as users are more likely to adopt drones when they find them more efficient and comfortable than traditional methods. Importantly, this shift does not depend on cost considerations, as the compatibility of drones often outweighs concerns about preparation or maintenance expenses.

Moreover, compatibility is one of the four key factors that drive technological innovation in adventure activities, alongside relative advantage, trialability, and observability, which reduce complexity (Chen et al., 2023). The higher the compatibility with existing systems, the more likely users are to adopt drones, leading to increased innovation and efficiency in ecotourism practices. This confidence in the effectiveness and ease of drone use further encourages switching from older, less efficient methods, ultimately contributing to greater technological advancement in the sector. Previous study by Liu et al (2019), highlighted that compatibility positively influence switching intention. Therefore, the study proposed:
H1: Compatibility of drone technology positively influences hikers' intention to switch to using drones in adventure practices.

2.2.2 Inertia (Mooring factor)

Inertia, defined as an individual's resistance to change despite the availability of better alternatives, significantly influences behavioural patterns and the adoption of new technologies (Dogra et al., 2023). It diminishes the perceived usefulness and ease of use of alternatives, leading to a preference for familiar, established methods over newer, more efficient solutions such as drones. The negative impact of inertia on switching intentions is particularly evident

when individuals continue using outdated methods, even in the presence of superior technological advancements. In adventure activities, this resistance to change poses a challenge to the widespread adoption of innovative tools like drones, which offer greater efficiency and precision.

Mooring factors, such as inertia, exert a strong influence on the ecotourism sector, where resistance to adopting new technologies can hinder innovation and growth. The effect of inertia in adventure activities is particularly problematic, as it prevents hikers from embracing advancements like drones for tasks such as finding new trail, and security control. Internal factors, such as positive experiences with traditional methods, contribute to this inertia, as users often prefer familiar processes that have provided satisfactory results in the past (Cui et al., 2021). Additionally, a lack of exposure and information about the benefits of new technologies, such as drone usage, further reinforces this resistance. The absence of adequate knowledge or awareness about drone applications leads hikers to rely on traditional methods, thereby limiting their potential for higher productivity.

Risk aversion is another critical factor contributing to inertia in ecotourism practices. Hikers who are reluctant to adopt new methods due to the perceived risks associated with innovation tend to maintain outdated approaches, despite the availability of more effective alternatives (Cui et al., 2021). This aversion to risk not only stalls technological progress but also prevents the ecotourism industry from achieving greater efficiency. Inertia thus inhibits the transition from traditional to modern methods, such as drone usage, resulting in a stagnation of ecotourism practices. Ultimately, the combination of limited exposure, fear of risk, and a preference for familiar methods underpins the persistence of inertia, which continues to hinder the broader adoption of innovative ecotourism technologies. Previous study by Gray et al. (2017) showed that inertia negatively affects switching intention. Therefore, the study proposed:
H2: Inertia negatively influences hikers' intention to switch to using drones in ecotourism practices.

2.2.3 Technology Anxiety (Push Factor)

Technology anxiety refers to an individual's feelings of nervousness, discomfort, or confusion when adopting new technologies, often leading to negative consequences in decision-making processes (Lenz et al., 2023). This anxiety can stem from concerns related to security and privacy, as users may be uncertain about the safety of their personal information. In the context of ecotourism technology, such as drones, hikers who experience technology anxiety may be hesitant to explore its potential benefits. For instance, despite the advantages drones offer in facilitating tasks like pesticide application, hikers with high levels of technology anxiety may not fully utilize these innovations due to their discomfort with unfamiliar systems.

Moreover, technology anxiety serves as a mediating factor in shaping users' risk perceptions, ultimately affecting their intentions to switch to new technologies. The uncertainty surrounding the outcomes of using drones, coupled with a lack of knowledge or experience, can amplify feelings of doubt and hesitation (Xie et al., 2022). These doubts may result in a reluctance to adopt drones, even when the potential benefits are well-established. In addition, anxiety related to perceived risks—such as data breaches or operational failures, can significantly hinder the

intention to replace traditional methods with drone-based solutions. As a result, hikers who experience heightened anxiety about technological risks are less likely to integrate drones into their ecotourism practices, thus slowing the rate of innovation.

Finally, privacy concerns are a significant contributor to technology anxiety, particularly when users perceive a high level of risk associated with the potential loss of sensitive data. For example, hikers may worry that data or video information about their activities could be stolen or compromised, leading to a loss of control over critical ecotourism information. (Xie et al., 2022) Such privacy concerns can exacerbate technology anxiety, further influencing switching intentions and discouraging the adoption of drones. The severity of these perceived risks can create a barrier to the effective use of drones, preventing users from fully benefiting from the technology's capabilities in improving ecotourism efficiency and precision. (Leong & Koay, 2023) Based on a previous study by Xie et al. (2022), an increase in technology anxiety can decrease users' intention to switch. Hence, the study proposes:
H3: Technology anxiety negatively influences hikers' intention to switch to using drones in ecotourism practices.

2.2.4 Switching Intention

Switching intention is defined as the concept of the consumer's desire to behave based on their previous attitude towards the object and behaviour. Next, switching intention is the consumer's probability or certainty of switching from the current product to the new product. The phenomenon of business competition affects behaviour changes due to dissatisfaction or other problems, leading to loyalty to one product and switching to another (Anggraini et al., 2022). Switching intention refers to the likelihood or intention of a user to change from one product or service to another. It concerns substituting a pre-existing product or service, whereas adoption intention refers to the initial decision to use a particular product or service (Sham et al., 2023). Switching intention is a theory in determining the study of consumer behaviour after purchase. It can be defined as behaviour that tends to change as the degree to which a buyer is likely to switch from an existing product or service to an alternative product or service that is more preferred and has appeal (Nguyen et al., 2022).

Next, switching intentions can also occur because one's behavioural intention, where the hiker's intention to use drone technology improves with an increase in one's perception. For example, perceived ease of use of technology, self-efficacy, verifiability of results, perceived external control, enjoyment, quality of output, and job relevance. Next, hikers who are not afraid, nervous, or anxious about technology are more inclined to adopt drone services, increasing the acceptance of using drones due to the hikers' willingness to use digital technology increases and their behavioural intention to use technology also increases. (Frempong et al., 2020).

In this current study, the switching intention variable from the PPM theory is used as a dependent variable to be understood hikers' behaviour from using old methods to switching to using drones in adventure activities. Next, switching intention is influenced by push, pull and mooring (PPM) factors. Compatibility is a pull factor while inertia is a mooring factor and technology anxiety is a push factor by using the PPM theory to determine the response to the dependence variable that is switching intention. The previous study by Iranmanesh et al. (2022)

has researched about determinants of switching intention from web-based stores to retail apps. Besides, there is also a study from Sham et al. (2023) to study users switching intention from using traditional postal methods to drone delivery services. According to this study can be explained about factors influencing switching intention to use drone among hikers. Figure 2.1: Illustrates the research framework of the study.

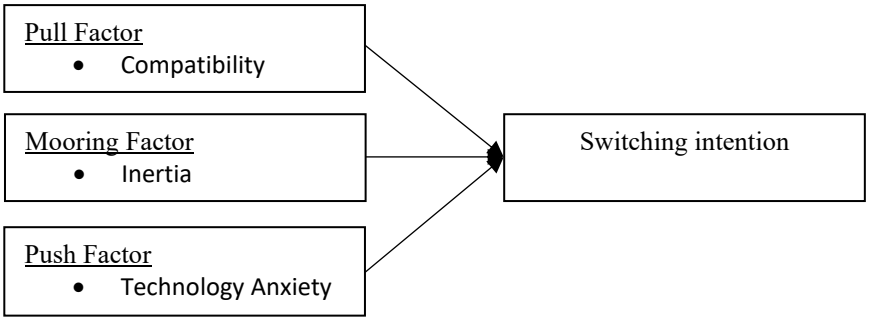


Figure 1: Research Framework

3.0 Materials and Methods

3.1 Research Design

This research used a quantitative approach, specifically a survey questionnaire. This method enables the efficient collection of data from a large sample of hikers, enabling the identification of significant relationships between the independent and dependent variables. The factors influencing hikers' intention to switch to drone usage include pull, mooring, and push factors, with compatibility representing the pull factor, inertia as the mooring factor, and technology anxiety as the push factor PPM model serves as the basis of this investigation. To ensure significance, the findings of this study need to be tested on hypotheses that affect the relationship between two or more variables.

3.2 Research Sampling

This study uses non-probability sampling, specifically convenience sampling. This method is selected because it allows for the inclusion of participants based on their availability and willingness to participate, which is practical given the study's focus on hikers in Langkawi. Convenience sampling is advantageous when time and resources are limited, as it provides access to participants who meet the study's criteria without the need for more complex sampling techniques. The hikers selected for this study include those with experience in traditional adventure tourism activities methods and some awareness of drone technology, ensuring that the sample consists of individuals who can offer relevant data on the factors influencing the intention to switch to drone technology.

Using convenience sampling is appropriate when the researcher aims to gather insights from a readily available group that can provide valuable information. This method allows the study to target hikers who are accessible and likely to contribute meaningful data about their perceptions, experiences, and intentions regarding drone adoption in adventure activities. By employing this approach, the research can effectively explore the factors influencing switching intentions, providing a detailed understanding of the barriers and motivators affecting drone

technology adoption in Langkawi. Additionally, convenience sampling facilitates efficient data collection, enabling the study to align closely with its objectives while capturing the challenges and opportunities specific to hikers in these regions.

For this research, convenience sampling was used by meeting face-to-face with hikers from Langkawi, selecting participants based on their availability and willingness to take part in the study. This approach allowed me to efficiently gather data from hikers with diverse ecotourism backgrounds, including those experienced in traditional adventure tourism activities and those with some awareness of drone technology.

3.3 Population and Sample Size

The population for this study consisted of all hikers in Langkawi known for its diverse ecotourism activities. In these locations, hikers follow various ecotourism practices, including hiking, climbing and trekking. Given the study's focus on understanding the factors influencing the intention to switch to using drones among these hikers, it is important to ensure that the sample represents the broad spectrum of ecotourism activities and demographics in the region. In addition, the role of drones in the ecotourism sector is very important. Therefore, through this study, the researcher can identify problems that cause hikers not to use drones in their daily work. In addition, attraction factors can also be identified to ensure that drone functions can be used by all hikers.

The minimum study sample was calculated through the power of analysis on the G*Power software version 3.1.9.7 (Hair et al., 2019; Ngah et al., 2021), which suggested 43 samples as the minimum sample size for the present study with three predictors to achieve a power of 80% at a medium effect size (0.15) and 0.05 confidence level.

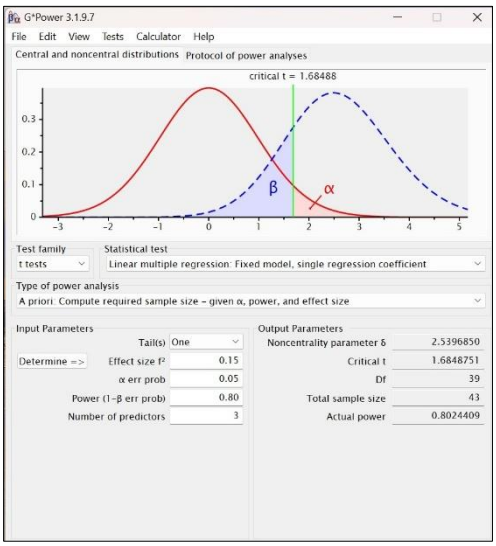


Figure 2: Sample size calculation using G*Power software

3.4 Data Collection

Primary data was collected through a structured questionnaire distributed via convenience sampling. The questionnaire was divided into two sections: Part A gathered demographic information, including age, gender, education level, and adventure tourism activities experience, while Part B focused on assessing the key variables influencing hikers' switching intentions to adopt drone technology. The variables measured included compatibility, inertia, technology anxiety, and switching intention. Part B employed a Likert scale, where respondents indicated their level of agreement with each statement, ranging from 1 (strongly disagree) to 5 (strongly agree). Data collection was conducted through face-to-face interviews with hikers across Langkawi. This method allowed for direct interaction with the participants, providing clarity and ensuring that responses accurately reflected their perceptions and experiences regarding drone adoption. Hikers from various ecotourism backgrounds, regardless of the activities they cultivated, were included to ensure a diverse and representative sample.

3.5 Statistical Tools and Data Analysis Approaches

This study uses SmartPLS software and SPSS to analyse the hypotheses According to Hair et al. (2019), Partial Least Squares Structural Equation Modeling (PLS-SEM) is widely used in various fields, including international management, marketing, information systems, and operations management. The PLS-SEM approach is preferred by researchers due to its capability to estimate complex models comprising multiple constructs, indicator variables, and structural pathways, without assuming a specific data distribution.

Smart Partial Least Squares (PLS) is a soft modelling method for Structural Equation Modelling (SEM) that makes no assumptions about the distribution of data (Vinzi et al., 2010). PLS-SEM is particularly useful in scenarios where sample sizes are small, theories are underdeveloped, predictive accuracy is crucial, and the correct model specification cannot be confirmed (Henseler et al., 2009). This makes it an ideal tool for analysing the switching intentions among hikers, where sample sizes may be limited, and the theoretical framework is still being developed.

SPSS, short for Statistical Package for the Social Sciences, is a software tool developed for quantitative data analysis. It allows researchers to compare results from different statistical analyses, including those obtained through PLS-SEM, providing a comprehensive approach to data interpretation. In this study, SPSS was used to perform initial data analysis, descriptive statistics, and preliminary hypothesis testing, ensuring robustness and reliability in the results. All data collected in this study was first used to generate demographic data using SPSS software, providing an overview of the participants' characteristics. Next, SmartPLS was used for all research objectives to develop hypotheses, predict relationships to determine whether the hypotheses are supported, and develop the structural model.

4.0 Result and Discussion

4.1 Data Analysis and Results

This research was conducted by PLS-SEM over CB-SEM for data analysis, as it aligns more effectively with the objective of investigating hikers' willingness to adopt drone technology

(Hair et al., 2018). The data analysis unfolded in two phases. Initially, SPSS version 27 was utilized to assess the demographic characteristics of respondents, computing key descriptive statistics—such as frequencies and percentages to shed light on attributes like age, gender, education, and employment. Subsequently, SMARTPLS facilitated the examination of relationships between the independent variables (IV) and the dependent variable (DV). The procedure began with the evaluation of the measurement model to confirm convergent and discriminant validity, followed by the analysis of the structural model to test the hypotheses. Consistent with the recommendation of Hair et al. (2017), a normality test was conducted using the WebPowertool (https://webpower.psychstat.org/models/kurtosis/results.php?url=46b0a3a3ae631f87eeb4991f39c4f2c0). The results showed Mardia's multivariate skewness ($\beta = 2.520$ $p < 0.01$) and Mardia's multivariate kurtosis ($\beta = 28.530$ $p < 0.01$), indicating that the data were slightly not normal. Since PLS-SEM does not assume normally distributed data, it remained appropriate for this study (Ringle et al.,2015).

4.2 Respondents

A total of 246 respondents participated in this study. Most respondents were male (71.5%), while females comprised 28.5% of the sample. In terms of age distribution, 34.1% of respondents were above 50 years old, 32.5% were between 30 and 39 years, 22.4% were between 40 and 49 years, and 11.0% were aged between 18 and 29 years. Regarding ethnicity, the vast majority were Malay (96.7%), with Chinese respondents accounting for 0.8% and other ethnic groups comprising 2.4%. Most respondents were married (85.0%), while 13.0% were single and 2.0% divorced. In terms of adventure tourism activities experience, 34.6% of the respondents had 1–5 years of experience, followed by 22.8% with 6–10 years, 20.3% with 11–15 years, and 22.4% had more than 15 years of experience. Educational background varied, with 48.4% having completed secondary education, 29.7% having tertiary education, 17.1% having primary education, and 4.9% reporting no formal education. Ecotourism activities size among respondents showed diversity, with 42.3% managing ecotourism activities below 1.0 hectare, 25.6% managing ecotourism activities between 1.1 and 2.0 hectares, 15.0% managing ecotourism activities between 2.1 and 4.0 hectares, and 17.1% managing ecotourism activities above 4.1 hectares. In terms of monthly income, 61.4% of respondents earned below RM 2,500, 32.1% earned between RM 2,501 and RM 7,000, 5.3% earned between RM 7,001 and RM 14,000, and 1.2% earned above RM 14,001.

Table 2: Respondent's profile

Demographic Characteristics	Frequency	Percent (%)
Gender		
Male	176	71.5
Female	70	28.5
Age		
18-29	27	11.0
30-39	80	32.5
40-49	55	22.4
Above 50	84	34.1
Race		

Malay	238	96.7
Chinese	2	0.8
Other	6	2.4
Marital status		
Single	32	13
Married	209	85.0
Divorce	5	2.0
Hiker's experience		
1-5	85	34.6
6-10	56	22.8
11-15	50	20.3
More 15	55	22.4
Education level		
No Formal education	12	4.9
Primary education	42	17.1
Secondary education	119	48.4
Tertiary education	73	29.7
Ecotourism activities size		
Below 1.0	104	42.3
1.1-2.0	63	25.6
2.1-4.0	37	15.0
4.1 above	42	17.1
Monthly income		
Below RM 2,500	151	61.4
RM 2,501 – RM 7000	79	32.1
RM 7,001 – RM 14,000	13	5.3
Above RM 14, 001	3	1.2

4.3 Common Method Variance

Common Method Variance (CMV) can refer to the correlation between different constructs that exist from of using the same measurement methods, not from the constructs themselves (Baumgartner et al., 2021). In this research, a single source was used to getting information from the respondents on the independent and dependent variables; this source can lead to significant concern regarding CMV if respondents are asked to provide their answers simultaneously. So, to prevent the risk associated with CMV, it is important to implement both statistical and procedural methods.

In terms of the procedure method, the study used a different anchor scale to measure the study's constructs. A 7-point Likert scale was used to assess the dependent construct (endogenous construct), while a 5-point Likert scale was used to assess the independent constructs (exogenous construct) (MacKenzie & Podsakoff, 2012). For the statistical method full collinearity was used for the statistical procedure. The study employed this test by regressing all variables against a common variable to ensure that the VIF does not exceed 3.3 for free from CMV (Albtoosh et al.,2022; Kock,2015). Table 4.2 shows there is no bias as all the VIF

for intentions to reuse (ITR), perceived value (PV), traceability (TC), trust, time-saving (TS), and various food choices (VFC) was less than 3.3.

Table 3: Full Collinearity Analysis

	COM	IN	SI	TA
VIF	1.976	1.331	1.992	1.496

4.4 Measurement Model

The two-step procedure for the measurement model conforms with the guidelines for structural equation modelling (SEM) analysis. Convergent validity and discriminant validity are two distinct types of validity.

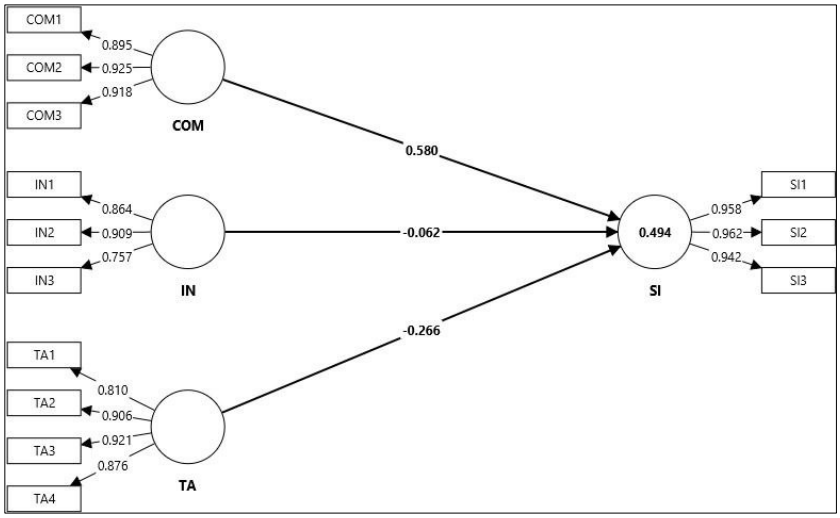


Figure 3: Measurement Model

4.4.1 Convergent Validity

Convergent validity is the quality of the measurement tool, which is usually a collection of question statements (Kock, 2020). A measurement instrument has good convergent validity when respondents interpret the question statement related to each latent variable in the same manner as the designers intended (Kock, 2014). Additionally, convergent validity is used to establish the strength of the relationship between scores obtained from different measurements, and it is important to establish construct validity if a researcher uses two different measurement procedures and research methods. To generate convergent validity, researchers must measure loadings, composite reliability (CR), and average variance extracted (AVE). According to Hair et al. (2019), convergent validity is established when the loading value is greater than 0.70, the AVE is at least 0.5, and the CR reaches a minimum of 0.7.

From Table 3, all loadings were above 0.70, signifying that the indicators have a correlation with the corresponding latent variable. Compatibility (COM1 = 0.895, COM2 = 0.925, COM3 = 0.918) has positive loadings. Inertia (IN1 = 0.864, IN2 = 0.909, IN3 = 0.757) also showed positive loadings. Switching Intentions (SI1 = 0.958, SI2 = 0.962, SI3 = 0.942) showed strong

positive loadings, and Technology Anxiety (TA1 = 0.810, TA2 = 0.906, TA3 = 0.921, TA4 = 0.876) demonstrated positive loadings as well.

Next, composite reliability (CR) was measured to assess the reliability of a set of indicators. The CR value above 0.70 is considered acceptable, while values above 0.90 are not desirable. According to Table 3, the CR values were acceptable across the constructs: Compatibility had a CR of 0.900, Inertia had a CR of 0.806, Switching Intentions had a CR of 0.950, and Technology Anxiety had a CR of 0.901.

Lastly, the average variance extracted (AVE) was measured under convergent validity. The AVE value should be at least 0.50, as the values below indicate more error variance than explained variance. In Table 3, Compatibility had an AVE of 0.833, Inertia had an AVE of 0.715, Switching Intentions had an AVE of 0.909, and Technology Anxiety had an AVE of 0.773, all indicating sufficient convergent validity.

Table 4: Convergent Validity

CONSTRUCT	ITEM	LOADING	Croanbach Alpha	CR	AVE
Compatibility	COM1	0.895	0.900	0.902	0.833
	COM2	0.925			
	COM3	0.918			
Inertia	IN1	0.864	0.806	0.877	0.715
	IN2	0.909			
	IN3	0.757			
Switching Intentions	SI1	0.958	0.950	0.951	0.909
	SI2	0.962			
	SI3	0.942			
Technology anxiety	TA1	0.810	0.901	0.908	0.773
	TA2	0.906			
	TA3	0.921			
	TA4	0.876			

4.4.2 Discriminant Validity

Discriminant validity guarantees that each concept is unique and not excessively associated with other constructs. It verifies that the constructs inside a model assess distinct ideas and do not overlap. Discriminant validity is established when constructs that are logically expected to be unrelated are empirically distinct. As per the directives of Veirman et al. (2011) and Gholami et al. (2013), discriminant validity is an essential assessment for distinguishing across constructs. This research used the HTMT (Heterotrait-Monotrait) ratio to evaluate discriminant validity, in accordance with Franke & Sarstedt (2019), whereby an HTMT value above 0.85 suggests a possible issue with discriminant validity. The study in Table 4.3 indicates that all constructs exhibit HTMT values below 0.85. Hence, the results in this study proved that the model met the discriminant validity requirements of the tested constructs and items.

Table 5: Discriminant Validity

CONTRUCT	COM	IN	SI	TA
COM				
IN	0.237			
SI	0.689	0.335		
TA	0.185	0.530	0.425	

4.5 Structural Model

The bootstrapping method, with 1,000 resamples, was used to evaluate the significance and relevance of the structural model relationships. Five essential criteria were applied to determine whether the hypotheses were supported or unsupported. First, the multicollinearity test was conducted, ensuring that the Variance Inflation Factor (VIF) values were below 3.3 (Diamantopoulos & Siguaw, 2006), indicating no high correlation between independent variables. Second, the t-value needed to be greater than or equal to 1.645 to indicate a statistically significant direct effect (Hair et al., 2017). Third, the p-value had to be less than or equal to 0.05 for statistical significance (Hair et al., 2017). Fourth, the beta values must align with the hypothesized direction (either positive or negative), showing the strength and direction of the relationship. Lastly, there should be no zero value between the lower (LL) and upper (UL) bounds of the confidence interval to confirm the relationship's significance (Hair et al., 2017).

Based on these criteria, two hypotheses were supported, while one was unsupported. The relationship between Compatibility (COM) and Switching Intentions (SI) was significant and positive ($\beta = 0.580$, $t = 10.591$, $p < 0.001$), confirming that higher compatibility increases the likelihood of switching. Similarly, Technology Anxiety (TA) was found to have a significant negative effect on Switching Intentions ($\beta = -0.266$, $t = 4.360$, $p < 0.001$), indicating that higher levels of anxiety reduce the tendency to switch. However, the relationship between Inertia (IN) and Switching Intentions was not significant ($\beta = -0.062$, $t = 0.954$, $p = 0.170$), showing that inertia does not play a meaningful role in switching behaviour in this context. Additionally, the VIF values were all well below the threshold of 3.3, confirming that multicollinearity was not an issue in this analysis. These findings highlight the varying degrees of influence that different factors have on switching intentions, with both Compatibility and Technology Anxiety having significant impacts, while Inertia did not show a meaningful effect.

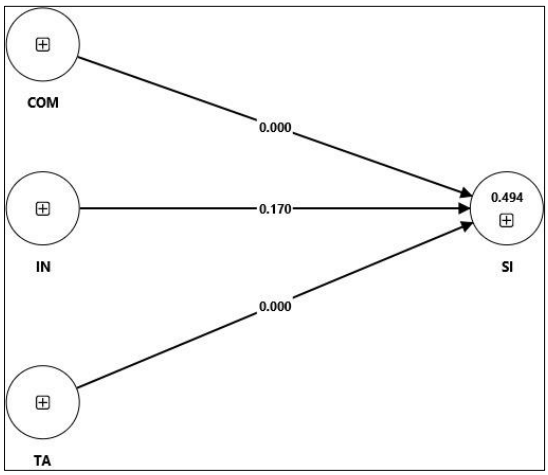


Figure 4: Structural Model

Table 6: Hypothesis Testing/Structural Model

Relationship	Beta	SE	t value	P value	LL	UL	VIF	Decision
COM -> SI	0.580	0.055	10.591	0.000	0.48	0.666	1.053	Supported
IN -> SI	-0.062	0.064	0.954	0.170	-0.172	0.040	1.319	Unsupported
TA -> SI	-0.266	0.061	4.360	0.000	-0.372	-0.168	1.299	Supported

4.6 Discussion

Hikers' decisions to adopt new ecotourism technologies, such as drone technology, are influenced by various factors. This study examines these factors using the Push-Pull-Mooring (PPM) model, providing insights into switching intentions among hikers in Langkawi.

Compatibility (H1): Based on the study by Liu et al. (2019), it is proposed that compatibility, or the perceived fit of drone technology with hikers' existing ecotourism practices, positively influences their intention to switch to using drones. The hypothesis for Compatibility was supported in this study. The beta value was 0.580, with a T-value of 10.591 and a P-value of 0.000, indicating that compatibility plays a significant role in encouraging hikers to adopt drone technology. Hikers who perceive that drone can easily integrate into their current adventure tourism activities operations are more likely to switch. This finding aligns with the idea that technology adoption is higher when there is a perceived fit with existing practices. Ensuring that drones complement traditional methods can further motivate hikers to adopt them.

Inertia (H2): From the study by Gray et al. (2017), it was suggested that inertia, or resistance to change due to established habits or comfort with current practices, negatively affects the intention to switch to new technologies like drones. However, the results from this study did not support this hypothesis. The beta value for Inertia was -0.062, with a T-value of 0.954 and a P-value of 0.170, suggesting that inertia did not have a significant impact on hikers' switching intentions. This finding suggests that hikers are inclined to adopt drone technology due to its potential to provide various conveniences and efficiencies in contemporary ecotourism practices. The openness of hikers to modernizing their adventure tourism activities methods appears to be driven by the promise of substantial benefits, particularly when such innovations are perceived to significantly enhance productivity. This willingness to embrace technological

advancements highlights the importance of demonstrating the practical advantages of drone technology, which can support hikers in optimizing their operations and improving overall efficiency. As a result, hikers are likely to view drone technology as a valuable tool that aligns with their goal of increasing productivity in a competitive ecotourism landscape.

Technology Anxiety (H3): According to Xie et al. (2022), increased anxiety or discomfort with new technology can lower the likelihood of users switching to that technology. This was confirmed in this study. Technology Anxiety had a significant negative effect on switching intention, with a beta value of -0.266, a T-value of 4.360, and a P-value of 0.000. Higher levels of anxiety toward drone technology significantly reduce hikers' willingness to adopt it. This finding emphasizes the importance of addressing psychological barriers through education, training, and demonstrations. Providing hikers with hands-on experience and proper guidance can help alleviate their concerns and increase their confidence in using drones, ultimately encouraging broader adoption.

In short, this study highlights the significant roles of Compatibility and Technology Anxiety in shaping hikers' switching intentions toward drone technology in Langkawi. While Inertia did not have a significant effect, the results emphasize the need for strategies that enhance the compatibility of drone technology with existing practices and reduce technology anxiety through targeted training and support. These efforts will likely foster higher adoption rates of drone technology in adventure activities

5.0 Conclusion

5.1 Introduction

This chapter provides a comprehensive analysis of the theoretical, managerial, and practical implications of the findings from this study, which investigated the factors influencing hikers' intentions to adopt drone technology in adventure activities using the Push-Pull-Mooring (PPM) framework. The chapter also outlines the limitations of the research and offers recommendations for future studies.

5.2 Theoretical Implications

This study employed the Push-Pull-Mooring (PPM) framework to examine the factors influencing hikers' intentions to switch to drone technology in adventure activities. The findings underscore the relevance of the PPM model in understanding hikers' transitions from traditional adventure tourism activities methods to innovative technologies like drones.
The significant positive impact of Compatibility on switching intentions reinforces the role of pull factors, supporting the PPM model's assertion that perceived benefits and alignment with existing practices play a key role in driving technology adoption. This finding aligns with prior studies (Liu et al., 2019), suggesting that when new technologies, such as drones, are perceived as compatible with hikers' existing practices, they are more likely to adopt them. However, this study extends the existing literature by emphasizing the critical importance of showing compatibility in terms of operational fit, ease of use, and integration into traditional adventure tourism activities methods. This opens up avenues for further research into how different dimensions of compatibility influence adoption rates, especially in adventure activities, where technological innovations must seamlessly blend with long-established practices.

The study's findings on Inertia introduce a noteworthy divergence from previous research. Contrary to the expectation that inertia would serve as a major barrier to adoption, the results indicate that inertia has no significant negative effect on switching intention. This challenge traditional views of inertia as purely obstructive and suggests that hikers in this context may not view the transition to drone technology as disruptive to their routines or established habits. This divergence highlights the need for further exploration of how inertia operates in ecotourism settings, where hikers may be more open to adopting modern technologies that promise enhanced productivity. It also suggests that resistance to change in this sector may be less of a psychological barrier and more related to practical or economic considerations.

Technology Anxiety emerged as a significant mooring factor negatively influencing switching intentions, which is consistent with the PPM model's predictions regarding psychological barriers to technology adoption. The results emphasize the role of anxiety in shaping hikers' reluctance to switch to drones, highlighting the importance of addressing psychological concerns through education, training, and support services. This aligns with previous studies (Xie et al., 2022), but this research advances the theoretical understanding of how anxiety functions in ecotourism contexts, where hikers may have limited exposure to sophisticated technologies. By demonstrating the negative impact of technology anxiety, this study encourages future theoretical work to investigate strategies that can mitigate these anxieties, including practical demonstrations, hands-on training, and accessible support networks that can build hikers' confidence in adopting drone technology.

Overall, the findings of this study extend the PPM model's applicability to the ecotourism sector by integrating key context-specific factors such as technology anxiety, compatibility, and inertia. By doing so, this research contributes to the broader understanding of how push, pull, and mooring factors interact in ecotourism technology adoption and highlights the importance of considering psychological and practical barriers alongside perceived benefits. Future studies could further refine the PPM model by incorporating additional variables such as financial incentives, governmental policies, and peer influences, ensuring its relevance across diverse settings and industries where innovation plays a critical role in shaping behaviour.

5.3 Managerial Implications

The findings of this study offer valuable insights for ecotourism stakeholders, policymakers, technology providers, and ecotourism extension services in fostering the adoption of drone technology among hikers. First, these results can help ecotourism policymakers design targeted programs that address hikers' technological anxiety and highlight the benefits of drone adoption. By understanding the factors that drive or inhibit hikers' willingness to switch to drones, government bodies can create awareness campaigns, provide financial incentives, and offer subsidies to ease the transition from traditional adventure tourism activities methods to drone technology.

For technology developers, the results highlight the necessity of creating drones that are easy to use, cost-effective, and tailored to hikers' specific requirements. Manufacturers should prioritize the seamless integration of drone technology with current ecotourism methods, which

will help diminish the perceived difficulties and boost its attractiveness. Additionally, companies could establish on-site training sessions and provide practical demonstrations to alleviate hikers' concerns and foster confidence in drone usage, leading to higher adoption levels.

Ecotourism extension services are vital in converting the possible advantages of drone technology into actionable insights for hikers. By delivering ongoing support and practical training, extension services can serve as facilitators, closing the gap between conventional adventure tourism activities practices and modern technological innovations. The research indicates that extension agents should concentrate on teaching hikers the benefits of drones in areas such as efficiency improvement, yield optimization, and cost savings, ultimately driving greater adoption.

Lastly, this study highlights the significance of collective advocacy for hikers' cooperatives and community leaders in shaping hikers' choices. By disseminating success stories and examples of drone implementation in adventure activities, cooperatives can help shift hikers' perspectives towards embracing innovative methods. Collaboration among hikers, technology providers, and policymakers can enhance the ecotourism sector's capacity to modernize and address the obstacles to adopting advanced technologies like drones.

To summarize, the managerial implications of this research highlight the importance of a comprehensive strategy that includes government backing, accessible technology, ongoing education, and community-focused advocacy to promote the adoption of drone technology in adventure activities. Such initiatives will ensure that hikers are well-informed and more inclined to accept technological advancements that enhance both their productivity and the ecotourism industry as a whole

5.4 Limitations and Future Research

This study provides significant insights into the factors influencing hikers' intentions to adopt drone technology in adventure activities, several limitations need to be addressed, which also suggest avenues for future research.

First, this study did not focus on specific activities that may be suitable for drone technology. Since different activities may require different adventure tourism activities practices, it would be beneficial for future research to investigate how drones can be effectively used for specific activities, such as security monitoring, finding new trail, and safety awareness which are common in Malaysia. This approach would offer more suggestions and insights for hikers, allowing them to use drone technology that best suits their specific activities needs.

Second, this study only focused on hikers in Langkawi, which may lead to non-specific findings. Therefore, future studies should specify the geographical scope by conducting research covering one state in Malaysia, for example focusing on one state in Kedah. Such an approach would allow findings to be more focused and bigger view on one state by considering the diverse adventure tourism activities practices and environmental conditions in the area.

By addressing these limitations, future research can provide a more comprehensive understanding of the use of drones in adventure activities and offer practical guidance for hikers across Malaysia.

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REWINDING MEMORY: AN EXPERIENTIAL AND PARTICIPATORY METHODOLOGY FOR COLLECTING COLLECTIVE MEMORIES THROUGH OBSOLETE TECHNOLOGIES

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Abstract: *This research explores the connection of collective memory, place and obsolete media technologies through a participatory and experiential art installation. Grounded in artistic research methodologies and theories of material culture and psychogeography, the work investigates how vintage technologies such as CRT monitors, VHS players and early digital interfaces can serve as affective triggers for shared memory. The exhibition is structured as a site of memory-making by inviting participants to interact with and respond to relic technologies through curated sensory environments and participatory stations. Data collection methods include observational field notes, semi-structured interviews and creative visitor-generated responses, all of which contribute to a hybrid archive of lived experience and mnemonic expression. By activating nostalgia as a method of inquiry, the project generates insights into how material media mediate personal and collective narratives.*

Keywords: *(Collective Memories, Experiential Exhibition, Participatory Art, Vintage Technology)*

Introduction

In an era dominated by digital media and algorithmically curated memory, the role of obsolete technologies in shaping collective memory is increasingly overlooked. Yet, objects such as cathode-ray tube (CRT) monitors, VHS tapes, cassette players and early computing interfaces persist not only as material remnants of the past through which memory, identity and place are negotiated. This paper explores how vintage media technologies can be mobilized as active components in the collection and reconstruction of collective memory through an experiential and participatory exhibition framework. We investigate how obsolete media can function as mnemonic devices that trigger personal and shared narratives that are spatially, emotionally and historically situated by designing an interactive exhibition that invites participants to engage with vintage technologies. The exhibition is a display of artifacts and at the same time operates as a dynamic memory interface, where participants contribute stories and visual traces to a growing archive shaped by communal interaction.

Memories, Material Culture and Place

The relationship between memories, material culture and place are entangled and mutually organic. Memories are frequently tied in the material world. Physical objects and specific sites

act as repositories or triggers for remembering. Material culture, the tangible expressions of human life such as artifacts, buildings, tools and common items became a medium through which memories are mediated, preserved and performed. At the same time, place offers both the setting and the essence for these processes: it is not just a scene but an engaged contributor in influencing how memories are created, understood, and shared.

Ponty (1945) argues that our memories are not just stored "inside" us but are embodied in the places and objects around us, meaning that the material world participates in shaping our memories. He further emphasized that places and objects are instilled with significance because they are woven into lived experience. Geographical locations, cityscapes and home interiors gather layers of significance through personal experiences, communal traditions and historical occurrences. They are recalled in various ways based on social standings. Memory and location are consistently debated socially and politically. For example, a town can represent a source of community pride for some while serving as a location of pain or exclusion for others. In this manner, place serves as an evolving manuscript page of memory, frequently showcasing power dynamics concerning who is allowed to remember what and which memories are pushed to the margins.

Material Culture, Experience & Participatory Art

Material culture focuses on the relationship between people and their physical objects, offers a valuable framework for understanding participatory art. According to Miller (2010), material culture is not just about objects but about how these objects mediate social relationships and cultural meanings. In participatory art, the objects used, whether everyday items, tools, or media, often become central to the shared experiences between artists and participants.

Participatory art invites collaboration, where meaning is co-produced through engagement with both materials and people. Bishop (2012) emphasizes that in participatory art, the aesthetic experience is relocated from the art object to the interaction itself. However, material objects still play a key role in shaping those interactions. They become what Latour (2005) would call "actants"—non-human agents that influence the outcome of social processes. In this way, the materials used in participatory artworks are not neutral, they are embedded with histories, functions and cultural resonances. Appadurai (1986) used terms a "social life", referring to when vintage or everyday objects are employed in participatory settings, they carry layers of memory, nostalgia, and personal narrative to surface. This is particularly potent when objects are familiar or communal, as it invites participants to project personal meaning and collective memory onto them. When these technologies are reactivated within participatory art installations, they shift from static relics to dynamic interfaces that invite multisensory engagement. This hands-on interaction allows visitors to manipulate outdated media, facilitating personal and collective memory elicitation (Van Dijck, 2007) and enabling forms of storytelling that emerge through use rather than display. Bourriaud's (2002) concept of relational aesthetics emphasized that the artwork becomes a catalyst for social exchange, developing temporary communities through shared encounters with media from the past. These engagements frequently become intergenerational dialogues, as participants bring divergent experiences and memories into contact, highlighting the differential temporalities and affective economies attached to the same technologies (Boym, 2001). Moreover, the archive becomes co-authored, growing organically through user-contributed narratives and interventions.

Archiving as an Artistic Practice

Archiving as an artistic practice involves the intentional collection, preservation and presentation of materials. This practice is often overlooked or marginal, that are recontextualized within an aesthetic or conceptual framework. Rather than serving as a tool for documentation or historical record, the archive in art becomes a critical and generative medium.

Artists who engage with archives do not just preserve the past, but they activate it, reinterpret it and often challenge dominant narratives. In reviving and recontextualizing obsolete media, interrupting the narrative of seamless innovation and surfacing marginalized or forgotten uses, ranging from DIY modifications to subcultural appropriations and non-Western technological adaptations (Huhtamo & Parikka, 2011). These practices constitute "counter-archives" that question hegemonic historiographies and reposition technological obsolescence as a site of critical inquiry rather than loss. Methodologically, this approach aligns with practice-based artistic research (Candy & Edmonds, 2018), where knowledge emerges through the act of making, encountering, and reflecting. It generates situated knowledge (Haraway, 1988), grounded in specific communities, embodied interactions, and temporal entanglements. Staging the archive in experimental and participatory formats, intersecting oral history and reconfigures them through aesthetic and material engagement would foreground the sensorial and the performative as legitimate modes of inquiry and knowledge production.

Psychogeography

Emerging from the mid-20th-century practices of the Situationist International, psychogeography interrogates how urban environments condition psychological responses and behavioral patterns, emphasizing the subjective, often unconscious interactions between individuals and the materiality of the city (Debord, 1955). The dérive, or drift, becomes a method of spatial critique and affective mapping. It reveals how everyday spaces are charged with political, historical, and emotional resonances. Within this research's framework, material culture, encompassing objects, functions as evidence of past human activity and as active agents in the production of place-based meaning (Miller, 1987; Ingold, 2013). These material forms carry embedded narratives that contribute to the affective atmospheres of a site, shaping how places are perceived and remembered. As such, psychogeography offers a critical methodology for exploring the co-constitution of space and memory, situating material culture as central to the lived geographies and cultural imaginaries that emerge through embodied urban practices.

Methodology

Overview

This research adopts a practice-led, participatory methodology centered on the co-production of memory narratives within an experiential exhibition of vintage technologies. Grounded in artistic research inquiry, the method aims to elicit and analyze collective memories by engaging participants in multi-sensory, thematic encounters with obsolete technologies. The process positions memory as a relational and performative act, unfolding within affective and material contexts.

The exhibition was held in a university campus and lasted for 5 days. It was structured around a series of curated "Memory Stations", each representing a thematic zone such as Home, Communication, Play and Learning. These zones feature operational vintage technologies arranged to simulate domestic and public environments from past decades. Within this setting, we embedded enquiry tools to facilitate and capture memory-sharing in both structured and spontaneous forms. We invited open participation from students to faculty staff member, looking into diverse demographics who may or may have not lived an experience with the featured technologies. While the setting is informal and inclusive, participants will have the option to engage more deeply in follow-up interviews or workshops. We utilized analog participatory tools such as memory notebooks and sticky walls placed throughout the exhibition space. These tactile stations shall invite participants to contribute handwritten or drawn responses to open-ended prompts, allowing personal recollections to emerge organically through engagement with the physical materials. Next, participatory observation is used to document spatial behavior, affective responses and interpersonal interactions within the exhibition. We maintained field notes by observing how participants move through and interact with the environment. These observations are supplemented by conversations, which utilize empathy prompts such as "What does this remind you of?" and "Where were you when…" to elicit emotionally resonant memories. Additionally, informal and semi-structured interviews lasting approximately 10 to 20 minutes were conducted with participants who express interest in deeper engagement to gain further insight into individual and shared experiences.



Figure 1: The Curated Memory Stations.



Figure 2: Participants Interacting and Experiencing the Vintage Technologies.

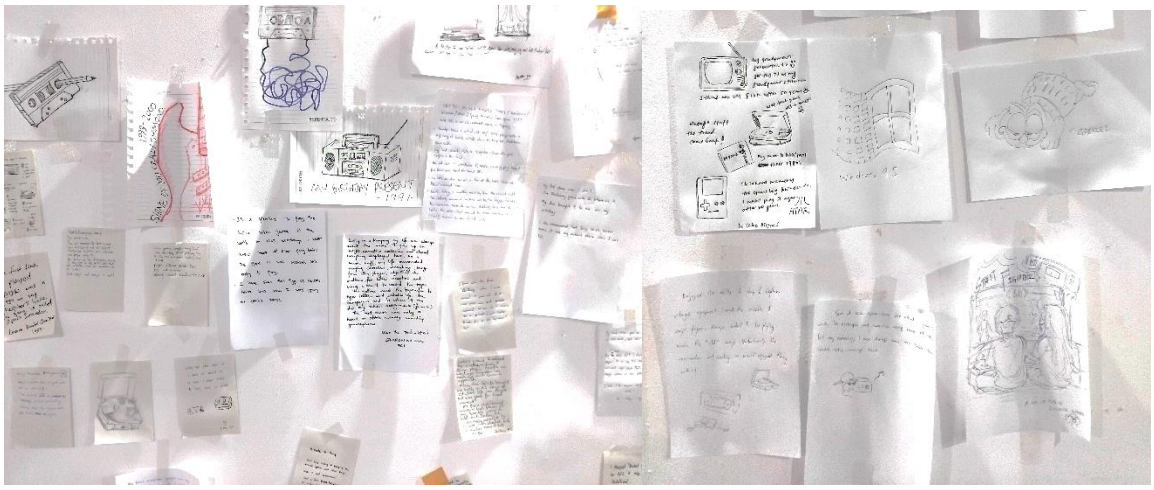


Figure 3: Written notes and drawings on Sticky Wall as Live Memory Archive.

Summary

We referred and utilized this methodology to encourage spontaneous and reflective contributions, hoping to emphasize the embodied act of memory-making. Based on the participatory design of this exhibition project, the data collected revealed significant generational differences in memory content, modes of engagement and affective responses. Older participants contributed their memories grounded in lived experience, often referencing local history, analog technologies and sensory impressions of place. Their engagement were mainly reflective and narrative-driven with emphasis on oral storytelling and a desire to preserve collective identity. In contrast, younger participants approached memory-making through second-hand experiences, often referencing digital culture, aesthetics of retro technology or inherited family stories. Their contributions were more visual, symbolic and playful and they demonstrated a greater willingness to remix or annotate previous entries in the live memory archive. Spatially, older generations responded with nostalgia or sentimentality

to reconstructed places and objects, while younger participants displayed curiosity or irony in engaging with obsolete technologies. The exhibition's open, recursive structure is anticipated to foster intergenerational dialogue, revealing overlapping yet distinct memory worlds that reflect broader cultural shifts in how memory is formed, shared and situated within material environments.

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THE CREDIBILITY OF SOCIAL MEDIA MARKETING IN INFLUENCING E COMMERCE PLATFORMS: CONVERSION RATES

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Abstract: *In the evolving landscape of digital marketing, social media influencers and content creators have emerged as pivotal agents of persuasion, often blurring the boundaries between personal opinion and strategic advertising. This paper investigates the extent to which influencers influence consumer purchase decisions through the perception of consumers. Anchored in empirical research, this study employs a quantitative approach using a five-point Likert scale to assess perceived notions among young adult consumers in Perak, Malaysia. A total of 300 respondents from local universities participated in the study. The analysis centres on three independent variables— advertisement, perceived quality and perceived credibility— and their impact on consumers' trust and intention to purchase. Findings reveal that these variables significantly influence the purchase intention by their perceived credibility of influencers, thereby shaping consumer behaviour on e-commerce and social media platforms. Additionally, the study explores how influencers' strategic control over content, language tone, and platform engagement allows them to mould perceptions and drive conversion rates. Ultimately, the study highlights the perception of influencers and content creators in contemporary influencer marketing, underscoring the need for advertisers to understand and ethically navigate the cognitive triggers that influence consumer behaviour.*

Keywords: *Social media marketing, perceived quality, influencer trustworthiness, consumer perception, conversion rate.*

Introduction

In 2025, almost everyone with a smartphone has at least one social media application on their phone. The magnitude of this phenomena effects the very way we communicate, absorb content and even how and when purchase items. These virtual communication technologies have made its way to the very heart of societies with many being dependent on its capabilities (Yu et al., 2022). It is revealed that more than 4.60 billion people were active internet users around the world, accounting for around 59.5% of the population in the world. Thus, there were 4.32 billion mobile internet users, and 4.2 billion were active users on social media platforms. The advent of the digital economy has transformed the landscape of commerce, where social media and e-commerce platforms are not merely channels of communication but are robust ecosystems for consumer engagement and business transactions. According to Export.Gov (2019), over 16.5 million Malaysians are online shoppers, with a majority accessing shopping platforms via mobile devices. This transformation necessitates a deeper understanding of consumer behaviour, particularly the role of social media marketing (SMM) and the credibility of influencers in shaping e-commerce decisions.

Therefore, social media has become an integral part of the lives of many individuals around the world (Sohaib et al., 2022). Social media has become a critical channel for setting trends, promoting products and brands, and influencing purchase decisions. Although social commerce is inching closer to becoming a standalone channel, it isn't fully developed yet. This creates a necessary interplay between social platforms and traditional e-commerce sites.

This study looks at the influence of social media marketing in driving conversion rates towards e commerce. A conversion rate records the percentage of users who have completed a desired action. Conversion rates are calculated by taking the total number of users who 'convert'- for example by clicking on an advertisement and dividing it by the overall size of the audience and converting that figure into a percentage (Purnomo., 2023). These conversion rates are driven from social media platforms towards a third-party site which are usually e-commerce platforms. The advertisements used in social media marketing is looked at as one of the independent variables, along with the quality of content and the credibility of the social media influencer. When looking at the advertisements, questions using the Likert scale focuses on the content of the advertisements that was presented to the user/ respondents. The advertisements in questions are of sponsored ads and/or stories as well as pop ups on social media platforms. The second independent variable centres on the quality of the content of both advertisements and contents from influencers and key opinion leaders on social media. As an example, in one of the questions given in this set is regarding the authenticity of the content and how genuine the respondent feels towards the content. Whilst the third independent variable looks at the credibility of the influencers on social media emphasizing on trustworthiness. Trustworthiness was highlighted due to a previous study stating a high correlation trustworthiness of an influencer and purchase intentions within the context of social media (De Jans et al, 2018). In this set, the questions are set to the attitudes and perceived credibility of the social media influencers.

In investigating the influence of social media marketing towards e commerce, the objectives of the study are:

RO1: To study the influence of social media advertisement content towards purchase intent click in driving conversion rate.
RO2: To study the influence of perceived content quality towards purchase intent click in driving conversion rate.
RO3: To study the influence of influencer's credibility (focusing on trustworthiness) towards purchase intent click in driving conversion rate.

Methodology

This study employs a quantitative study using a structured survey on a five-point Likert scale with a sample size of 300 respondents using adoptive convenience sampling. Respondents were from the population of undergraduates studying in the Universiti Tunku Abdul Rahman (UTAR) and Universiti Teknologi Mara (UiTM). Both universities are located in Perak, Malaysia as it is more applicable to assess the sample. 80% of the respondents are from UTAR, whilst the remaining 20% of respondents are from UiTM. The majority of the respondent's demographic is from generation z where the age range is from 13 to 28 years old. This is imperative for the study as this cohort reflects widely the use of technology and its affinity

towards a tech savvy generation. The items tested consist of advertising on social media platforms, perceived quality of content, and credibility of influencers (looking at

trustworthiness) along with basic demographic information. The social media platforms tested in this study include Meta (formerly known as Facebook), Instagram, Tiktok and Xiaohongshu (Red Book). The 'e-commerce' in this study refers to all e commerce sites including Malaysian and non-Malaysian based platforms. This includes Amazon, Taobao, Temu, Shoppee, Lazada, Carousel, Mudah etc.

The study focuses on descriptive analysis and correlational studies between the variables using SPSS Statistic 23. Pearson correlation was used to determine any significant relationship between RO1; advertisement content RO2; perceived quality and RO2; influencer's credibility. Within this study, a qualitative approach was also used within the survey as short, structured questions were given to gain a deeper understanding of the reasoning of the respondent's choices. These questions are based on three items which reflects the three objectives – (RO1) advertising content, (RO2) content quality, and (RO3) influencer's credibility.

Theory of reasoned actions was used in this investigation as it provides a framework that demonstrates the influence of an individual's attitude and subjective norms predicts an actual behaviour (Fishbein & Ajzen, 1975). This shows that the actual behaviour stated here relates to the intent of purchasing and driving the conversion rate towards the e commerce platforms.

Findings and Analysis

Table 1: Correlation Analysis between the Advertisement Content, Perceived Quality and Influencer's Credibility Towards Purchase Intent on E Commerce (and Driving Conversion Rate)

	(1)	(2)	(3)
(1) ADVERTISEMENT CONTENT	1	.523*	.477*
(2) PERCEIVED QUALITY	.523*	1	.512*
(3) INFLUENCER CREDIBILITY	.477*	.512*	1

Notes: *Correlation is significant at the 0.05 level (2-tailed).

As the analysis displays, there is a significant relationship between advertisement content, perceived quality and the influencer's credibility towards purchase intent on e commerce in driving conversion rate is supported determining the proposed objective 2 (RO2): There is a significant relationship between perceived quality and the influencer's credibility towards purchase intent on e commerce and is supported with significantly positive correlation [$r = .512^{**}$, $N = 265$, $p < 0.05$].

In addition to the short-structured questions, based on (RO1) advertising content, a theme emerged from the collective response in looking at how the tone and language of social media advertisement might dissuade or persuade the overall intent of the respondents. In investigating (RO2) the perceived quality, respondents highlighted on the control of content quality. Looking at whether its genuine and authentic would influence purchase intent. Whilst (RO3) understanding the influencer's credibility, respondents reflect on the engagement of the influencer highlighting that the better the engagement, the higher the trust towards an influencer would be.

Conclusion and Recommendations

The findings of this study underscore the evolving connection between social media marketing and consumer behaviour in the e-commerce ecosystem. As digital platforms continue to integrate commerce into the social experience, the credibility of marketing content is communicated through influencers and strategic advertising has emerged as a pivotal determinant of consumer trust and intent to purchase. Anchored in the Theory of Reasoned Action (Fishbein & Ajzen, 1975), this research affirms that attitudes shaped by advertisement content, perceived quality, and the credibility (trustworthiness) of influencers significantly contribute to actual behavioural outcomes—namely, conversion rates on e-commerce platforms. From the correlational analysis, it is evident that all three independent variables—advertisement content, perceived content quality, and influencer credibility—demonstrate a statistically significant positive relationship with purchase intent. Advertisement content correlates with perceived quality at $r = 0.523$, and both correlate positively with influencer credibility ($r = 0.477$ and $r = 0.512$, respectively). These results validate the premise that effective social media marketing is not merely about visibility or virality, but the alignment of authentic, well-crafted, and credible messages that resonate with consumers' expectations and values.

Advertisement content emerged as a powerful catalyst for engagement, with respondents noting that clarity, tone, and relevance of messaging could either entice or deter purchase intent. This implies that marketers must be highly deliberate with their language, tone, and visuals, ensuring that advertisements do not appear overly promotional or manipulative, which risks alienating a digitally savvy audience. Perceived content quality, particularly in terms of genuineness and consistency is another critical influence on conversion behaviour. Consumers demonstrated a preference for content that felt *authentic*, rather than staged or algorithmically optimized. When advertisements and influencer content reflect genuine user experiences, emotional resonance, and clear value propositions, trust is more easily established, thereby increasing the likelihood of conversion. Influencer credibility, especially trustworthiness, plays a pivotal role in bridging the gap between awareness and action. Influencers who engage authentically with their audience—responding to comments, sharing personal insights, and maintaining consistency—tend to garner higher levels of consumer trust. Trust, as established in the literature, is a prerequisite for purchase behaviour in online environments, where traditional cues of legitimacy (e.g., physical storefronts or in-person service) are absent. The quality of engagement, rather than just frequency, was seen as instrumental. Influencers who offered thoughtful replies, shared behind-the-scenes experiences, and admitted when a product may not suit everyone were perceived as more *human* and *reliable*. This interactional transparency signals ethical behaviour and enhances perceived integrity. In contrast, influencers who failed to engage with their audience weakened consumer trust and reduced the likelihood of conversion. This insight highlights a crucial point: engagement is not merely a function of content dissemination—it is a trust-building mechanism. The more authentic and reciprocal the engagement, the more likely consumers are to form emotional connections and proceed with purchase decisions. This underscores the dual role of influencers as both entertainers and relational marketers.

Future research could expand on the dimensions of influencer engagement focusing on frequency, responsiveness, emotional tone, and transparency as independent variables influencing purchase decisions and/or intent. Mixed-method studies combining sentiment

analysis of comment sections and consumer interviews could provide richer insights into navigating social media marketing strategies. The integration of social media marketing into the e-commerce continuum is both a challenge and an opportunity. It requires the understanding of digital communication, psychological persuasion, and ethical marketing. By aligning advertisement content, perceived quality, and influencer credibility with consumer expectations and by elevating influencer engagement as a cornerstone of trust, businesses can not only enhance their conversion rates but also foster lasting brand loyalty in an increasingly competitive digital landscape.

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TRIANGULATING QUALITATIVE AND AHP DATA TO DESIGN A SOLAR ENERGY DECISION-MAKING FRAMEWORK: A MALAYSIAN RESIDENTIAL PERSPECTIVE

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Abstract: *Despite Malaysia's high solar potential and the availability of government incentives under programs like Net Energy Metering (NEM 3.0), the adoption of solar energy systems (SES) among household consumers remains significantly low. This study aims to develop a sustainable decision-making framework by triangulating qualitative insights and quantitative prioritization to better understand the key factors influencing SES adoption. A sequential mixed-method design was employed in two phases. In Phase One, thematic analysis of semi-structured interviews with SES adopters under NEM 3.0 revealed six major themes: financial viability, service capability, technology flexibility, company credibility, regulatory feasibility, and external influences. Phase Two applied the Analytic Hierarchy Process (AHP) to these six themes, using pairwise comparisons conducted by SES users to quantify the relative importance of each criterion. The AHP findings revealed that Service Capability (26.07%) and Financial Viability (24.79%) were the most influential factors, while External Influences received the lowest weight. These quantitative results were found to be consistent with the qualitative insights from Phase One, indicating strong convergence between what users expressed narratively and how they prioritized factors when forced to make trade-offs. Based on this triangulation process, a comprehensive SES decision-making framework was developed, reflecting both contextual lived experiences and structured data-driven rankings. This framework provides practical value to policymakers, solar providers, and end users by offering a clear roadmap for promoting residential SES adoption. Methodologically, the study demonstrates the strength of integrating thematic analysis with AHP. Practically, it contributes to Malaysia's renewable energy goals and supports Sustainable Development Goals 7 (Affordable and Clean Energy) and 13 (Climate Action).*

Keywords: *Solar Energy Systems (SES), Decision-Making Framework, Analytic Hierarchy Process (AHP), Thematic Analysis, Household Adoption*

Introduction

In recent years, Malaysia has made notable strides in promoting renewable energy adoption, with solar energy positioned as a key driver toward achieving its sustainability targets under the Sustainable Development Goals (SDG 7 – Affordable and Clean Energy, and SDG 13 – Climate Action) (NRECC, 2024; SEDA, 2023). The nation's solar potential is vast, with average solar irradiation levels ranging between 4.0 to 4.9 kWh/m²/day, making it highly

suitable for SES, particularly for rooftop installations on residential homes (MIDA, 2020; International Energy Agency, 2019). Despite this favourable environmental and technical landscape, the actual adoption rate of SES among household consumers remains modest, especially under the government's Net Energy Metering (NEM 3.0) program (GlobalData Energy, 2019; Chee, 2023).

While incentives and infrastructure are in place, household decision-making around SES adoption continues to be shaped by a complex mix of behavioural, financial, regulatory, and informational factors. Existing studies have highlighted various barriers to adoption, including high capital costs, lack of awareness, concerns about long-term performance, and limited trust in service providers (Ridauddin Daud, 2024; Azman et al., 2021). Moreover, the adoption landscape is further complicated by fragmented findings from previous research, many of which examine influencing factors in isolation, failing to present a cohesive view of the interrelationships that govern consumer decisions (Balcombe et al., 2014; Cheah & Phau, 2022).

Given this context, this study seeks to investigate and integrate both qualitative and quantitative dimensions of household SES adoption in Malaysia. Drawing from a sequential mixed-method approach, the research explores lived consumer experiences through thematic analysis and prioritizes adoption criteria via the AHP (Braun & Clarke, 2006; Saaty, 2008). This triangulated methodology not only captures the nuanced personal and contextual motivations behind SES adoption but also quantifies the relative importance of key factors in consumer decision-making.

Ultimately, the study proposes a comprehensive and sustainable decision-making framework tailored to the Malaysian residential context. This framework is designed to guide households, policymakers, and service providers in fostering informed decisions, improving service alignment, and accelerating the national energy transition toward a greener future.

2. Literature Review

The adoption of SES in household contexts has been examined through numerous interdisciplinary lenses, such as economics, behavioral science, and policy studies. Literature does not, however, present a unified framework that combines these perspectives to capture decision-making in the real world, particularly in specific local settings like Malaysia.

2.1 Models of Technology Adoption

Several theoretical models have been proposed to understand the process of technology uptake. Diffusion of Innovation (DOI) theory, as outlined by Rogers (2003), describes the mechanism through which innovations spread in a population, dividing people into five adopter groups: innovators, early adopters, early majority, late majority, and laggards. However, DOI lacks the specificity to examine consumer-specific patterns of behavior in the SES context.

To address such barriers, the Technology Adoption Life Cycle (TALC) (Moore, 1991) presents the concept of a "chasm" between early adopters and the early majority that explains the adoption stagnation widely observed for solar technologies. At the same time, the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) (Venkatesh et al., 2012) adds to

the discussion of adoption by including factors like performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, and habit. These behavioral constructs were particularly helpful in informing the decision-making framework in this study.

2.2 Adoption of SES In Malaysia

Malaysia has the advantage of stable solar irradiance and a maturing renewable energy policy landscape. Yet, household SES adoption is slower than expected as shown in Table 1 below. The NEM Rakyat Programme's cycle 3 allocation for household consumers is crucial in driving the adoption of SES among household consumers, particularly through its incentive structure. Despite the allocation of 250 MW, only 171.61 MW of applications have been submitted, of which 157.03 MW have been approved. The remaining 78.39 MW (31.36% of the total quota) highlights a shortfall in the adoption rate among household consumers to be completed by year end of 2024.

Table 1: NEM Rakyat Allocation and Take Up Rate

NEM Rakyat Programme	MWac
Total Allocation (NEM Rakyat)	250.00
Quota Applied	171.61
Total Quota Approved	157.03
Quota Balance to the date 2024	78.39 (31.36%)

Source: SEDA (2024)

GlobalData (2019) shows that there are not many rooftops solar opportunities being tapped. Ridauddin Daud (2024) and Zahari et al. (2024) inform that despite various subsidy programs like NEM 3.0 and SolaRIS, household adoption is deterred by the high upfront capital investment, low awareness, and regulatory ambiguity. Based on Figure 1.1, Malaysia had a total of approximately 4.55 million buildings as of 2021 with an estimated total roof area of 720.6 km² available for solar installation (MyRER, 2021). Additionally, residential buildings contributes the highest percentage in terms of building type which taking up approximately 22.7 GW of potential, split between 3.9 million houses.

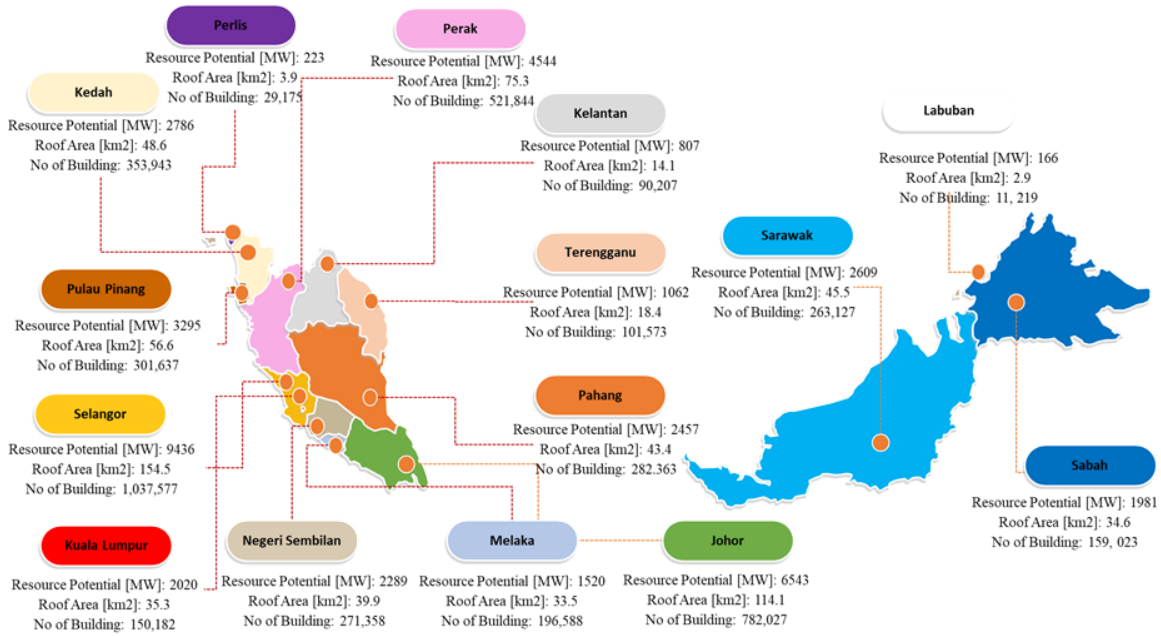


Figure 2: Summary of Building Assessed for Rooftop Solar PV
Source: MyRER,2021

Azman et al. (2021) discovered financial feasibility, with worries over payback periods and upkeep expenses, to be a main discouragement. Likewise, Bao et al. (2020) and Balcombe et al. (2014) recognized long-term return on investment (ROI) issues to be significant in domestic SES choices. Research conducted by Batel (2020) and Palm & Eriksson (2018) highlights the importance of social proof and provider credibility in shaping decision-making among households, thereby illustrating the prevailing trust deficit in the market. While some studies discuss SES adoption in the Asia-Pacific region (Sovacool, 2014), they do not delve specifically into Malaysian household-level results, particularly those under schemes like NEM 3.0.

3. Research Gap and Motivation

Despite the proliferation of solar energy initiatives in Malaysia, household adoption of SES has not progressed at the pace anticipated by national energy planners. As of 2024, participation in the NEM 3.0 Rakyat program remains critically low, with less than 17% of allocated household capacity fulfilled (SEDA, 2024). This shortfall threatens Malaysia's ability to meet its renewable energy mix target of 31% by 2025 and 40% by 2035 (Nik Nazmi, 2024). The underperformance indicates a deeper problem: SES adoption is not merely a matter of affordability or technical feasibility, but rather the result of complex decision-making processes shaped by household perceptions, behavioral patterns, service quality, and policy trust (Ridauddin Daud, 2024).

Most prior research has adopted either a techno-economic or behavioral lens, rarely integrating the two to reflect the nuanced decision-making pathways of real adopters. For example, financial concerns such as upfront capital and payback period are often studied in isolation from qualitative factors like service reliability or company reputation (Azman et al., 2021; Balcombe et al., 2014). This has led to fragmented findings that fail to offer a unified or actionable roadmap for stakeholders. Moreover, many models are intention-based (e.g.,

surveys of willingness to adopt) and are not grounded in the experiences of actual SES users, thereby limiting their predictive and prescriptive power (Chee, 2023; Cheah & Phau, 2022).

The theoretical frameworks traditionally used such as the DOI (Rogers, 2003), TALC (Moore, 1991), and UTAUT2 (Venkatesh et al., 2012) are useful in explaining general adoption trends, but they lack specificity in capturing Malaysia's regulatory and market conditions. Particularly, they do not account for the layered influence of national programs like NEM 3.0, nor the dual role of consumers as both energy users and micro-producers under net metering mechanisms.

Methodologically, there is a clear gap in studies that combine qualitative depth with quantitative structure. While qualitative interviews capture lived experiences and contextual subtleties, they lack the capacity to quantify the relative weight of decision factors. Conversely, purely quantitative approaches like Structural Equation Modelling (SEM) or regression analysis require predefined constructs and often ignore the rich narratives that shape consumer behavior. This research addresses that gap by triangulating thematic analysis (Braun & Clarke, 2006) with the AHP (Saaty, 2008), thereby integrating subjective meaning-making with objective prioritization.

The motivation behind this study lies in its potential to generate a holistic and operational decision-making framework for SES adoption among Malaysian households. By focusing on actual adopters under the NEM 3.0 scheme, the study contributes real-world insight into what factors matter most and in the adoption journey. This framework not only assists policymakers in aligning incentives with user needs but also helps solar service providers tailor their offerings to meet expectations in service delivery, technical support, and credibility. In doing so, the study contributes both methodologically and practically to Malaysia's clean energy transition, supporting national policy objectives and Sustainable Development Goals (SDG 7 and SDG 13).

4. Methodology

This study adopts a sequential exploratory mixed-method design grounded in pragmatism, aligning with the study's objective to develop a sustainable decision-making framework for SES adoption among Malaysian household consumers. The methodology is structured in mixed methods that separated into two distinct yet integrated phases: (1) qualitative exploration through thematic analysis, and (2) quantitative prioritization using the AHP.

4.1 Research Philosophy and Strategy

This study adopts a pragmatic epistemological stance, allowing for the integration of both subjective insights and objective evaluation (Lincoln & Guba, 1985; Creswell, 2024). The approach to theory development is inductive in the qualitative phase—aiming to explore themes emerging from participants' lived experiences—and deductive in the quantitative phase, where the derived themes are tested and ranked using structured comparisons (Peirce, 1958; Combemale et al., 2024).

An exploratory strategy was employed through semi-structured interviews, while a survey-based strategy guided the AHP instrument, both aligning with a mixed-method design (Creswell & Poth, 2018; Akotia et al., 2024). The study is cross-sectional in nature, capturing

decision-making data at a single point in time (Braun & Clarke, 2006). For data collection and analysis, thematic analysis was applied in the qualitative phase, while the AHP structured the quantitative assessment, offering a dual lens understanding of SES adoption priorities (Saaty, 2008). The summary of this study is outlined in Table below.

Table 2: Research Approach

No	Properties	Approach Use for This Study		Reference(s)
		Qualitative	Quantitative	
1	Philosophy	Epistemology (Pragmatism)		Lincoln & Guba, 1985; Creswell 2024
2	Approach to Theory Development	Inductive	Deductive	Peirce, 1958; Fowler, 2014
3	Strategies	Explorative	Survey	Creswell & Poth, 2018).
4	Methodologies Choice	Mixed Method (Semi- Structure Interview)	Mixed Method (Pairwise Comparison Questionnaires)	Akotia et al., 2024
5	Time Horizon	Cross Sectional		Braun & Clarke, 2006
6	Technic and Procedure	Thematic Analysis	AHP Analysis	Saaty, 2008

4.2 Phase 1: Qualitative Design – Thematic Analysis

The qualitative phase of this study aimed to explore the lived experiences, perceptions, and contextual motivations influencing household adoption of SES under Malaysia's Net Energy Metering (NEM 3.0) program. Adopting a epistemological lens, the study sought to generate deep, user-centric insights that would inform the subsequent prioritization framework. A purposive sampling strategy was employed to select nine residential participants who met three specific criteria: (1) ownership of a landed property; (2) installation of rooftop SES under the NEM 3.0 scheme; and (3) completion of at least one full billing cycle. These inclusion criteria ensured that participants had sufficient engagement to reflect on both pre-installation decision-making and post-installation performance experiences.

Data collection was conducted via semi-structured interviews, a method well-suited for uncovering nuanced meanings and behavioral context (Creswell & Poth, 2018). Interviews lasted between 40 to 90 minutes and followed an open-ended guide designed around key SES adoption themes. All sessions were audio-recorded, transcribed verbatim, and anonymized to preserve data integrity and respondent confidentiality. These methodological steps reflect best practices in qualitative inquiry and were particularly useful in maintaining trust and enabling participants to speak freely (Braun & Clarke, 2006).

Thematic analysis was used to process the data, following the six-phase framework developed by Braun and Clarke (2021): (1) data familiarization, (2) code generation, (3) theme searching,

(4) theme reviewing, (5) theme defining and naming, and (6) report writing. This iterative and inductive process was supported by ATLAS.ti 9 software, which facilitated the systematic organization of codes, excerpts, and emerging themes (Friese, 2019). A total of 601 meaning-laden excerpts were coded, generating 68 initial codes, which were then organized into 24 sub-themes and subsequently grouped into six main themes: Financial Viability, Service Capability, Technology Flexibility, Company Credibility, Regulatory Feasibility, and External Influences.

To ensure coding consistency and thematic reliability, the study conducted Inter-Rater Reliability (IRR) testing using Cohen's Kappa, a robust statistical measure for agreement between independent raters. A κ value of 0.9205 was obtained, which, based on the benchmarks established by Landis and Koch (1977), represents "almost perfect agreement". This high IRR value confirms the credibility and trustworthiness of the thematic structure and suggests minimal bias in the interpretation of participants' responses (McDonald et al., 2019).

The outputs of this phase provided the conceptual foundation for the second phase of the study, where these themes were converted into criteria and sub-criteria for quantitative prioritization using the AHP. The integration of this qualitative rigor ensured that the final decision-making framework is both data-grounded and reflective of actual user experiences, contributing to its practical validity and scalability.

4.3 Phase 2: Quantitative Design – AHP Prioritization

Building upon the qualitative findings, the second phase of the study employed the AHP to quantitatively prioritize the six main themes identified in Phase 1. AHP was selected for its ability to transform complex, multi-criteria decision problems into a structured hierarchy, allowing for systematic pairwise comparisons of factors based on participant judgment (Saaty, 2008; Ahmad & Tahar, 2014). This method aligns well with the study's aim of developing a pragmatic and data-driven SES decision-making framework that balances both subjective perception and objective weighting.

To maintain alignment and strengthen the internal validity of the triangulation process, the same cohort of nine SES adopters from the qualitative phase was retained. This consistency ensured that the criteria evaluated in AHP were based on the participants previously expressed lived experiences and that judgments were made with contextual continuity in mind (Creswell & Poth, 2018).

The AHP process involved (1) constructing hierarchical decision models, (2) developing pairwise comparison matrices, (3) normalizing values, (4) calculating priority vectors, and (5) validating consistency through the Consistent Ratio (CR). A CR value below 0.10 was used as the threshold for logical consistency in judgments (Saaty, 2008). All matrices in this study met this benchmark, ensuring reliable quantitative outputs.

Lastly, the use of AHP in this context provided two strategic advantages: first, it quantified the relative importance of criteria that were previously explored only qualitatively, and second, it allowed for transparent traceability in how stakeholder preferences are reflected in the final framework. This strengthens both the methodological rigor and the applied relevance of the research for decision-makers and practitioners in the Malaysian renewable energy sector.

4.4 Triangulation And Integration

The findings from both the qualitative and quantitative phases were systematically triangulated to construct a consumer-oriented decision-making framework for Solar Energy System (SES) adoption. This integration not only enhanced the depth and reliability of the results but also ensured that the framework reflects both behavioral realities and prioritization logic. The thematic insights provided rich, grounded narratives about the motivations and constraints faced by household SES adopters, while the AHP added structural weight to those themes by ranking them based on relative importance.

The triangulation process also addressed key methodological concerns commonly seen in SES research such as the over-reliance on either purely qualitative or quantitative approaches by adopting a mixed-methods strategy rooted in pragmatism (Creswell & Creswell, 2018). This design ensured that qualitative depth informed quantitative precision, resulting in a model that is empirically validated, contextually appropriate, and directly applicable for use by both policy institutions and solar service providers.

The overall methodological process, including the transition from thematic analysis to quantitative prioritization and the construction of the decision support framework, is summarized in Figure 2. This figure visually maps out the sequential logic and analytical integration that underpin the research design, reinforcing the transparency, rigor, and applicability of the proposed model.

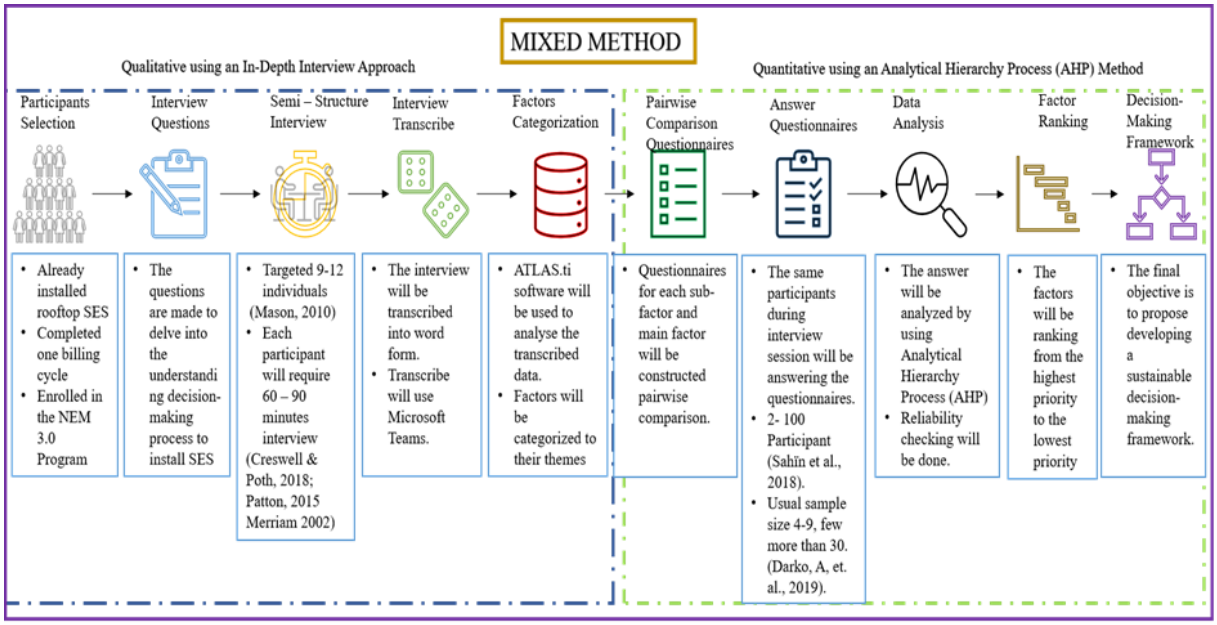


Figure 3: Summary of Research Design

5. Findings and Discussion

This section presents the results from the two-phased sequential mixed-method approach, followed by an integrated discussion of the triangulated findings. The findings respond to the

study's objective of developing a consumer-centric, evidence-based decision-making framework to enhance household adoption of SES in Malaysia under the NEM 3.0 program.

5.1 Phase 1: Qualitative Approach – Thematic Analysis

Thematic analysis of 601 coded excerpts (Figure 3) drawn from in-depth interviews with nine residential SES adopters revealed six major themes that significantly influence household decisions regarding SES adoption under NEM 3.0 program from 68 initial codes and further refine into 24 axial codes (Table 3).

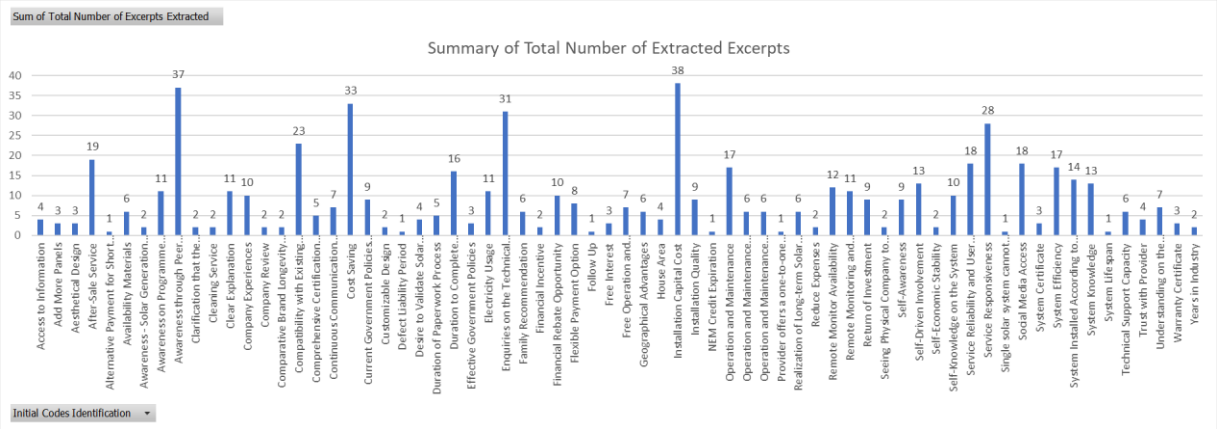


Figure 4: Summary of Total Number of Extracted Excerpts

Table 3: Axial Coding Identification

No	Initial Code	Axial Coding
1	Continuous Communication with Provider	Access To Information
2	Social Media Access	
3	Access To Information	
4	Family Recommendation	Community Engagement
5	Awareness Through Peer Connection	
6	House Area	Geographical Advantages
7	Geographical Advantages	
8	System Lifespan	Long-Term Usage
9	Electricity Usage	
10	Reduce Expenses	
11	Realization Of Long-Term Solar Benefits	
12	Comparative Brand Longevity Perception	
13	Self-Knowledge On the System	Self-Awareness
14	Self-Driven Involvement	
15	Awareness – Solar Generation and Consumption Concept	
16	Self-Awareness	
17	Follow Up	After-Sale Service
18	Service Reliability and User Confidence	
19	Service Responsiveness	
20	After-Sale Service	
21	Trust With Provider	Company Experiences

No	Initial Code	Axial Coding
22	Company Review	
23	Seeing Physical Company to Gain Trust	
24	Company Experiences	
25	System Knowledge	System Knowledge
26	Years In Industry	Years In Industry
27	Financial Rebate Opportunity	Financial Incentive
28	Financial Incentive	
29	Free Interest	Financial Support
30	Alternative Payment for Short Term	
31	Flexible Payment Option	
32	Self-Economic Stability	Installation Capital Cost
33	Installation Capital Cost	
34	Free Operation and Maintenance	Operation And Maintenance Cost
35	Operation And Maintenance Cost	
36	Cost Saving	Payback Period
37	Return Of Investment	
38	System Certificate	Comprehensive Certification System
39	Warranty Certificate	
40	Comprehensive Certification System	
41	Duration Of Paperwork Process	Ease Of Administrative Process
42	Understanding On the Paperwork Required	
43	Current Government Policies Structure	Effective Government Policies
44	Single Solar System Cannot Install in Two Different Houses	
45	Awareness On Programme Under SEDA	
46	NEM Credit Expiration	
47	Effective Government Policies	
48	Installation Quality	Implementation Ability
49	Duration To Complete Installation	
50	Availability Materials	
51	Operation And Maintenance Duration	Operation And Maintenance
52	Cleaning Service	
53	Clarification That the Company Offer a Warranty Instead of and O&M Package	
54	Provider Offers a One-To-One Replacement Warranty	
55	Defect Liability Period	
56	Operation And Maintenance	
57	Clear Explanation	Technical Support Capacity
58	Enquiries On the Technical Explanation	
59	Technical Support Capacity	
60	Compatibility With Existing Infrastructure	Compatibility With Existing Infrastructure

No	Initial Code	Axial Coding
61	Aesthetical Design	Customizable Design
62	Add More Panels	
63	Customizable Design	
64	System Installed According to Usage	
65	Desire To Validate Solar System Performance	Energy Performance and Efficiency
66	System Efficiency	
67	Remote Monitor Availability	Remote Monitoring and Control
68	Remote Monitoring and Control	

Finally, the final six themes are identified: Financial Viability, Service Capability, Technology Flexibility, Company Credibility, Regulatory Feasibility, and External Influences. Each theme synthesizes a set of interrelated perceptions, motivations, and constraints experienced by real-world adopters, offering a grounded understanding of decision-making beyond abstract models.

Service Capability emerged as the most dominant and frequently emphasized theme across all participants. Respondents underscored the importance of after-sales service, system reliability, and technical support availability, often stating that the post-installation experience shaped their satisfaction more than the installation process itself. The ability to contact service personnel, receive fast responses, and resolve technical issues especially in the first few months after installation was cited as essential to maintaining confidence in the investment. This finding suggests that SES providers must offer not just technical products but also dependable support systems to sustain consumer trust and word-of-mouth advocacy.

Financial Viability was the next most prevalent theme, encapsulating concerns about initial installation costs, payback period duration, and monthly energy bill reductions. Participants revealed that their decision hinged on a clear understanding of cost-benefit ratios, with financial incentives like SolaRIS rebates and tax exemptions playing a supporting—but not sole—role. This implies that affordability, while crucial, must be framed within broader household economic planning.

Technology Flexibility included subthemes such as panel layout compatibility, system efficiency, and the availability of remote monitoring applications. Participants valued systems that could be easily integrated with their home structure and offered real-time feedback on energy generation. These perceptions indicate an increasing consumer expectation for user-friendly, smart-enabled solar solutions, particularly among tech-savvy households.

Company Credibility emerged as a trust-based filter for decision-making. Attributes such as transparent quotations, online presence, peer recommendations, and previous project portfolios were important indicators of provider legitimacy. Participants were cautious about fly-by-night installers and emphasized the need for transparent and verifiable provider information. This theme reinforces the view that SES adoption is not solely a technological transaction, but a trust-based service agreement.

Regulatory Feasibility and External Influences, while frequently mentioned, were treated more as contextual enablers than core decision-making factors. Regulatory aspects such as NEM application procedures and approval timelines were important for procedural ease but did not independently determine adoption. Similarly, external influences like media exposure, environmental awareness, and peer endorsement played a role in creating awareness, but required stronger financial or service-related justification to translate into actual uptake. This divergence between frequency and impact suggests that awareness alone is insufficient—effective adoption hinges on enabling mechanisms that align with practical household priorities. the summary of the themes is tabulated in Table 4.

Table 4: Summary of Themes Identification

Themes	Axial Code
Financial Viability	Financial Support
	Financial Incentive
	Payback Period
	Installation Capital Cost
	Operational and Maintenance Cost
Company Credibility	Years in Industry
	Company Experiences
	System Knowledge
	After-Sale Service
External Influences	Community Engagement
	Geographical Advantages
	Self-Awareness
	Long-term Usage
	Access to Information
Technology Flexibility	Compatibility with Existing Infrastructure
	Customizable Design
	Energy Performance and Efficiency
	Remote Monitoring and Control
Service Capability	Implementation Ability
	Technical Support Capacity
	Operation and Maintenance
Regulatory Feasibility	Effective Government Policies
	Ease of Administrative Process
	Comprehensive Certification System

The validity and consistency of the coding process were verified through inter-rater reliability analysis, using Cohen's Kappa, which yielded a coefficient of $\kappa = 0.9205$. According to Landis and Koch (1977), a kappa value above 0.61 signifies "almost perfect agreement." This result demonstrates that the thematic categories were interpreted consistently between independent raters, thus reinforcing the credibility and methodological rigor of the qualitative findings (McDonald et al., 2019).

Together, these six themes not only reflect the lived realities of SES adopters under NEM 3.0 but also provide a nuanced understanding of the trade-offs and trust considerations that shape household energy transitions. These findings later formed the foundational criteria in the AHP-based prioritization process, ensuring a coherent linkage between qualitative depth and quantitative structure in the proposed decision-making framework.

5.2 Phase 2: Quantitative Approach – AHP

The second phase of the study employed the AHP to systematically prioritize the six main themes and their 24 associated sub-criteria identified in the qualitative phase. This step aimed to quantify the relative importance of decision-making criteria influencing household adoption of SES under the NEM 3.0 program.

The AHP analysis revealed Service Capability as the most influential main criterion with a Global Weight (GW) of 26.07%, followed by Financial Viability (24.79%), Technology Flexibility (16.22%), Company Credibility (14.12%), Regulatory Feasibility (11.14%), and External Influences (7.65%). This ordering validates a strong preference among consumers for post-installation support, cost-effectiveness, and system performance, over broader contextual factors such as external awareness or regulatory processes.

At the sub-criteria level, the ranking patterns reinforced this prioritization. The top three globally weighted (GW) sub-criteria were all drawn from the Service Capability category: Operation and Maintenance (GW = 11.49%), Technical Support Capacity (GW = 7.87%), and Implementation Ability (GW = 6.71%).

These results reflect consumers' clear expectations for long-term system dependability, professional service delivery, and technical support assurance. The highest-ranked technology-related sub-criterion was Energy Performance and Efficiency (GW = 8.05%) under Technology Flexibility, reflecting the importance of output reliability and functional performance. Meanwhile, Installation Capital Cost (GW = 6.39%) and Payback Period (GW = 5.73%) ranked highest within Financial Viability, underscoring economic sensitivity in adoption decisions.

To ensure the robustness and reliability of the prioritization outputs, all CR values were assessed across the matrices. According to Saaty (2008), a CR of ≤ 0.10 indicates that the judgments are logically coherent. In this study, all main and sub-criteria matrices achieved CR values well below this threshold, ranging from 0.01 to 0.07, with the highest inconsistency observed in the External Influences matrix (CR = 0.07). This still falls within the acceptable range and confirms that the pairwise judgments provided by participants were logically consistent.

A summary of CR values across all matrices is presented in Table 5, which illustrates the overall internal consistency of the quantitative process. This step is crucial in validating the AHP results and strengthening the methodological reliability of the framework.

Table 5: Summary of Consistent Ratio

No	Criterion	CI	n	RI	CR	Result
1	Main Criterions	0.0152	6	1.24	1%	**Passed**
2	Financial Viability	0.0388	5	1.12	3%	**Passed**
3	Company Credibility	0.0350	4	0.9	4%	**Passed**
4	External Influences	0.0769	5	1.12	7%	**Passed**
5	Technology Flexibility	0.0140	4	0.9	2%	**Passed**
6	Service Capability	0.0049	3	0.58	1%	**Passed**
7	Regulatory Feasibility	0.0060	3	0.58	1%	**Passed**

A summary of the Relative Weight (RW)—which reflects each sub-criterion's importance within its own group—and the Global Weight (GW)—which reflects each sub-criterion's importance across all groups—is provided in Table 6. This distinction provides both micro-level insight into within-group priorities and macro-level clarity across all adoption factors.

Table 6: Global Ranking of Decision-Making Criteria in Adopting Solar Energy System among Household Consumers

Criteria	RW	Sub-Criteria	RW	RR	GW	GR
Financial Viability	0.2479	Financial Support	0.1709	4	4.24%	11
		Financial Incentive	0.1289	5	3.20%	16
		Payback Period	0.2311	2	5.73%	6
		Installation Capital Cost	0.2578	1	6.39%	5
		Operational and Maintenance Cost	0.2112	3	5.24%	8
Company Credibility	0.1412	Years in Industry	0.0826	4	1.17%	23
		Company Experiences	0.1508	3	2.13%	18
		System Knowledge	0.3681	2	5.20%	9
		After-Sale Service	0.3985	1	5.63%	7
External Influences	0.0765	Community Engagement	0.1636	3	1.25%	21
		Geographical Advantages	0.0694	5	0.53%	24
		Self-Awareness	0.1539	4	1.18%	22
		Long-term Usage	0.4369	1	3.34%	14
		Access to Information	0.1762	2	1.35%	19

Criteria	RW	Sub-Criteria	RW	RR	GW	GR
Technology Flexibility	0.1622	Compatibility with Existing Infrastructure	0.1981	3	3.21%	15
		Customizable Design	0.0815	4	1.32%	20
		Energy Performance and Efficiency	0.4966	1	8.05%	2
		Remote Monitoring and Control	0.2237	2	3.63%	13
Service Capability	0.2607	Implementation Ability	0.2573	3	6.71%	4
		Technical Support Capacity	0.3018	2	7.87%	3
		Operation and Maintenance	0.4408	1	11.49%	1
Regulatory Feasibility	0.1114	Effective Government Policies	0.3665	2	4.08%	12
		Ease of Administrative Process	0.3946	1	4.40%	10
		Comprehensive Certification System	0.2389	3	2.66%	17

The prioritization patterns derived from AHP mirrored the thematic prominence identified in Phase 1, affirming the effectiveness of the study's triangulated methodology. This strong convergence confirms that household SES adoption decisions are driven by practical, performance-based, and financially oriented concerns, rather than abstract or externally imposed influences.

This coherence between qualitative and quantitative findings strengthens the empirical foundation for the final SES decision-making framework, ensuring that it is not only contextually grounded for the Malaysian residential landscape but also actionable for stakeholders across industry, government, and civil society.

5.3 Decision Making Framework

5.3.1 Integration of Phase 1 and Phase 2 Findings

The triangulated analysis revealed strong convergence between the thematic insights (Phase 1) and the AHP prioritization (Phase 2) for most criteria. Service Capability emerged as the most dominant factor in both phases, ranking first in AHP (26.07%) and receiving 108 coded excerpts from the qualitative data. Sub-criteria such as Operation and Maintenance, Technical Support Capacity, and Implementation Ability consistently appeared in participant narratives and were also top ranked in global AHP weightings, reinforcing the centrality of post-installation reliability and provider responsiveness.

Financial Viability also showed strong alignment, ranking second in both the qualitative (121 codes) and AHP results (24.79%). Participants frequently discussed upfront capital costs, long-term savings, and incentive mechanisms, emphasizing cost-benefit logic in their decisions.

Technology Flexibility demonstrated similar coherence, placed third in AHP (16.22%) and fourth in qualitative analysis (90 codes). Sub-criteria like Energy Performance and Efficiency and Monitoring App Functionality highlighted the desire for technical performance, modular compatibility, and digital control.

Company Credibility presented partial convergence, ranked fourth in AHP (14.12%) and fifth in qualitative rank (98 codes). While trust, transparency, and provider experience were discussed, participants often saw these as secondary to technical or financial factors when making final decisions.

Regulatory Feasibility and External Influences revealed divergence. Although External Influences ranked first in qualitative coding (136 codes)—with participants frequently referencing peers, media, and environmental awareness—it ranked last in AHP (7.65%), indicating that while such factors influence initial interest, they carry less weight during final decision-making. Similarly, Regulatory Feasibility, while ranked fifth in AHP (11.14%), received only 48 qualitative mentions, showing moderate relevance in practice.

This triangulation process confirmed that while all six themes are relevant, the most decisive factors are service, financial feasibility, and system functionality. All of which are actionable by service providers and policymakers. Summary of triangulated result is shown in Table 7.

Table 7: Summary of Triangulation Result

Theme	Qualitative Rank	AHP RW (%)	AHP Rank	Most Influential Sub-Criterion	Triangulation Result
Service Capability	3rd (108 codes)	26.07	1st	Operation & Maintenance (GR: 1)	Strong Convergence
Financial Viability	2nd (121 codes)	24.79	2nd	Installation Cost (GR: 5)	Strong Convergence
Technology Flexibility	4th (90 codes)	16.22	3rd	Energy Performance and Efficiency (GR: 2)	Strong Convergence
Company Credibility	5th (98 codes)	14.12	4th	After-Sale Service (GR: 7)	Partial Convergence
Regulatory Feasibility	6th (48 codes)	11.14	5th	Ease Administrative Process (GR: 10)	Partial Convergence
External Influences	1st (136 codes)	7.65	6th	Community Engagement (GR: 21)	Divergence

5.2 Proposed Decision-Making Framework

Building on the triangulated findings, a structured decision-making framework was developed to guide household SES adoption in a realistic, evidence-based, and policy-relevant manner. The framework synthesizes the qualitative insights from lived experiences with the quantitative weights generated via AHP, offering a comprehensive structure that addresses the complexity of SES decision-making in the Malaysian residential context. The framework is organized around six primary criteria as shown in Table 6.

Each of these core dimensions is operationalized through 24 sub-criteria, which were prioritized using global and local weightings derived from the AHP process. This multi-criteria model reflects real-world decision considerations such as system efficiency, technical support, payback period, company reputation, and environmental motivation.

As shown in Figure 4, the framework illustrates how these six themes interact dynamically across different stages of the consumer decision journey.

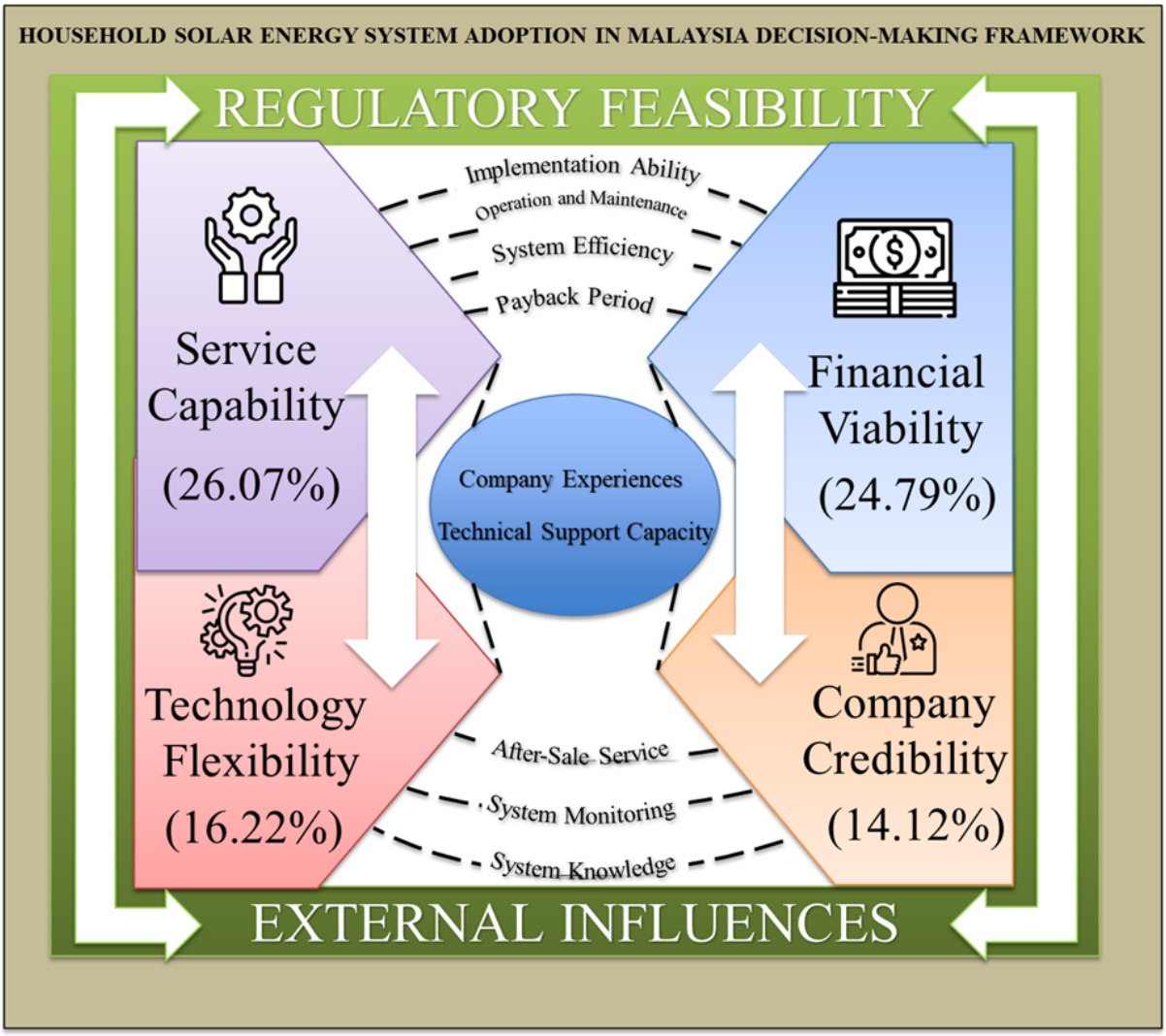


Figure 5: Decision-Making Framework

Based on Figure 4, early phases are shaped by External Influences, such as community visibility, peer engagement, and public narratives. These stimuli prompt consumer awareness and initial research, leading into evaluation stages, where Financial Viability and Technology Flexibility become key filters. In later stages, Service Capability and Company Credibility influence provider selection, system validation, and installation confidence.

Moreover, surrounding all stages are Regulatory Feasibility components, which act as boundary conditions and enablers through licensing ease, program comprehension, and policy

support. The central positioning of Company Experiences and Technical Support Capacity (as shown in the figure's core) reflects the strong overlap between Service Capability and Company Credibility, emphasizing that household trust and post-installation reliability are at the heart of sustained adoption.

Lastly, the framework also incorporates feedback loops, recognizing that SES adoption is not always linear. Consumers may revisit earlier stages such as provider selection or financial feasibility when encountering technical challenges, policy updates, or new offers in the marketplace.

5.3 Step-By-Step Process Flow on the Decision-Making Framework

Building upon the decision-making structure outlined in Section 5.2, this section presents a behaviourally realistic, step-by-step process flow, designed to simulate the actual progression of household consumers in adopting SES. The model is presented in Figure 5 and reflects both the empirical insights from thematic analysis and the quantitative priorities derived via AHP.

The structure is inspired by classical process flow models first proposed by Frank and Lillian Gilbreth (1921), later adapted for behavioural applications, and reviewed by Sharma (2019). This ensures that the framework remains operationally relevant and theoretically robust, particularly for energy decision research in residential contexts.

The decision-making framework for household SES adoption comprises the following seven sequential and behaviorally informed steps, each mapped to key themes and prioritized sub-criteria from the triangulated findings:

1. Awareness & Motivation
   Consumers are first exposed to solar energy through external sources such as media, peers, and environmental concerns. This stage corresponds to the External Influences theme, which initiates interest and exploratory behavior.

2. Research & Evaluation
   Motivated consumers begin to collect detailed information on SES options, including system types, provider offerings, and potential financial benefits. If information remains unclear, the framework includes a feedback loop to reinforce informed decision-making.

3. Financial Feasibility
   This step involves assessing whether SES adoption is financially viable based on capital costs, payback period, operational savings, and available incentives. It aligns with the Financial Viability theme and reflects the second-highest ranked factor in AHP (24.79%).

4. Engage with Provider
   Consumers initiate contact with providers to obtain quotations, validate system design claims, and clarify technical and service-related questions. This step reflects both Service Capability (26.07%) and Company Credibility (14.12%), highlighting the importance of trust and support.

5. Technology Flexibility
   The compatibility of the proposed SES with household infrastructure is assessed—covering rooftop space, system design, wiring, and expected performance. This step emphasizes Technology Flexibility (16.22%), ensuring consumers understand installation feasibility and output.

6. Provider Comparison
   Consumers evaluate SES providers on factors such as after-sales service, warranties, technical reliability, and reputation. If concerns remain, the consumer is prompted to revisit prior steps. This iterative logic mirrors real-world purchase behavior and reinforces Service Capability.

7. Adoption Decision & Commitment
   Upon satisfaction of financial, technical, and trust-based considerations, the consumer proceeds with the final decision to adopt SES. However, built-in feedback loops allow for ongoing reconsideration if doubts emerge or circumstances change.

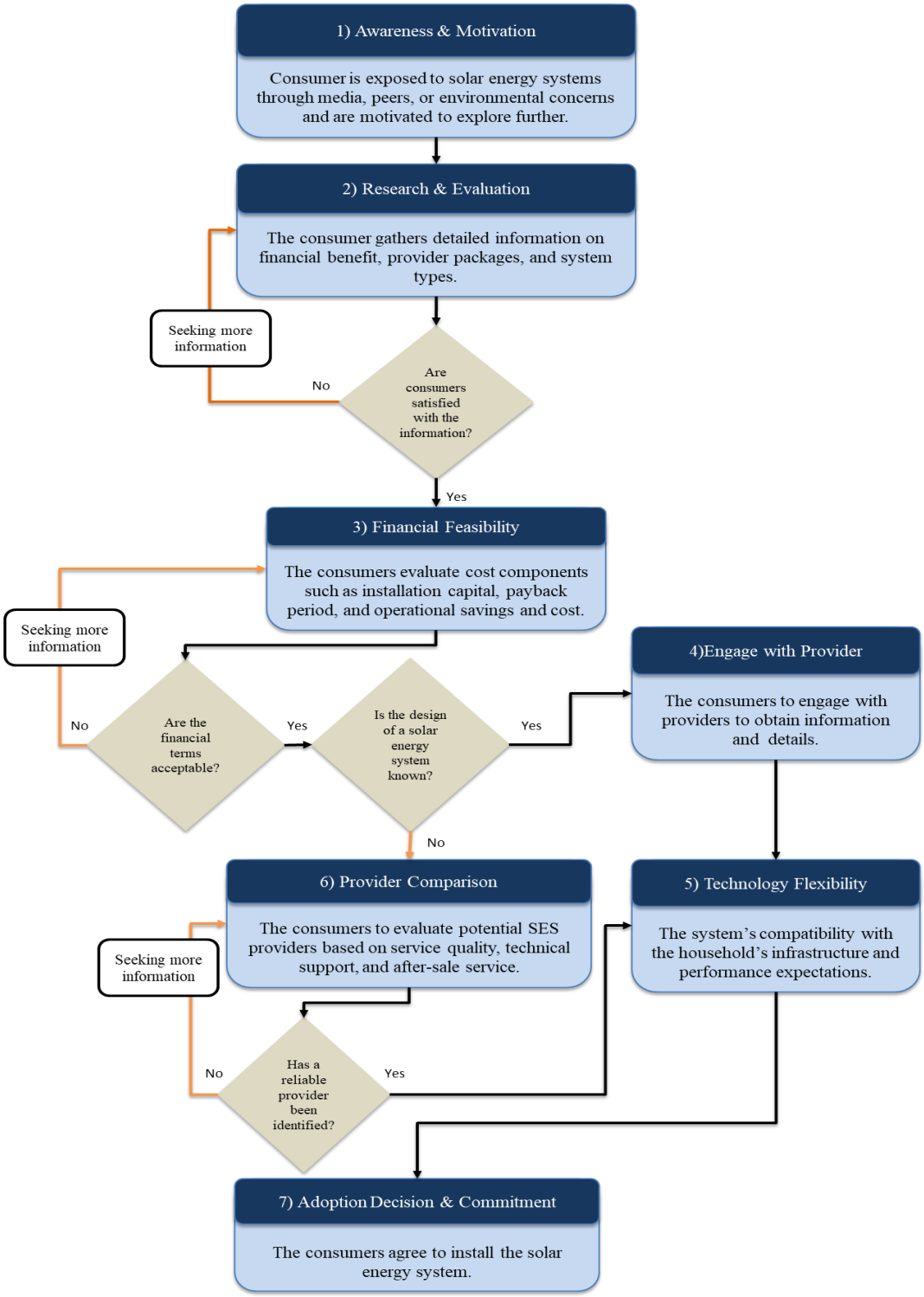


Figure 6: Step-by-Step Flow on the Decision-Making Process

6. Conclusion and Future Directions

This study set out to explore and prioritize the key factors influencing household adoption of SES under Malaysia's NEM 3.0 program, ultimately proposing a decision-making framework rooted in actual user experience and analytical rigor. By adopting a sequential mixed-method approach merging thematic insights from qualitative interviews with quantitative prioritization

through the AHP. The study successfully triangulated the perceptions, motivations, and preferences of residential SES adopters.

The findings revealed that Service Capability and Financial Viability are the most influential decision-making criteria. Households emphasized the importance of post-installation technical support, reliability, and affordability as foundational to their confidence in adopting SES. While themes such as External Influences and Regulatory Feasibility were frequently mentioned in interviews, their lower ranking in AHP highlighted a distinction between initial motivation and final decision-making weight. This differentiation strengthens the contribution of this study by not only identifying what factors matter—but also how much they matter at different decision stages.

The resulting decision-making framework offers a practical tool for guiding stakeholders across multiple domains. For households, it simplifies complex choices by structuring the decision journey into clear, actionable phases. For solar service providers, it reveals critical performance areas to strengthen, such as after-sales support and cost transparency. For policymakers, it highlights where strategic interventions—such as streamlined approvals and incentive alignment—can generate the highest adoption impact.

This research supports Malaysia's efforts to enhance residential solar participation in line with SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action),and contributes empirically to the growing body of literature on sustainable energy adoption behavior in the Global South.

6.1 Future Research Directions

Building on the empirical and conceptual contributions of this study, several future research avenues are recommended to extend the applicability and impact of the proposed SES decision-making framework:

- Cross-Regional Replication: Applying this framework in other Malaysian states or across ASEAN countries would allow researchers to test its generalizability and uncover regional or cultural variations in SES adoption behavior. Such comparative studies could highlight differences in policy effectiveness, infrastructure readiness, or consumer awareness levels.
- Non-Adopter Comparative Analysis: Including households that have not adopted SES but express strong interest could illuminate critical gaps between intention and action. This would provide insight into persistent barriers—financial, informational, or psychological—that prevent potential adopters from transitioning to actual users.
- Policy Scenario Modelling: Integrating dynamic simulation techniques, such as system dynamics or agent-based modelling, could allow researchers and policymakers to explore the impact of changes in subsidies, approval processes, or provider regulations on consumer decision weights and adoption rates.
- Technology Integration and Innovation: As the SES landscape evolves, future frameworks could be enhanced by incorporating next-generation technologies such as AI-powered energy management systems, blockchain-based incentive

tracking, or smart-home compatibility assessments. These integrations would improve predictive capabilities and user confidence.

Collectively, these directions would contribute to the evolution and refinement of the decision-making model, ensuring its relevance in a rapidly changing renewable energy ecosystem and aligning with Malaysia's commitment to long-term sustainability under SDG 7 and SDG 13.

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DECISION-MAKING FACTORS INFLUENCING INTERNATIONAL STUDENTS' SELECTION OF INTERNATIONAL BRANCH CAMPUSES IN MALAYSIA: A QUANTITATIVE STUDY USING PLS-SEM

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Abstract: *The globalisation of higher education has intensified competition among host countries to attract international students, with International Branch Campuses (IBCs) emerging as strategic platforms to facilitate cross-border academic mobility. Despite the growing number of IBCs in Malaysia, limited empirical research has examined the factors influencing international students' decision-making in selecting these campuses. Addressing this gap, the present study investigates the key determinants shaping such decisions, offering insights to strengthen institutional positioning in an increasingly competitive educational landscape. Guided by the push-pull theoretical framework, the study focuses on four core factors which are personal determinants, socioeconomic background, university reputation, and cost of education. Adopting a quantitative research design, data were collected through an online survey distributed to international students enrolled at IBCs in Malaysia. A total of 244 valid responses were analysed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to evaluate both the measurement and structural models. The results indicate that all four factors significantly influence students' decision-making, with personal determinants emerging as the most dominant predictor. While cost of education also showed a significant effect, their influence was comparatively weaker. This study contributes to the internationalisation literature by providing empirical evidence on student decision-making within the underexplored context of Malaysian IBCs. The findings suggest that higher education institutions should prioritise affordability and invest in enhancing their global reputation to attract a diverse international student body. These insights offer practical implications for university administrators and policymakers aiming to strengthen Malaysia's position as a leading international education hub.*

Keywords: *International Students, Decision-making, International Branch Campuses, PLS-SEM, Malaysia*

1. Introduction

The internationalisation of higher education has transformed global student mobility patterns, driving universities to expand beyond national borders through International Branch Campuses (IBCs) (Wilkins, 2021). IBCs enable students to obtain foreign qualifications within host countries, offering academic pathways that blend international credentials with local accessibility (Wilkins, 2021). Malaysia inspires to become one of the key regional hubs for IBCs in Southeast Asia, due to its strategic geopolitical location, affordable living costs, multicultural society, and government support for transnational education (Abdullah & Singh, 2021).

Despite the rapid growth of IBCs in Malaysia, international student enrolment remains uneven, and student recruitment continues to be a significant challenge for many institutions (MOE, 2020). Much of the existing literature focuses on broad drivers of international student choice in traditional university settings, such as academic reputation, tuition fees, and host country appeal (Abdul Aziz, Zulkifli, Mat Nashir, & Abdul Karim, 2020). However, studies that specifically examine the decision-making process in the context of IBCs, particularly in Malaysia, remain limited and fragmented.

The problem arises from this gap, while Malaysia actively promotes itself as a transnational education destination, there is insufficient empirical evidence identifying which specific factors most influence international students when choosing an IBC in the Malaysian context. Without this knowledge, IBCs risk misaligning marketing strategies and institutional offerings with the real priorities of prospective students, potentially limiting their ability to attract and retain international talent.

To address this gap, the present study applies a structured, theory-driven quantitative approach grounded in the push-pull framework to investigate the role of personal determinants, socioeconomic background, university reputation, and cost of education in influencing international students' selection of IBCs in Malaysia. Using Partial Least Squares Structural Equation Modeling (PLS-SEM), this research provides statistically validated insights to guide institutional leaders, marketing strategists, and policymakers in enhancing Malaysia's competitive position in global higher education.

This study contributes to the literature by offering one of the few comprehensive, data-driven analyses focused on the Malaysian IBC landscape, where the international student recruitment context differs from Western host countries and deserves context-specific understanding.

2. Literature Review

2.1 Personal Determinants

Personal determinants refer to internal attributes, motivations, and psychological needs that influence individual behaviour and decision-making (Starecek, Babel'ova, Koltnerova, & Caganova, 2023). In the context of university selection, these determinants encompass students' preferences, aspirations, and unique personal circumstances (Ke, Junfeng, & Xiaojing, 2022). Research indicates that students often choose study destinations based on a pre-existing affinity for the country or perceptions of its lifestyle, which may also influence their decision to remain their post-graduation (Gutema, Pant, & Nikou, 2024)

For instance, personal interest was found to be the strongest influence on enrolment in Malaysia's TVET programmes, highlighting its importance in shaping educational decisions (Abdul Aziz, Zulkifli, Mat Nashir, & Abdul Karim, 2020). Similarly, Yi and Duval-Couetil (2021) noted that entrepreneurial aspirations and perceived risks, shaped by individual goals and external constraints, affect students' educational and career paths. In addition, Li (2020) extended Cubillo et al.'s (2006) decision-making model to include factors such as personal development and exam performance, further reinforcing the role of internal motivations in international student decisions.

For IBCs in Malaysia, understanding diverse personal determinants is critical to aligning institutional offerings with student expectations. Addressing these factors can enhance engagement, satisfaction, and retention among international students.

2.2 Socioeconomic Background

Socioeconomic background refers to the social and economic conditions shaping individuals' upbringing and life experiences, including household income, parental education, and occupational status (Vadivel, Alam, Nikpoo, & Ajanil, 2023). These factors influence access to education, health, and career opportunities. For example, Abdul-Aziz et al. (2020) highlighted the importance of family support, financial or moral in shaping students' educational aspirations. They emphasised collaborative efforts among stakeholders to increase awareness of TVET programmes among students, especially non-Bumiputera.

Yoshida (2020) observed that students from lower socioeconomic backgrounds tend to face fragmented educational trajectories, with higher rates of grade repetition and dropout. These challenges are more pronounced among over-aged students, particularly boys. Similarly, D'Agostino et al. (2019) found that students from wealthier families are more likely to migrate for education, while lower provincial income levels are linked to higher out-migration rates, especially in health-related fields. Moreover, Prakasam et al. (2019) showed that family occupation and size influence educational choices. Children from salaried or larger families were less likely to pursue science or professional programmes, highlighting the trade-off between education and work.

In the context of IBC selection in Malaysia, socioeconomic background remains a critical factor. Financial affordability, family support, and regional disparities influence students' ability to enrol. Thus, IBCs must adopt inclusive strategies, including financial aid and outreach, to ensure equitable access for students from diverse backgrounds.

2.3 University Reputation

University reputation encompasses the perceived standing, quality, and credibility of an institution, often influenced by academic performance, research productivity, faculty qualifications, and alumni success (Mateus & Acosta, 2022). Institutions with a strong reputation tend to attract high-performing students and faculty, access more research funding, and offer graduates better employment prospects. Elements such as consistent media presence, industry collaborations, and favourable rankings further contribute to enhancing an institution's image and appeal (Mateus & Acosta, 2022).

Cynthia and Chong (2023) note that institutional reputation is a major consideration for international students seeking higher education. These students often associate institutional recognition with academic excellence and employability outcomes. Their findings suggest a consistent pattern in recent literature linking institutional reputation to student preferences, particularly within the context of Malaysia's private higher education institutions (HEIs). A well-regarded university is often perceived as a pathway to broader career opportunities and international mobility.

Mateus and Acosta (2022) also stress that university reputation is formed through the perceptions of stakeholders such as students, staff, employers, and society shaped by the institution's consistent engagement and performance. It reflects long-term efforts in delivering quality education and achieving positive student outcomes. In line with this, Kaushal and Ali (2020) observed that a strong institutional image not only builds student satisfaction but also promotes loyalty, with students more likely to recommend the university, continue their studies, or remain active as alumni.

In conclusion, university reputation remains a key driver in international students' university selection process. For IBCs in Malaysia, maintaining a strong reputation is vital to attracting students, ensuring global relevance, and sustaining institutional growth.

2.4 Cost of Education

The cost of education refers to the total financial burden associated with obtaining a degree, including tuition, accommodation, transportation, textbooks, and general living expenses. These costs can differ widely depending on the type of institution, academic discipline, and geographic location (Mazhari & Atherton, 2020). Financial factors often play a crucial role in students' educational decisions, particularly when high costs become obstacles to access or completion.

International students often assess affordability when choosing where to study. Malaysia, for example, is considered a cost-effective destination compared to Western countries. Research shows that many students receive parental financial support due to Malaysia's relatively lower tuition and living costs (Cynthia & Chong, 2023). Still, the financial aspect remains a key factor influencing students' university choices (Cynthia & Chong, 2023). Prior studies have identified tuition fees as one of the top considerations for international students, second only to academic reputation in some cases (Cynthia & Chong, 2023).

Economic conditions such as job prospects and the cost of living in the host country also impact students' long-term plans after graduation (Gutema, Pant, & Nikou, 2024). Evidence suggests that students from lower-income backgrounds are particularly sensitive to education costs and tend to choose affordable institutions located in cities with lower living expenses (Gutema, Pant, & Nikou, 2024). Therefore, understanding the cost of education is essential in analysing student decision-making in selecting IBCs in Malaysia.

3. Methodology

This study adopts a quantitative research approach to investigate the decision-making factors in influencing international students' in selecting IBCs in Malaysia. The research follows a positivist research paradigm, which aligns with the study's aim of identifying patterns and relationships in decision-making through numerical data. The study design is cross-sectional, capturing data from international students at a single point in time, making it suitable for exploring the relationships between the independent variables which are personal determinants, socioeconomic background, university reputation, and cost of education and the dependent variable which is the decision to choose IBCs. A descriptive correlational design is employed to analyse the strength and nature of these relationships, enabling a deeper understanding of the decision-making process.

The study's target population includes international undergraduate students enrolled at 10 IBCs in Malaysia. The chosen sample consists of international students who have the potential to pursue postgraduate studies in Malaysia, as they are actively engaged in the decision-making process regarding their educational future. To ensure a representative sample, a non-probability purposive sampling method was used, focusing on students who meet specific criteria, including being enrolled in an IBC. The target sample size was set at 300, with 244 valid responses collected after data cleaning, providing sufficient power for the data analysis.

A structured questionnaire was developed for primary data collection, drawing on the Push-Pull Theory and literature related to decision-making factors for international students. The questionnaire consisted of four sections starting from demographic information, decision-making factors including personal determinants, socioeconomic background, university reputation, and cost of education. All items were measured using a 5-point Likert scale, which allows respondents to express their level of agreement or disagreement with the statements. The questionnaire was pre-tested on a sample of 20 international students to ensure clarity, reliability, and validity.

The data collection process took place over four weeks, starting in December 2025. The survey was distributed online through university platforms, student associations, and student support services, with multiple reminders sent to increase participation. Ethical guidelines were followed throughout the process, including obtaining informed consent and ensuring participant confidentiality.

For data analysis, Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed. PLS-SEM is suitable for examining complex relationships between observed and latent variables, particularly when sample sizes are moderate (Hair, Risher, Sarstedt, & Ringle, 2019). The analysis was conducted in two stages. First, the measurement model was evaluated to ensure the reliability and validity of the constructs, using composite reliability (CR), average variance extracted (AVE), and factor loadings. Second, the structural model was tested to explore the hypothesized relationships between the variables.

Ethical considerations were observed by ensuring that participants' rights were respected. Informed consent was obtained from all participants, and their anonymity was preserved by avoiding the collection of personal identifiers. Data were used strictly for academic purposes, in compliance with ethical standards for research involving human subjects.

4. Results

The analysis of the data was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine the relationships between the independent variables which are personal determinants, socioeconomic background, university reputation, and cost of education and the dependent variable which is decision to choose IBCs. This section presents the results of the measurement and structural model evaluations, followed by an in-depth discussion of the findings.

4.1 Measurement Model Evaluation

The first step in the data analysis was to evaluate the measurement model to ensure that the constructs were valid and reliable. The results showed that all the constructs demonstrated good internal consistency and convergent validity. The composite reliability (CR) values for the constructs ranged from 0.844 to 0.910, which are above the threshold of 0.70 recommended by Hair et al. (2019). This indicates that the constructs used in the model are reliable. The Average Variance Extracted (AVE) for all constructs was above the 0.50 threshold, further confirming convergent validity (Fornell & Larcker, 1981). Additionally, the factor loadings for each indicator were significant, with values above 0.7, suggesting that the items adequately represent their respective constructs.

4.2 Structural Model Evaluation

Following the assessment of the measurement model, the structural model was evaluated to test the hypothesised relationships. The results indicated that personal determinants ($\beta = 0.325$, $p < 0.05$), socioeconomic background ($\beta = 0.164$, $p < 0.01$), and university reputation ($\beta = 0.252$, $p < 0.01$) had significant positive effects on international students' decisions to select International Branch Campuses (IBCs) in Malaysia. These findings are consistent with previous research that underscores the role of personal motivations, financial capacity, and institutional image in influencing students' educational decisions (Xu et al., 2023; Li & Lindo, 2022).

The cost of education also demonstrated a significant but comparatively lower influence ($\beta = 0.159$, $p < 0.05$), suggesting that while financial factors are important, they may be secondary to more intrinsic motivations and institutional qualities. These results highlight the multifaceted nature of international students' decision-making, where both push and pull factors interact to influence the final choice of IBCs.

Table 1: Composite Reliability, Path Coefficients, and AVE for Decision-Making Factors in Selecting IBCs

Factor	Composite reliability (rho_a)	Path Coefficient (β)	Average variance extracted (AVE)
Personal Determinants	0.903	0.325	0.771
University Reputation	0.910	0.252	0.640
Socioeconomic Background	0.844	0.164	0.666
Cost of Education	0.879	0.159	0.698

4.3 Hypotheses Testing

The results confirm that the hypothesised relationships between personal determinants, socioeconomic background, university reputation, and cost of education are statistically significant, indicating that these factors play a crucial role in international students' decision-

making when selecting IBCs in Malaysia. Among these, personal determinants emerged as the strongest predictor, highlighting the importance of students' internal motivations, such as ambition and adaptability, in shaping educational choices. This finding reinforces the argument by Starecek, Babel'ova, Koltnerova, & Caganova (2023) and Ke, Junfeng, & Xiaojing (2022) that individual aspirations are central to cross-border educational mobility. Moreover, the significant influence of university reputation underscores the value international students place on institutional prestige and global rankings. This supports Mateus & Acosta (2022) assertion that reputation is not only a signal of academic quality but also a proxy for future employability. The alignment of these results with prior studies enhances the generalisability of the push-pull framework in the context of IBCs, while also offering new empirical evidence from the underexplored Malaysian setting. Collectively, the findings suggest that higher education providers must strategically promote institutional strengths while aligning with the personal and socioeconomic profiles of their target international market.

5. Discussions

The findings carry significant implications for higher education institutions and policymakers seeking to enhance Malaysia's position as a transnational education destination. The most influential factor, personal determinants underscore the centrality of individual motivations, such as ambition, adaptability, and self-efficacy, in shaping international students' university selection. This suggests that IBCs must move beyond institutional marketing and instead focus on understanding and aligning with students' personal aspirations. Recruitment strategies that communicate how programmes support personal growth, career progression, and cross-cultural readiness are likely to resonate more effectively with prospective students. The strong influence of personal determinants also suggests that international students view the IBC experience as a self-driven opportunity rather than a passive educational choice. This finding extends previous applications of the push-pull model by highlighting the agency of the student in decision-making, especially in the IBC context where the campus is geographically separated from the home institution.

While personal factors dominated, university reputation remains a critical institutional signal, particularly in competitive regions. The finding implies that IBCs must not rely solely on their affiliations but should actively build reputational capital through localised academic excellence, research output, and employer engagement.

Socioeconomic background also emerged as a significant factor, indicating that students' financial situations and family economic status influence their choice of IBCs. Institutions must recognize the diversity in students' financial capacities and consider developing targeted financial aid, scholarships, or flexible payment plans to make education more accessible to students from varied economic backgrounds.

Additionally, cost of education, though less dominant, still emerged as a statistically significant factor, particularly relevant for students from lower-income backgrounds. This reinforces the importance of maintaining the affordability advantage of IBCs. Financial aid programmes and transparent fee structures can serve as important access mechanisms, especially in attracting students from developing countries.

Taken together, the findings suggest that institutional strategies should not be one-dimensional. Instead, they must integrate student-centred messaging, academic branding, and financial support to appeal to a broad range of international student profiles. From a theoretical perspective, this study provides empirical support for extending push-pull theory by incorporating personal determinants more explicitly in the IBC selection context, offering a nuanced understanding of international student mobility in Southeast Asia.

In summary, the results of this study provide valuable insights into the decision-making process of international students choosing IBCs in Malaysia. Personal factors, socioeconomic background, and university reputation significantly influence their decisions, with nationality acting as a moderating factor. The findings align with the existing literature on decision-making in higher education and provide practical recommendations for IBCs and policymakers aiming to attract international students. By understanding the nuanced preferences and priorities of international students, institutions can better position themselves to meet the needs of this diverse group.

5.1 Recommendations

1. *Enhance Institutional Reputation*; based on the significant impact of university reputation, it is recommended that IBCs in Malaysia invest in strategies to enhance their global standing. This could include strengthening academic programs, enhancing faculty qualifications, increasing research output, and engaging in international collaborations. Marketing efforts should emphasize the unique strengths and global recognition of the IBC, particularly targeting students from countries where academic prestige is a priority.
2. *Financial Aid and Scholarships*; Given the influence of socioeconomic background on students' decisions, institutions should prioritize offering robust financial aid packages and scholarships, especially for students from lower-income countries. Offering financial support can help mitigate the barrier posed by the cost of education and make IBCs in Malaysia more accessible to a broader range of international students.
3. *Provide Support for International Students*; To address the varying needs of international students, universities should consider offering tailored support services, such as orientation programs, career counselling, and mentoring, which are sensitive to the unique cultural and socioeconomic backgrounds of students. Such initiatives will help students feel more integrated and supported, enhancing their overall satisfaction with their decision to study at an IBC.
4. *Further Research on Nationality as a Moderating Factor*; This study provides evidence of the moderating role of nationality in international students' decision-making. However, future research should further explore how different cultural, economic, and educational contexts influence students' preferences and choices in other countries or educational settings. Expanding this research to include other types of institutions and geographical regions would help to generalize the findings and offer more comprehensive insights into international student decision-making.
5. *Focus on Stakeholder Collaboration*; Collaboration between IBCs, government agencies, and student associations is vital for increasing international student enrolment. These stakeholders can work together to promote Malaysia's educational offerings more effectively and address the challenges faced by international students, such as visa processes and cost concerns.

5.2 Limitations and Suggestions for Future Research

While this study provides valuable insights into the decision-making process, it is limited by its cross-sectional design, which captures data at a single point in time. Future research should adopt longitudinal designs to track changes in international students' decision-making processes over time. Additionally, the study focused on undergraduate students in Malaysia. future research could expand to include postgraduate students and IBCs in other countries for broader applicability.

Another limitation of the study is the use of a non-probability purposive sampling method, which may limit the generalizability of the findings. Future studies should consider using random sampling methods to enhance external validity. Moreover, while this study explored four main decision-making factors, future research could include additional variables such as cultural preferences, language barriers, and the impact of online education.

6. Conclusion

This study aimed to explore the decision-making factors in influencing international students' decision-making when selecting IBCs in Malaysia. The findings indicate that personal determinants, university reputation, socioeconomic background, and cost of education are key factors influencing students' decisions,

The study revealed that personal determinants play the most critical role in decision-making, followed by university reputation and socioeconomic considerations. The influence of cost of education was less pronounced but still relevant for certain groups, particularly those from lower-income backgrounds. This finding reinforces the Push-Pull Theory, highlighting the varying weight of decision-making factors depending on the students' national context.

The findings suggest that international students' decision-making processes are complex and multifaceted, with both internal motivations (e.g., personal goals) and external factors (e.g., reputation, financial considerations) shaping their choices.

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VICARIOUS LIABILITY IN E-HAILING SERVICES: EVALUATING PLATFORMS' LEGAL RESPONSIBILITY FOR DRIVER'S NEGLIGENCE

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Abstract: *The rapid growth of Malaysia's e-hailing industry, led by platforms like Grab, has raised critical legal questions regarding liability for driver negligence. While these platforms provide essential transportation services, accidents involving e-hailing drivers often lead to disputes over whether companies should bear vicarious liability. This article examines the legal framework governing platform responsibility, focusing on whether Malaysian courts may hold e-hailing operators accountable for their drivers' negligent acts. Using doctrinal legal approach by analysing journal articles, case law and statutory provisions, this article examine the application of vicarious liability principles to e-hailing platforms in Malaysia and the liability of e-hailing platforms in negligence cases. Findings reveal that Malaysian law currently lacks clear precedent, creating uncertainty in negligence claims. The article proposes legislative clarity to define e-hailing platforms' duties. It concludes that as the e-hailing services evolves, Malaysia's legal system must adapt to ensure equitable outcomes for accident victims while sustaining the industry growth.*

Keywords: *Vicarious Liability; E-Hailing; Negligence; Malaysian Transport Law*

Introduction

E-hailing, or electronic hailing, is a service that enables customers to hire a vehicle by ordering through e-hailing apps on their smartphones. Nowadays, this service has also expanded to include options beyond car rides, such as e-hailing for bikes and even food delivery. The service has becoming popular because of its convenience and fast response from the providers upon customers ordering. In fact, with the e-hailing apps, customers may not have to face trouble in ordering or taking public transportation (Sabar et al., 2023; Jamaluddin et al., 2021; Jais & Marzuki, 2020).

The development of e-hailing in Malaysia began in 2012 with the launch of MyTeksi, later known as GrabTaxi (Manaf, 2022). Founded by Anthony Tan and Tan Hooi Ling, the service initially faced resistance from traditional taxi companies but successfully started operations. By 2013, it had grown significantly, reaching 10,000 bookings per day (Jais and Marzuki, 2020). Platforms like Uber and GrabCar are not classified as direct transportation providers but instead considered as digital intermediaries connecting passengers with third-party drivers through their mobile applications. The platforms facilitate transportation services by enabling agreements between passengers and independent drivers, who use their own vehicles to fulfil the rides (Al-Shakhrit, 2021; Amirnuddin, 2017). As mentioned, Grab evolving from a ride-hailing platform into a multifaceted service provider that include food delivery (GrabFood) and cashless payment solutions (GrabPay) (Manaf, 2022).

However, this service has led to legal question regarding liability for accidents caused by e-hailing drivers. Traditionally, vicarious liability holds employers accountable for the negligent acts of their employees committed in the course of employment. Yet, the unique structure of e-hailing service where drivers are often classified as independent contractors rather than employees, challenges the conventional legal frameworks (Undari and Sugiyama, 2024). In Malaysia, as in many jurisdictions, courts face hardship in determining whether e-hailing platforms should bear responsibility for driver negligence, particularly in cases involving traffic accidents, passenger injuries, or third-party harm. Malaysian case law currently offers no clear rulings on whether ride-hailing platforms like Uber and GrabCar are liable for passenger injuries, creating uncertainty for victims, insurers, and companies. Without legal reforms classifying drivers as employees or imposing stricter platform accountability, injured passengers often struggle to claim compensation directly from these services. Instead, they typically depend on the driver's insurance (if available) or sue the driver individually, leading to prolonged disputes and inconsistent outcomes.

The ambiguity surrounding the employment status of e-hailing drivers creates significant legal uncertainty (Rogers, 2016). While platforms exercise control over drivers through app-based directives and fare structures, they often disclaim liability by asserting that drivers are independent contractors (Koonse, 2021). This raises the issue of whether e-hailing platforms will be vicariously liable for driver negligence. According to Aminurdin (2017), if a passenger is injured due to the negligence of an Uber or GrabCar driver, the question of whether the platforms is vicariously liable depends on the driver's employment status and the scope of the platform's control over the driver's actions. Under traditional vicarious liability principles, an employer is liable for the negligent acts of an employee committed within the scope of employment. However, platforms like Uber and GrabCar argue that they are not employers of their drivers but instead merely intermediaries connecting drivers with passengers through their digital platforms. They argue that legal responsibilities including securing adequate vehicle insurance and ensuring passenger health and safety are the duties of drivers themselves. This allows the platforms to avoid liability for accidents or negligence.

Therefore, the article seeks to examine the application of vicarious liability principles to e-hailing platforms in Malaysia. Specifically, it aims to evaluate factors influencing vicarious liability determinations and analysing the liability of e-hailing platforms in negligence cases. By addressing this issue, this research contributes to the ongoing debate on adapting traditional vicarious liability doctrines to negligent cases involving e-hailing platforms and determining whether injured passengers can claim compensation directly from platforms or must rely on drivers' personal liability.

Regulatory Framework of E-Hailing in Malaysia

Initially, e-hailing services operated in a grey area, competing with traditional taxis without clear regulations. At the time, Malaysia's transportation laws, primarily the Commercial Vehicles Licensing Board Act 1987 (CVLBA) and the Land Public Transport Act 2010 (LPTA) were designed for conventional taxis and did not cover e-hailing services. This lack of clear regulations created tensions between e-hailing operators and traditional taxi drivers, who argued that e-hailing services had unfair advantages. Unlike licensed taxis, e-hailing

drivers were not initially required to obtain PSV (Public Service Vehicle) licenses, comply with fare regulations, or other requirements (Jais and Marzuki, 2020).

Following protests from taxi drivers and due to safety concerns (Teo, 2018), the former Malaysian Transport Minister, Anthony Loke Siew Fook announced in 2018 that e-hailing will not be banned in the country. Instead of prohibiting it, the Malaysian government introduced amendments as follows: (1) the Land Public Transport (Amendment) Act 2018; (2) the Commercial Vehicles Licensing Board (CVLB) Act 1987; and (3) the Road Transport (Amendment) Act 2020. Thus, e-hailing drivers must now comply with rules such as to undergo annual inspections of vehicles at PUSPAKOM centers, drivers must pass medical and criminal background checks and obtain a Public Service Vehicle (PSV) license. Additional mandates include purchasing e-hailing-specific insurance, contributing to the Social Security Organization (SOCSO), and equipping vehicles with safety tools like fire extinguishers (Manaf, 2022; Al-Shakhrit, 2021).

The Law of Vicarious Liability in Malaysia

Vicarious liability is a fundamental doctrine in tort law that holds one party responsible for the wrongful acts of another, based on their relationship (Mohammed Naaim, 2023; Norchaya Talib, 2021; Tan, 2015). In Malaysia, this legal principle plays a crucial role in determining liability in employer-employee relationships, including in e-hailing services. The principle of vicarious liability is rooted in common law and has been incorporated into Malaysian legal practice through judicial decisions. The rationale behind this doctrine is that employers are in a better position to bear the financial burden of liability. Thus, an employer who gains advantages from the work performed by their employees should also assume responsibility for the risks tied to such work and face liability for any damages or injuries resulting from it (Mohammed Naaim, 2023).

The key requirements for establishing vicarious liability include the following: (1) existence of a special relationship; (2) tort committed by the employee—the wrongful act must be a tort, meaning it causes harm or injury to another party; and (3) during the course of employment—the tort must have been committed within the scope of employment (Mohammed Naaim, 2023; Norchaya Talib, 2021). These requirements are also stated in the case of *Tan Eng Siew & Anor v Dr. Jagjit Singh Sidhu & Anor* [2006] 5 CLJ 175.

Existence of a Special Relationship

The existence of a special relationship is a fundamental requirement in establishing vicarious liability in Malaysia. This relationship typically arises in employer-employee or principal-agent scenarios, where one party (the employer or principal) is held liable for the wrongful acts of another (the employee or agent). Independent contractors generally do not attract vicarious liability unless the relationship resembles that of an employer-employee (Mohammed Naaim, 2023; Hewsen, 2022; Norchaya Talib, 2021).

A case that illustrates this point is the case of *Siow Ching Yee v Columbia Asia Sdn. Bhd.* [2024] 3 MLJ 66. The case examines whether a private hospital liable for the actions of its independent contractor doctors, specifically in a situation where a patient suffered severe brain damage due to the negligence of a consultant anaesthetist. The court stated as follows:

"In vicarious liability it imposes liability on the defendant for the tortfeasor's breach of duty towards the plaintiff, based on relationship of employment between the defendant and the tortfeasor."

Tort Committed by the Employee

Another essential requirement for establishing vicarious liability is that the employee must have committed a tortious act, which is a civil wrong that causes harm or injury to another party, either intentionally or unintentionally (Mohammed Naaim, 2023; Norchaya Talib, 2021). This includes negligence, which is defined by Alderson B in the case of *Blyth v. Birmingham Waterworks Co.* (1856) 11 Exch 781 as follows: "… the omission to do something which a reasonable man, guided upon those considerations which ordinarily regulate the conduct of human affairs, would do; or doing something which a prudent and reasonable man would not do." Similarly, according to Ahmad and Hingun (2019), the tort of negligence can be defined as involving a defendant's failure to meet the required standard of care, resulting in loss or damage to the parties affected. In Malaysia, rooted in English common law, negligence requires plaintiffs to establish three core elements as follows: (1) duty of care; (2) breach of duty; and (3) causation.

Duty of Care

The foundation of negligence lies in proving the defendant owed the plaintiff a legal duty of care (Norchaya Talib, 2021). In *Heaven v Pender* (1883) 11 QBD 503, the court held that a duty of care existed when any ordinary man recognizes that a person's failure to use ordinary care and skill expected of him, would lead to injury to another person. One of the tests that can be used to determine the existence of duty of care is the neighbour test and was first discussed in *Donoghue v Stevenson* [1932] AC 562. In this case, Lord Atkin listed the two requirements in proving the existence of duty of care which are foreseeability and proximity. However, in Malaysia, courts adopt the Caparo three-stage test from *Caparo Industries plc v Dickman* [1990] 2 AC 605, requiring the plaintiff to prove that the harm must be reasonably foreseeable, the existence of relationship of proximity between parties, and that the imposition of liability on the defendant must be fair, just, and reasonable. This is as stated by the Federal Court in the case of *Tenaga Nasional Malaysia v Batu Kemas Industri Sdn Bhd & Another appeal* [2018] 6 CLJ 683, which affirmed the Caparo test and emphasizing its role in determining the existence of duty of care in different situations (Norchaya Talib, 2021).

Breach of Duty of Care

A breach occurs when the defendant fails to meet the standard of care expected of a reasonable person (*Donoghue v Stevenson* [1932] AC 562). This is known as a reasonable man test, where courts assess whether the defendant's conduct fell below this standard, by considering factors like the likelihood of harm and practicality of precautions. The court evaluates the conduct expected of a reasonable person in the same circumstances and determines whether the defendant could have reasonably foreseen the potential harm (Norchaya Talib, 2021). Thus, the standard of care applied to professionals with a particular skill is similar with other reasonable person with the same skill or expertise (*Swamy v Matthews* [1968] 1 MLJ 138). The test in determining the standard of care of a professional

defendant was established in *Bolam v Friern Hospital Management Committee* [1957] 2 All ER 118. In this case, the court held that the standard of care for doctors is 'the standard of the ordinary skilled man exercising and professing to have special skill'.

Causation

Factual causation is about whether the plaintiff's injury would have occurred "but for" the defendant's negligent act (Norchaya Talib, 2021). The landmark case for this is the case of *Barnett v Chelsea and Kensington Hospital Management Committee* [1969] 1 QB 428, where the main issue was whether the plaintiff's death due to arsenic poisoning was caused by the failure of the defendant to treat the plaintiff. The court held that there was a breach of a duty on the part of the hospital, but the doctor's negligence did not cause the death since the plaintiff would die, even if the poisoning had been diagnosed on arrival to the hospital.

Even if factual causation is established, the harm must not be too remote (legal causation). A defendant will only be liable if it is reasonably foreseeable that his conduct will result in some damage to the plaintiff (Norchaya Talib, 2021). In other words, legal causation evaluates whether the damage was a foreseeable consequence of the defendant's breach. This is based on the case of *Overseas Tankship (UK) Ltd v Morts Dock (The Wagon Mound case)* [1961] AC 388. This marked a shift from the strict "direct consequences" test in *Re Polemis* [1921] 3 KB 560 to a foreseeability-based approach. Malaysian courts frequently cite the *Wagon Mound case* to limit liability to foreseeable outcomes.

In the Course of Employment

The tort must have been committed within the scope of employment. To determine this, it is necessary to distinguish employees from independent contractors. Employees are subject to employers' control over work performance, whereas independent contractors operate independently. In determining this, courts may apply different tests such as the control test (degree of supervision) or the integration test (whether work is integral to the business) (Mohammed Naaim, 2023; Hewsen, 2022; Norchaya Talib, 2021). Another test applicable is the close-connection test that was affirmed by the Federal Court in the case of *GMP Kaisar Security (M) Sdn Bhd v Mohamad Amirul Amin Mohamed Amir* [2022] 6 MLJ 369. The court referred to the case of *Lister v Hesley Hall Ltd* [2002] AC 215, which stated that this test asks whether the wrongful act is so closely connected to the employee's duties that it would be fair to hold the employer liable. In GMP, the Federal Court highlighted the evolving scope of vicarious liability, emphasizing the "close connection test" which assesses whether an employee's actions are sufficiently linked to their job duties. The test is said to replacing the outdated and vague concept of "frolics of their own" that was used in older case like *Samin bin Hassan v Government of Malaysia* [1976] 2 MLJ 211. The case of GMP involves an appeal by GMP Kaisar Security (M) Sdn Bhd ('GMP') against the decision of the Court of Appeal, which had affirmed the High Court's decision. The High Court had allowed a tort claim brought by Mohamad Amirul Amin ('Amirul') against Jaafar bin Haalid ('Jaafar') and GMP. The appeal by GMP challenged the Court of Appeal's affirmation of the High Court's decision, which had allowed Amirul's claim in tort against both Jaafar and GMP. The case ultimately hinged on the application of the principle of vicarious liability in the context of an employer-employee relationship where the employee committed a tortious act, which was also a criminal act, using a weapon provided by the employer.

In the case of *Top Strata Management Sdn Bhd v Perbadanan Pengurusan Bukit Desa Kondominium* [2024] MLJU 672, the High Court discussed the law on vicarious liability as it formed the first ground of appeal by the 1st defendant. The 1st defendant, Top Strata Management Sdn Bhd, argued that as the employer of the 2nd defendant, A. Rahman Bin Sabar, who misappropriated monies from the plaintiff, Perbadanan Pengurusan Bukit Desa Kondominium, it should not be held vicariously liable for his fraudulent acts. In this case, the court began by stating the fundamental principle of vicarious liability: that in certain circumstances, an employer can be held liable for the negligent or intentional wrong committed by their employee, even if the employer is not at fault. The jurisprudence behind this principle is that certain relationships inherently require the person who engages others to accept responsibility for their wrongdoings. The High Court emphasized that the leading authority in Malaysia on vicarious liability is the Federal Court's decision in *GMP Kaisar Security (M) Sdn Bhd v Mohamad Amirul Amin Mohamed Amir,* where the Federal Court laid down the requirements for vicarious liability including the intentional wrong must be committed by the employee in the course of employment.

Analysis of the Liability of E-Hailing Drivers in Negligence Cases

While Malaysia's e-hailing industry has grown rapidly, e-hailing companies and operators face a critical issue regarding liability for accidents during operation, which remains unresolved. In 2019, it was reported that a Chinese national, Li Li Mei, died in an e-hailing accident near Cyberjaya. The car skidded and crashed into a lamp post and road divider, causing her to die on the spot. Her friend Lin Wen Chun and the driver sustained minor injuries (The New Straits Times, 2019).

Uber and Grab, the dominant e-hailing platforms in Malaysia, have avoided accepting liability for their drivers' negligence. They emphasize that drivers are independent contractors, not employees, thereby distancing themselves from direct liability for drivers' torts, including negligence. However, it should be noted that there are few cases that are held differently on this issue. In *Uber BV and Others v Aslam and Others* [2021] UKSC 5, the court held that Uber drivers are considered as workers. This case centered on the employment status of Uber drivers, specifically whether they should be classified as workers and entitled to rights like minimum wage and paid leave, or just as independent contractors. In this case, the respondents claim they were "workers" under the Employment Rights Act 1996, the National Minimum Wage Act 1998, and the Working Time Regulations 1998, thus making them entitled to minimum wage, paid leave, and other legal protections. On the other hand, the appellants argued they were merely independent contractors. During the hearing, the Employment Tribunal found the respondents were working when their application (app) was switched on, within authorized territory, and willing to accept assignments. The Employment Appeal Tribunal and Court of Appeal upheld these findings and the appellants appeal to the Supreme Court, which dismissed the appeal. The Supreme Court upheld the lower courts' decisions that the Uber drivers were indeed workers under the relevant legislation due to the significant control Uber exerted over them.

In contrary, the New Zealand Employment court in the case of *Arachchige v Rasier New Zealand Ltd & Uber BV* [2020] NZEmpC 230 held that Uber drivers are independent

contractors, and not workers. The claimant in this case worked as an Uber driver in Auckland from 2015 to 2019, under a services agreement with Uber BV and Rasier New Zealand Ltd. In June 2019, he was terminated from the platform due to a customer complaint. He applied to the Employment Court in Auckland to declare himself an employee of Rasier NZ and/or Uber BV under section 6 of the Employment Relations Act 2000, claiming unjustifiable dismissal. The court in deciding the issue, referred to Section 6(2) of the Employment Relations Act 2000 which mandates the court to assess the relationship between the claimant and Uber entities, considering factors including the terms of the services agreement, any operational differences, the parties' actions, whether the individual is working on their own account, and others. After weighing all the factors, the court found that the claimant did not meet the Employment Relations Act's definition of an employee. Although there may have been an employment relationship, the claimant's intent was to operate his own business independently, not be significantly influenced by Uber.

In Malaysia, reported court cases that addressing vicarious liability for accidents involving e-hailing drivers remain limited. However, general principles of vicarious liability from traditional employment relationships would provide a framework for understanding how Malaysian courts might decide the issue in such cases. E-hailing platforms in Malaysia classify their drivers as independent contractors, by citing reasons such as flexibility in the drivers' working hours and vehicle ownership. An example is in the High Court of *Loh Guet Chin v Minister of Human Resource & Ors* [2022] MLJU 2503. The case ruled that an e-hailing driver is not a workman (or employee) under Section 2 of the Industrial Relations Act 1967. The High Court listed the reasons for the decision including: (1) no employment contract was signed between the applicant and the third respondent's company; (2) the applicant does not receive a salary but the third respondent receives a commission of 20% from the applicant based on the profitability of bringing customers earned with the platform provided by the third respondent's company; (3) the third respondent did not make EPF, SOCSO and Employment Insurance Scheme (EIS) contributions; (4) the third respondent did not prepare an income statement for the purpose of income tax on the applicant; and (5) the third respondent did not control the applicant. On the other hand, the applicant is free to use the application provided by the third respondent. The appellant's appeal to the Court of Appeal which later affirmed the decision made by the High Court and dismissed the appellant's appeal for an unfair dismissal case and stated that a workman is someone engaged through a contract of service (Anbalagan, 2023). Further appeal was made to the Federal Court which was also dismissed (Bernama, 2024).

Therefore, e-hailing drivers are not deemed as 'workers' or employee under the Employment Act of 1955, thus making them not entitled to the same benefits and protection as conventional workers. As a result, the Malaysian e-hailing driver community does not been provided with insurance or takaful coverage through their employment by the e-hailing service providers (Isa, 2024). Nevertheless, few legal scholars argue that e-hailing platforms should bear liability due to their operational control and financial benefit. In fact, suggestions are made to amend the definition of employer and employee as stated in the Employment Act 1955 to include the e-hailing drivers (FMT, 2021). Similarly, the Malaysian Bar Council has called for legislative reforms to clarify e-hailing drivers' employment status. The Malaysian Bar has welcomed the proposed Gig Workers Bill 2025 (the Bill) as a legislative effort to address the legal ambiguities and social vulnerabilities faced by gig workers, including the e-hailing drivers who have always been classified as

independent contractors. The Bill will provide a definition of gig workers, detail reasonable compensation standards, grievance mechanism, and enhanced social security provisions (Abdul Wahab, 2025).

Conclusion

In Malaysia, vicarious liability for e-hailing drivers hinges on proving an employer-employee relationship and establishing that the tort occurred within the scope of employment. While no landmark Malaysian cases yet address vicarious liability for e-hailing drivers clearly, existing precedents suggest courts would apply traditional tests focusing on control and scope of employment. As the service of e-hailing evolves, it is important for the Malaysian legal system to confront this issue directly and clearly to safeguard victim's right as well as protecting the right of e-hailing drivers. For now, victims may rely on insurance claims, but the door remains open for courts to hold e-hailing companies accountable under vicarious liability principles.

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THE INTERSECTION BETWEEN RESULTING TRUST AND MATRIMONIAL PROPERTY LAW: MALAYSIAN PERSPECTIVE

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Abstract: *The equitable doctrine of resulting trust plays an important role in equity and trust law, especially to preserve the intention of the transferor and to prevent unjust enrichment. A resulting trust could arise when one party (transferor) pays for property but registers it in another's name, creating a presumption that the payer retains beneficial interest unless evidence suggests otherwise. This doctrine is crucial in resolving disputes over property ownership, especially in cases involving family members. This is where the concept of resulting trust overlaps with family law, specifically in the division of matrimonial property. The aim of this paper is to examine the equitable doctrine of resulting trust and its application within Malaysian family law context. In Malaysia, family law operates under two distinct frameworks: civil law for non-Muslims and Shariah law for Muslims. The coexistence of these systems ensures that legal matters involving family matters are addressed according to the individual's religious beliefs, reflecting Malaysia's multicultural society. This paper is a concept paper, where the discussion on the concept of resulting trust is made based on equitable principles and relevant legal provisions on matrimonial property, supported with scholarly articles. The dual legal system of family law in Malaysia presents challenges, particularly in cases where civil and Shariah laws intersect. Despite these complexities, the system aims to provide equitable solutions that respect the diverse cultural and religious backgrounds of Malaysia's population. Understanding the interplay between resulting trusts and family law within this dual system is essential for legal practitioners, academics and individuals alike. It highlights the importance of equitable principles in ensuring fair outcomes in property disputes while also respecting the distinct features of family law in Malaysia.*

Keywords: *resulting trust, family law, matrimonial property*

Introduction

Trust is a concept which was developed under equity to mitigate the strictness or rigidity of common law. According to Martin (2005), a trust is a relationship recognised by equity which arises where property is vested in a person or persons called trustees, which these trustees are obliged to hold for the benefit of other person or persons called *cestui que trust* or beneficiaries. The interest of these beneficiaries are usually detailed out in the instrument creating the trust, such as a trust deed. However, in some circumstances, the interest may be implied or imposed by law, and resulting trust comes under this category. Thus the existence of resulting trust is not dependent on compliance with certain formalities. This paper deliberates further about the concept of resulting trust and its overlap with certain family law principles relating to matrimonial property. Malaysia exercises a dual system of

family Law, ie, civil and Shariah, which provides detailed provisions on division of matrimonial property. If we look at the theoretical aspect of resulting trusts and the legal principles relating to the division of matrimonial property, there are some similar principles that can be identified. Therefore this paper explores further to what extent the doctrine of resulting trust is applicable in the division of matrimonial assets.

Understanding the Concept of Resulting Trusts

In order to understand the concept of resulting trust, it is pertinent to briefly introduce the concept of trust itself. To create trusts, a settlor must fulfill the requirement of three certainties, namely certainty of intention, certainty of subject matter and certainty of object or beneficiary (Ashgar & Muhamad, 2022). However, in a resulting trust, an express intention to create trust is not there. In other words, the settlor does not expressly state that he intended to create a trust.

Therefore, resulting trust is not an express trust, but an implied trust. In explaining the circumstances of resulting trust, Hudson (2005) explains that resulting trust may arise in two different context: either to restore the equitable interest in property to its original beneficial owner in circumstances in which a transfer of that property has failed; or to recognise the equitable proprietary rights of someone who has contributed to the purchase price of property with an intention that he/she takes some property rights in that property. These two types of resulting trust were emphasised by Lord Brown-Wilkinson in *Westdeutschhe Landesbank Girozentrale v Islington LBC* [1996] 2 All ER 961 at page 973:

> " … situations which are traditionally regarded as giving rise to a resulting trust, *viz* (1) voluntary payments by A to B, or for the purchase of property in the name of B or in his and A's joint names, where there is no presumption of advancement or evidence of intention to make an out-and-out gift; or (2) property transferred to B on an express trust which does not exhaust the whole beneficial interest."

The above explanation indicates two categories of resulting trusts, the first one is presumed resulting trust, while the second one is automatic resulting trust. Automatic resulting trust refers to the situation where express trust fails, thus the property will result back to the settlor. In the context of this paper, the discussion is related to the first category, which is presumed resulting trust. It does not come into existence based on the actual intention of the parties, but it is founded on the existence of state of affairs giving rise to presumed intention. As described by Martin (2005) who refers it to a situation in which a transferee is required by equity to hold property on trust for the transferor, or for the person who provided the purchase money for the transfer. It is a situation where the beneficial interest results, or returns back to the transferor or to the party who makes the payment. This indicates that resulting trust can become a basis of a claim for a person who wishes to recover his own property, even though the property is not registered in his own name. This principle is relevant, according to Riddal (2008), in the case of joint purchase of property to be used as a family home, where a wife makes a contribution towards the purchase of a house but the property is conveyed into the name of the husband alone.

In Malaysia, the concept of presumed resulting trust has been recognised by the court in *Goh Koon Suan v Heng Gek Kiau* [1999] 8 CLJ 218 which applied the dicta in *Chua Cheow Tien v Chua Geok Eng* [1968] 2 MLJ 180:

> "The settled law is that if A buys property in the name of B, who is no relative, B is held to be a trustee of that property for A but if B is the child or a wife of A no such trust is presumed and the law presumes that the legal and beneficial ownership is in the child or the wife so that the onus is on those who seek to rebut the presumption and establish an absolute trust for the father."

The above case does not only recognize the concept of presumed resulting trust, but it also mentions another relevant principle, which is, there is no presumption of resulting trust in the situation where a father transfers property to his child, or a husband transfers property to his wife. However, it is rebuttable and if successfully rebutted, the property will be held as a trust for the father or husband.

In short, there are two important principles in presumed resulting trust. Firstly, where A purchases property using his own funds but putting it in the name of B, the presumption of resulting trust arises, that is, B holds the property on trust for A. Secondly, A and B participate in a purchase and the property is conveyed to them as joint tenants, the funds or part of them being provided by A but title in the name of B. Here the property is presumed to be held in trust for the person who has provided the purchase money. If a person contributes only a portion of the purchase price, his beneficial interest would be in proportion to his contribution (Mohsin & Wan, 2013).

Family Law and Division of Matrimonial Property in Malaysia

As stated earlier, Malaysia exercises dual system of family law, the Islamic law for the Muslims and the civil law for the non-Muslims. Both systems have their own rules and provisions relating to division of matrimonial property.

For the non-Muslims, section 76 of the Law Reform (Marriage and Divorce) Act 1976 provides that-

(1) The court shall have power, when granting a decree of divorce or judicial separation, to order the division between the parties of any assets acquired by them during the marriage or the sale of any such assets and the division between the parties of the proceeds of sale.
(2) In exercising the power conferred by subsection (1) the court shall have regard to—
(a)the extent of the contributions made by each party in money, property or work towards the acquiring of the assets or payment of expenses for the benefit of the family;
(aa)the extent of the contributions made by the other party who did not acquire the assets to the welfare of the family by looking after the home or caring for the family;
(b)any debts owing by either party which were contracted for their joint benefit;
(c)the needs of the minor children, if any, of the marriage;
(d)the duration of the marriage,
and subject to those considerations, the court shall incline towards equality of division.

…

(5) For the purposes of this section, references to assets acquired during a marriage include assets owned before the marriage by one party which have been substantially improved during the marriage by the other party or by their joint efforts.

Whereas, for the Muslims, section 122 of the Islamic Family Law (Federal Territories) Act 1984 provides that –

(1) The Court shall have power, when permitting the pronouncement of talaq or when making an order of divorce, to order the division between the parties of any assets acquired by them during their marriage by their joint efforts or the sale of any such assets and the division between the parties of the proceeds of sale.
(2) In exercising the powers conferred by subsection (1), the Court shall have regard to—
(a)the extent of the contributions made by each party in money, property, or labour towards the acquiring of the assets;
(b)any debts owing by either party that were contracted for their joint benefit; and
(c)the need of the minor children of the marriage, if any,
and, subject to those considerations, the Court shall incline towards equality of division.
(3) The Court shall have power, when permitting the pronouncement of talaq or when making an order of divorce, to order the division between the parties of any assets acquired during the marriage by the sole efforts of one party to the marriage or the sale of any such assets and the division between the parties of the proceeds of sale.
(4) In exercising the powers conferred by subsection (3), the Court shall have regard to—
(a)the extent of the contributions made by the party who did not acquire the assets to the welfare of the family by looking after the home or caring for the family; and
(b)the need of the minor children of the marriage, if any,
and, subject to those considerations, the Court may divide the assets or the proceeds of sale in such proportions as the Court deems reasonable, but, in any case, the party by whose efforts the assets were acquired shall receive a greater proportion.

Analysing the above provisions, it clearly shows that Malaysian law, both civil and Syariah, recognise direct and indirect contributions of spouses in the division of matrimonial property. If there is direct contributions by both husband and wife, the division will be made proportionately, acording to the contributions made by them. This is similar with the concept of resulting trust whereby, if A and B participated in acquiring the property but the name is put in one person only, this person is regarded as a trustee for the other person. However, the above provisions do not mention anything about the absence of presumption of resulting trust in the situation where a father transfers property to his child, or a husband transfers property to his wife.

Challenges In Implementing Resulting Trust in the Context of Matrimonial Property in Malaysia

Implementing resulting trust in the framework of marriage property in Malaysia offers various difficulties, mostly related to the complicated interaction between Islamic law and civil law. Under Islamic law, there is no particular clauses in the Quran and hadiths that specify how distribution of matrimonial property should be made. Therefore, Muslim scholars depend on values like *'urf* (customs) and *syirkah* (partnership) as the legal foundation to validate the division of matrimonial property involving Muslims in Malaysia.

However, it should be noted that these bases are not consensus among jusrist (Yusoff, 2024). Combining civil and Islamic laws, the present legal system for marriage property in Malaysia might cause legal difficulties and discrepancies (Yusoff, 2024) if not properly implemented according to both civil and Islamic rules. In relation to equitable principle of resulting trust, it is also important to note that even though Islamic law does not specifically mention about resulting trust, but in general, any principles which are not contradicting to Islamic law and bring benefits for the society, are permissible.

Crucially important for estate planning, trust instruments are not well used, which results in poor property management and possible beneficiary damage (Ab Abdullah et al., 2022). Early implementation of trust instruments is lacking, which causes problems during the distribution of marriage property, so influencing the family as well as the national economy (Ab Abdullah et al., 2022). The failure to properly manage and distribute property causes these issues, which could cause conflicts and financial instability inside families. The ineffectiveness of trust instruments emphasizes the need of a stronger legal system to guarantee the efficient management and distribution of marital property.

More public knowledge of Islamic estate planning is needed to guarantee efficient use of trust tools (Ab Abdullah et al., 2022). Legal obstacles comparable to those experienced in Musharakah Mutanaqisah property finance, including ownership issues and legal documents, also affect the implementation of resulting trusts in matrimonial property (Nor et al., 2019; Queshi & Hedayat, 2016). These difficulties underline the need for public education on Islamic estate planning to reduce legal uncertainty and guarantee fair distribution of matrimonial property.

Importance of Understanding Resulting Trust in the Context of Matrimonial Property

In the context of matrimonial property, resulting trust can be used as a way to resolve conflict over property ownership and distribution. Resulting trusts develop when there is no obvious desire or intention on the part of the donor to give or transfer property. In married environments where shared finances and contributions could complicate property ownership, this idea is especially important. Using such trusts will help to define ownership rights and guarantee fair division of assets during separation or divorce. The following are salient features of the relevance of knowing resulting trusts in this regard.

By employing resulting trusts to address property ownership problems, particularly in cases where there is no clear evidence of purpose to give or transfer property, legal practitioners significantly help to resolve conflicts. In marital proceedings, where contributions to property are not necessarily pecuniary or recorded (Ali et al., 2021) this is especially helpful. Practitioners have to be aware of the assumption of resulting trust, which holds that, unless proven differently, contributions to the purchase of property are not gifts. In situations whereby one party claims a larger portion of property depending on financial contributions, this presumption can be quite important (Capicchioni, 2024; Ramjohn, 2013). By acknowledging non-financial contributions, such as homemaking or childcare, which may not be recorded in legal ownership but are important in assessing beneficial ownership, resulting trusts allow fair division of matrimonial property (Ali et al., 2021). Resulting trust could be relevant to solve the issue of ownership of a family home (Pawlowski, 2022) In a case involving divorce due to conversion to Islam of one spouse who married under the civil law, one of the complex issues is related to the division of jointly acquired property (Sukri

et al., 2021). The principle of trust can be used to solve this conflict by recognising each other's contribution towards acquiring the property.

In academic field, scholars investigate the theoretical foundations of resulting trusts, including whether they derive from supposed purpose or operation of law. This research advances knowledge of property law and helps hone legal theories (Chambers, 2000). Academics can investigate how these junctions interact and impact one another, hence illuminating more general legal and social ramifications (Dutta, 2023). Another crucial component is case law study, which examines how resulting trusts are handled in other countries such the UK, Canada, and Australia. This study clarifies patterns and variations in legal interpretations and implementations (Chambers, 2000; Capicchioni, 2024).

Understanding resulting trusts helps people, especially those experiencing a divorce or separation, understand their rights to property obtained during the marriage. This knowledge can enable people to negotiate fair compensation and make wise judgments (Ali et al., 2021). Knowing how financial and non-financial contributions to property acquisition are acknowledged under resulting trusts can help people decide on financial plans and property ownership during marriage (Ramjohn, 2013; Watt, 2023). Knowing resulting trusts helps people predict possible legal results in property conflicts, therefore enabling better preparation for legal procedures and protection of their interests (Capicchioni, 2024).

Conclusion

The dual legal system of family law in Malaysia poses considerable complications, especially in instances where civil and Shariah laws converge. This junction frequently results in complications in legal proceedings, necessitating the harmonization of the principles and practices of both legal systems to provide equitable solutions. Notwithstanding these problems, the system endeavors to honor the many cultural and religious backgrounds of Malaysia's populace, guaranteeing that legal outcomes are equitable and just. Comprehending the interaction between resulting trusts and family law within this dual framework is essential for legal professionals, scholars, and individuals. It emphasizes the significance of equitable principles in adjudicating property disputes, while recognizing the distinctive characteristics of family law in Malaysia.

Resulting trusts are essential in the equitable allocation of property, particularly in marital circumstances when ownership and contributions may be unclear. Scholars contribute by examining the theoretical underpinnings of resulting trusts and reviewing case law to comprehend their applicability across various jurisdictions. This research enhances legal theories and offers insights into the broader consequences of the interplay between property law and family law. For individuals, especially those experiencing divorce or separation, comprehending resulting trusts can enable them to make informed decisions and negotiate equitable settlements. Future studies may concentrate on several domains to improve the understanding and relevancy of resulting trusts under Malaysia's dual legal framework. Comparative analyses between Malaysia and other countries with analogous dual legal systems may yield significant insights into optimal practices and areas for enhancement. These recommendations for future research would enhance the robustness and equity of the legal system in Malaysia.

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TENANCY LAW IN MALAYSIA: A NEED FOR REFORM

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Abstract: *In Malaysia, the general nature of tenancy is based on the Torrens system. Recently, there has been a growing demand for specific regulations on various tenancies due to societal changes. The problem lies in the application of current tenancy laws, which require specific attention regarding repairs, the execution of tenancy agreements, and their endorsement. Managing landlord and tenant relations is challenging, especially in the absence of specific laws and institutions to implement and enforce these regulations. One challenge is the broad application of tenancy laws across various contexts, such as agricultural, commercial, and residential tenancies. This paper examines the current tenancy laws in Malaysia, highlighting their strengths and weaknesses, particularly in Peninsular Malaysia. The study is based on library research, focusing on relevant tenancy laws and regulations in Malaysia. The findings aim to assist policymakers in addressing different tenancy contexts. Hopefully, this study will contribute to the broader body of knowledge on tenancy and property law governance.*

Keywords: *tenancy, property law, residential tenancies, land law.*

Introduction

The regulation of tenancy in Peninsular Malaysia is a critical issue, attracting significant attention due to the growing demand for housing, commercial, and agricultural sectors, and the need to balance the rights and obligations of landlords and tenants. The prevailing law governing tenancies in Malaysia is a blend of combination between common law, principles of equity, legislation, and court decisions. The current legal framework, scattered across various statutes such as the National Land Code 1956, Contracts Act 1950, Distress Act 1950, and Specific Relief Act 1950 has been criticized for inadequately addressing modern tenancy issues. Regulating tenancy should not be considered irrelevant, as tenancy has been subject to regulatory measures since the early 1900s in response to prevailing economic and social circumstances. Regulatory measures are crucial in addressing emerging issues such as war, rural-urban migration, inequalities in contracts, and occupancy quality. A sophisticated form of regulation is essential to balance market pressures and maintain predictability and security for both landlords and tenants. If rent increases disproportionately to income, there is pressure on the government to intervene for distributional reasons, ensuring people have access to affordable housing and equitable commercial and agricultural contracts. This paper explores key challenges, legal gaps, and potential solutions for regulating tenancy in Peninsular Malaysia, drawing insights from various research papers.

Current Legal Framework and Its Limitations

The existing legal framework governing tenancy in Peninsular Malaysia is fragmented and lacks speciality. The lack of specific law for regulating tenancies is due to the failure of the common law to recognise tenancies as an ordinary contract between the parties. The existing law on tenancy will cover all types of tenancies such as commercial, residential or agricultural tenancies. Unlike jurisdictions such as the UK, Australia, New Zealand, and Canada, Malaysia does not have dedicated legislation that comprehensively addresses landlord-tenant relationships in either residential, commercial or agricultural. Tenancy law in Malaysia is governed by several statutes, including the National Land Code 1965, Contract Act 1956, Distress Act 1951, Civil Law Act 1956, Specific Relief Act 1950, and Rules of Court 2012. These acts provide various remedies for both landlords and tenants. A tenancy can be established either orally or in writing, but the period must not exceed three years, as established in the case of *Than Kok Leong v Low Kim Hai [1983] 1 MLJ 187*. Unlike a lease, which can range from four to ninety-nine years and requires registration in a prescribed statutory form, a tenancy does not create a registrable interest in the land. The National Land Code provides for the endorsement of tenancy agreements to protect tenants, as seen in the case *of Luggage Distributors (M) Sdn Bhd v Tan Hor Teng & Anor [1995] 1 MLJ 719.* However, if a tenancy is not endorsed on the document of title for the tenanted premises or land, although valid, it will not be binding on future owners of the property.

Key Issues Arising from the Existing Law on Tenancy in Peninsular Malaysia

In Peninsular Malaysia, tenancy laws are applied across all sectors of tenancy—residential, retail, and agricultural. There is no personalised legislation enacted to suit the unique characteristics of each sector. This generalized legal approach relies primarily on broad statutory instruments such as the National Land Code 1956, Contracts Act 1950, Distress Act 1950, and Specific Relief Act 1950, which do not sufficiently address the specific legal and practical needs of different tenancies. As a result, stakeholders in each tenancy sector encounter challenges in obtaining equitable legal protections and clarity on their rights and obligations. The absence of specific tenancy laws has prompted calls for legislative reform to ensure that the rights and responsibilities of both landlords and tenants are adequately safeguarded, and to promote the viability of each tenancy sectors. The current tenancy laws in Malaysia shows significant gaps that necessitate the development of a new and modern tenancy law and regulations. These gaps primarily stem from the absence of a comprehensive legal framework specifically addressing landlord-tenant relationships, leading to power imbalances between them and inadequate dispute resolution mechanisms. (Jalil & Maidin, 2021) (Abdullah et al., 2023). This legal fragmentation results in inadequate legal protection on the rights and obligations of both landlords and tenants (Sufian, 2012).

The Need for Comprehensive Legislation

The need for a specific legislation to regulate each sector tenancy in Peninsular Malaysia has been repeatedly emphasized in various studies (Jalil & Maidin, 2021b; Kader, Mohamad, Amin, & Kassim, 2015; Suffian, 2012). A dedicated tenancy act has been proposed to address the issues and provide a balanced regulatory framework that protects the interests of both landlords and tenants. A new tenancy law should incorporate specific provisions that enhance the rights and obligations of both landlords and tenants, ensuring a balanced and fair relationship. The proposed legislation should focus on creating a

comprehensive framework that addresses key issues such as security deposits, dispute resolution, and the regulation of short-term rentals (Abdullah et al., 2023).

The general application of the existing tenancy law such the period of tenancy, the implied and express provision, and the endorsement of tenancy are applicable without any exemption. The demand of each tenancy is different as the objective of each tenancy will depend on the purpose of the tenancy. For residential tenancy, the tenant contracted with the landlord for the purpose of occupying habitable rental unit for the duration of tenancy. Therefore, the issue of repair and the maintenance of rental unit are important to ensure a worthy-occupancy of the rental unit (Jalil & Maidin, 2021a, 2021b). Conversely, the focus on agricultural tenancy is different as the tenant expected the landlord to give vacant possession of a land without any interruption from the landlord or his agent. The issue of repair and maintenance may not be the important focus for landlord and tenant in agricultural tenancy (Maidin, Zulkarnain, Sulaiman, & Ramli, 2013). For retail tenancy agreement, it was executed between the landlord and tenant for the purpose of business or commercial. The tenant is granted with possession of the retail unit and will be subjected to operational time and in-house rules. For landlord, the common covenants would be on the obligation on provision of security, amenities to the patrons, and insurance (Kader et al., 2015).

Agricultural Tenancy

Agricultural tenancies in Malaysia are generally governed by the National Land Code (NLC) and the Contracts Act 1950 with the exception to Padi Cultivators (Control of Rent and Security of Tenure) Act 1967 in which it regulates matters pertaining to the control of rent and security of tenure of padi cultivators. However, these existing laws are often inadequate in addressing the complexities of modern agricultural practices. The proposed act should clearly define the permitted agricultural activities and the rights to cultivate specific crops. This ensures that both parties understand the scope of permissible use and can prevent disputes related to unauthorized activities. With the purpose of tenancy clearly defined, there will be no abuse of the use of land by planting any illegal crops which will jeopardize the quality of the land. in matters pertaining to environmental and its sustainability protection, the act should incorporate provisions that mandate sustainable farming practices and compliance with environmental regulations (-Khee, 2009). This aligns with global trends towards sustainable agriculture and ensures long-term land viability. By having a specified provision on agricultural tenancy, clauses and provisions can be leveraged to mandate and direct responsible land management practices, minimizing harmful pesticide use, implementing crop rotation and conservation of water resources (Ab.Rahman & Othman, 2012). Additionally, the specific regulation can address the issue of water pollution by requiring proper waste discharge system and preservation of natural habitats (Huang, 1975).

Residential Tenancy

Residential tenancies are currently governed and regulated by a mixture of the Contracts Act 1950 and the National Land Code, leading to inconsistencies and limited tenant protection. The proposed residential tenancy act aims to standardize and enhance the legal framework for residential leases. Key components include the promotion of using standardized tenancy agreements, management of security deposit, speedier and cheaper

alternative dispute resolution (Jalil & Maidin, 2021b). Currently, parties involved in residential tenancies often rely on tenancy agreements drafted by lawyers, real estate agents, or templates found online to formalize the existence and execution of their agreements. However, this practice can lead to various issues, particularly when such agreements lack essential clauses necessary to safeguard the interests of both parties. The adoption of a standardized tenancy agreement can address these concerns by promoting efficiency in the execution process and ensuring a more balanced negotiation between the parties. A standardized agreement, designed to be simple, user-friendly, and written in plain language, would be regulated by specific legislation to ensure consistency and legal compliance. Furthermore, it would incorporate dispute resolution clauses, thereby providing parties with access to more affordable and expedited mechanisms for resolving conflicts(Jalil & Maidin, 2021a).

Disputes between landlords and tenants are often resolved either through negotiation or by taking the matter to court. Due to the absence of specific legislation governing the resolution of residential tenancy disputes, the legal rights of both parties are primarily protected by the provisions outlined in the tenancy agreement they have signed. If a tenant breaches any provision of the agreement, the landlord may initiate civil proceedings to seek remedies as stipulated in the contract. However, landlords are prohibited from resorting to self-help measures, as tenants may file counterclaims for damages. When dealing with an uncooperative tenant, landlords are further restricted by Section 7(1) of the Specific Relief Act 1950, which prohibits eviction and recovery of possession without a court order (Sethu, 1994). The process of obtaining a court order and reclaiming the rental property is often time-consuming and costly. Even when an eviction order is granted, it may result in a "paper judgment," requiring the landlord to initiate additional legal proceedings to recover losses. These delays and procedural complexities often benefit the tenant or occupier, allowing them to remain on the premises without incurring any cost.

Commercial Tenancy

Commercial tenancies differ significantly from residential and agricultural leases due to the dynamic nature of business operations and the need for contractual flexibility. To ensure clarity and legal protection for both landlords and tenants, a well-structured commercial tenancy framework should incorporate the essential components such as maintenance and repair provisions, force majeure and termination of tenancy agreement. (Kader et al., 2015) examined the absence of specialized commercial tenancy in Malaysia and identified significant gaps regarding the rights and obligations between the landlord and the tenant. While the commercial tenancy agreement mostly is executed between the parties, the agreements are usually prepared by the landlord. a comprehensive commercial tenancy law and regulations must be advocated to promote fairness and stability in the retail sectors. The enactment of a specialized commercial tenancy will align Malaysia into international standards, increasing investor confidence, and encouraging a more stable and transparent commercial market.

A Need of Reform

Each sector demonstrates a clear and growing need for a dedicated tenancy law tailored to its specific characteristics and challenges. The continued reliance on general tenancy provisions is increasingly inadequate, considering evolving societal norms, economic

transformations and the advancement of modern technology on agricultural. Current societal demands shaped by globalization and seamless interaction with the international community requires a more structured and sector-specific regulatory framework. The implementation of precise regulations and guidelines would not only provide clarity and protection for all stakeholders involved but also support broader national objectives. For instance, in the agricultural sector, a well-defined tenancy law could facilitate economic transformation while promoting environmental sustainability through the enforcement of responsible land use practices. Therefore, the development and promotion of sector-specific tenancy legislation are essential to ensure that legal frameworks evolve in tandem with societal needs.

Conclusion

The current legal framework governing tenancy relationships in Malaysia lacks the clarity and specialization necessary to effectively address the distinct needs of residential, commercial, and agricultural tenancies. This absence of specific legislation often results in prolonged disputes, legal uncertainty, and procedural inefficiencies, particularly in residential tenancies where landlords face significant barriers in enforcing their rights. In light of these observations, two key recommendations are proposed. Firstly, Malaysia should consider enacting separate legal framework for residential, commercial and agricultural tenancies. Each sector has its own demand and characteristics in terms of operational, economic and social consideration that merits a specialized treatment. The approach of one-size-fit all is no longer suitable for the current market taking into consideration the changes adopted by other jurisdiction such as New South Wales, Australia and Scotland in enacting distinctive legal instruments for each tenancy. These reforms streamlined procedures for creation and terminations of tenancy, and dispute resolution, showcasing a balanced and responsive legal approach towards the demand of the society. By adopting a more structured and sector-specific approach to tenancy law, Malaysia can better protect the rights of both landlords and tenants, promote investment in the rental market, and align its legal infrastructure with international best practices.

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BETWEEN FAITH AND FAMILY: THE EFFECT OF RELIGIOUS CONVERSION ON NON-MUSLIM DIVORCE PROCEEDINGS IN MALAYSIA

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Abstract: *This study looks at the legal challenges faced by non-Muslim families in Malaysia when one spouse becomes a Muslim. In Malaysia, there are two separate legal systems; civil law for non-Muslims and Islamic (Syariah) law for Muslims. When a person changes religion, especially in a marriage, it can cause confusion and problems because the two legal systems the two legal systems can lead to misunderstandings, especially in divorce cases. Previously before the amendment was made to the LRA, Section 51 of the Law Reform (Marriage and Divorce) Act 1976 (LRA) permits only the non-converting spouse to initiate divorce on the grounds of the other's conversion, often leaving the converting spouse in legal limbo. This conflict raises critical questions about religious freedom, and the rights of spouses and children. Through legal analysis, including landmark decisions such as Indira Gandhi, this paper examines how conversion is sometimes used in custody battles and how recent legal reforms aim to address these tensions. The study concludes by advocating for clearer legislative guidelines and more harmonized jurisdictional boundaries to protect the rights of all parties involved, regardless of faith.*

Keywords: *conversion, divorce proceedings, non-Muslim marriage, Law Reform (Divorce & Marriage) Act 1976*

Introduction

The coexistence of the dual legal systems in Malaysia often leads to jurisdictional overlaps and ambiguities, particularly in cases involving matters of family law, religious conversion, and the rights of individuals from different religious backgrounds. One of the contentious scenarios arises when a spouse in a non-Muslim marriage converts to Islam. The practical implications of such conversions often lead to jurisdictional disputes and emotional distress for families following two parallel legal systems.

This legal ambiguity causes delays, conflicting decisions, and emotional stress for the family. For instance, the landmark case Indira *Gandhi v. Pengarah Jabatan Agama Islam Perak & Ors* [2018] 1 MLJ 545, in which a mother fought for custody of her children after her ex-husband unilaterally converted them to Islam, highlighted the deep legal and emotional consequences of such conversions. Similarly, academic analyses have shown that non-converting spouses especially women face significant uncertainty regarding their rights to ancillary claims such as maintenance and child custody.

This article explores the impact of religious conversion on non-Muslim divorce proceedings in Malaysia. It focuses on three key areas: jurisdictional conflicts between civil and Syariah courts, the legal standing of non-converting spouses, and the remedies available under current Malaysian law.

Legal Framework and Jurisdictional Complexity

Civil marriages between non-Muslims are governed by LRA, while matters involving Muslims fall under various state Islamic Family Law Enactments and are adjudicated by the Syariah Courts. The two-track legal system is constitutionally rooted through Article 121(1A) of the Federal Constitution, which explicitly removes the jurisdiction of civil courts over matters that fall within the jurisdiction of the Syariah courts.

The two legal system often results in jurisdictional ambiguity, especially when both courts give authority over custody decisions involving minor children (Nair & Chuan, 2017; Tasrip & Rahman, 2016). The conversion effectively shifts the individual's legal status, placing them under Syariah jurisdiction, while the non-converting spouse remains governed by civil law. As a result, the previously unified civil marriage split across two legal systems, often leading to jurisdictional disputes. This is particularly evident in cases involving divorce, maintenance, and child custody, where the non-converting spouse may find themselves without clear legal recourse or protection.

Prior to the 2017 amendments to the LRA, the legal position of a spouse who converted to Islam was in highly uncertain. Under the original framework, the converting party had no legal standing to petition for divorce under the LRA, as the Act applied exclusively to non-Muslims. This legal silence effectively excluded the convert from civil matrimonial remedies, creating a situation where conversion was perceived not as a spiritual transformation, but as a legal penalty, a form of punishment that stripped the individual of their marital rights under civil law.

This imbalance was not merely theoretical. In practice, it led to uncertainty in legal position, where the converted spouse could not dissolve the marriage through civil courts, while the non-converting spouse retained that right under Section 51 of the LRA. The resulting ambiguities was widely criticized as unjust and discriminatory, especially in cases where the convert sought to remarry, resolve custody and maintenance issues but was left without a clear legal pathway.

Recognizing the urgency of reform, the 2017 amendments to the LRA introduced significant changes. Most notably, the amendments also strengthened Section 51, allowing the non-converting spouse to seek divorce and ancillary relief, and addressed broader issues such as child maintenance beyond the age of 18 and the recognition of non-financial contributions in the division of matrimonial assets.

Despite these improvements, scholars argue that the amendments still fall short of fully resolving the jurisdictional overlap and rights asymmetry that persist in interfaith family disputes. The continued existence of two parallel legal systems each with its own principles, procedures, and limitations thus making the legal uncertainty remains a defining feature of such cases.

This legal fragmentation not only undermines the principle of equal protection under the law but also places significant emotional and financial strain on families. The lack of a harmonized legal mechanism to address interfaith family disputes continues to leave many individuals especially women and children vulnerable to legal uncertainty and injustice.

Effects of Religious Conversion on Non-Muslim Divorce Proceedings

1. Jurisdictional Conflicts

One of the most immediate and complex consequences of religious conversion in a non-Muslim marriage is the emergence of jurisdictional conflict. When one spouse converts to Islam, their legal status transitions from civil to Syariah jurisdiction. However, the marriage originally solemnized under the Law Reform (Marriage and Divorce) Act 1976 (LRA 1976) is not automatically dissolved. This creates a legal grey area where both civil and Syariah courts may assert authority over different aspects of the same marriage.

This conflict was illustrated in the landmark case of *Subashini Rajasingam v. Saravanan Thangathoray* [2008] 2 MLJ 147. This case addressed that custody issues post-divorce, highlighting the complexities of mixed marriages and differing legal standards. The court emphasized the child's best interests, reflecting the broader conflict of laws in custody matters (Al-Samak, 2022). In this case, the husband converted to Islam and subsequently converted the couple's elder son without the consent of his non-Muslim wife. He then initiated custody proceedings in the Syariah Court. The wife, still a non-Muslim, sought relief in the civil courts under Section 51 of the LRA 1976, which allows a non-converting spouse to petition for divorce after the other party's conversion.

The Federal Court held that the husband, now a Muslim, had the right to seek remedies in the Syariah Court, and that the civil court could not restrain him from doing so. This decision effectively acknowledged the jurisdictional divide but left the non-converting spouse in a precarious position unable to challenge Syariah Court proceedings in which she had no legal standing as a non-Muslim.

This case exemplifies the broader systemic issue: civil courts are constitutionally barred from intervening in Syariah matters under Article 121(1A) of the Federal Constitution, even when the dispute originates from a civil marriage. As a result, the non-converting spouse may find themselves excluded from proceedings that directly affect their rights and the welfare of their children.

Samuri and Khan (2021) argue that legal literacy is essential for Muslim converts in Malaysia. There is a grave necessity to explore the perspectives of Muslim converts regarding the need for legal literacy that can educate them to make good decisions in the matters mentioned above to avoid going into a prolonged legal battle and wasting resources

2. Child Custody

The conversion of a non-Muslim spouse to Islam within a civil marriage has far-reaching implications, particularly in the realm of child custody and religious identity. Conversion to Islam in a non-Muslim marriage complicates child custody, as it raises issues of religious identity. Shariah scurts may prioritize the Muslim parent's rights, leading to potential conflicts between civil and Shariah law regarding custody and the child's welfare (Adil & Saidon, 2017).

When a parent converts to Islam, they become subject to Syariah law, while the non-converting spouse and children (if not converted) remain under the jurisdiction of civil law. This legal bifurcation frequently results in conflicting custody claims, with each court

system asserting authority based on the religious status of the parties involved. The situation becomes even more complex when the converted parent initiates custody proceedings in the Syariah court, where the non-Muslim spouse has no legal standing to participate or contest the outcome. Children may be caught between conflicting parental ideologies and legal interpretations, leading to emotional distress and instability (Tasrip & Rahman, 2016).

Research by Zin et al. (2019) and Jani & Zin (2016) highlights a troubling trend: converted parents often receive preferential treatment in Syariah court custody decisions, particularly when the child is of tender age. This raises serious concerns about whether the best interests of the child; a principle central to both civil and international family law are being adequately considered. In many cases, the emphasis on religious upbringing and the faith of the converting parent may overshadow other critical factors, such as emotional bonds, caregiving history, and the child's own wishes.

Moreover, the unilateral conversion of children by the newly Muslim parent without the knowledge or consent of the other parent adds another layer of complexity. This practice not only undermines the rights of the non-converting parent but also places the child at the center of a legal and religious tug-of-war. The *Indira Gandhi* case remains a stark reminder of the emotional and legal turmoil that can result from such unilateral actions.

These dynamics underscore the urgent need for coherent legal standards that prioritize the welfare of the child above religious or jurisdictional considerations. Without such safeguards, children risk becoming collateral damage in disputes driven more by legal technicalities and religious identity than by their own well-being.

A landmark case that brought these issues to the forefront is *Indira Gandhi v. Pengarah Jabatan Agama Islam Perak & Ors* [2018] 1 MLJ 545. In this case, Indira Gandhi, a Hindu mother, challenged the unilateral conversion of her three children to Islam by her ex-husband, who had converted to Islam and obtained a Syariah court order for custody. The conversion was carried out without her knowledge or consent, and the children remained legally minors under civil law.

In 2018, the Federal Court made a big decision that changed and set up the new principle in the issue of unilateral conversion of a child. It ruled that the conversion of a minor to Islam requires the consent of both parents, not just one as written in (Steiner, 2014). The court emphasized that the word "parent" in Article 12(4) of the Federal Constitution must be interpreted as "parents" in the plural, aligning with the broader constitutional principles of equality and justice. According to (Sofian, 2022), the Indira Gandhi case set a significant legal precedent by voiding unilateral religious conversions of children without parental consent, emphasizing the need for both parents' agreement in custody matters, and highlighting the tension between civil and Sharia law in Malaysia. The father's action to unilaterally convert the children without the mother's consent was considered to interfere with family life (Noor & Lee, 2023).

Importantly, the court also reaffirmed the jurisdiction of the civil courts in matters involving non-Muslim parents and children, even when one parent has converted to Islam. This ruling restored a measure of legal clarity and offered protection to non-converting parents, particularly mothers, who had previously found themselves excluded from Syariah court proceedings and unable to challenge decisions affecting their children.

Despite this landmark ruling, implementation remains uneven. In practice, enforcement of custody orders across jurisdictions can be inconsistent, and the emotional toll on families especially children can be severe. Legal scholars have noted that while the *Indira Gandhi* decision sets a strong precedent, it also underscores the need for systemic reform to prevent similar conflicts from arising in the first place.

The case also highlights the broader societal implications of religious identity in child parenting. In a pluralistic society like Malaysia, where religious affiliation can determine legal rights and obligations, the question of a child's religion is not merely symbolic it has tangible legal consequences. As such, the law must tread carefully to ensure that the rights of both parents and children are respected, and that no party is disadvantaged due to unilateral decisions made under the cover of religious conversion.

Following this Federal Court's decision, the case received widespread media attention. Public opinion was divided where some welcomed the judgment, while others expressed concern or disagreement (Mohd Sofian, 2022).

Religious Identity and the Child's Upbringing

Religious identity becomes a deeply contested issue in the aftermath of a spouse's conversion to Islam, particularly when children are involved. In Malaysia's dual legal system, the religious upbringing of a child is not merely a private family matter it is a legal issue with significant implications for custody, guardianship, and the child's future rights.

Unilateral conversions, where one parent converts the child to Islam without the consent of the other have been at the center of numerous legal battles. These actions often result in disputes over the child's religious status, which in turn complicates family dynamics and challenges the rights of the non-converting parent. According to the study *Unilateral Conversion of Minors to Islam: Legal Discourse and Muslim Converts' Narrative on Custody and Religious Rights in Malaysia* (2022), such conversions are frequently justified by the converting parent as being in the child's spiritual best interest, yet they often disregard the emotional and legal consequences for the other parent and the child.

Tasrip and Rahman (2016) once argued that the legal framework in Malaysia, while attempting to balance religious freedom and parental rights, often leans toward favoring the converted parent. This is particularly evident in Syariah court decisions, where the emphasis on Islamic upbringing is seen as a religious obligation. From this perspective, the preference for the converted parent is not merely legal it is theological, rooted in the belief that raising a child as a Muslim is a moral and religious duty.

However, this approach raises critical questions about the child's autonomy, the rights of the non-converting parent, and the principle of mutual parental consent. The Federal Court's decision in *Indira Gandhi* reaffirmed that both parents must consent to a child's religious conversion, indicating a shift toward a more balanced interpretation of parental rights. Yet, in practice, enforcement remains inconsistent, and many non-converting parents continue to face legal and emotional barriers in asserting their role in their child's religious upbringing.

This tension between legal frameworks and individual family dynamics reflects a broader societal challenge: how to reconcile religious obligations with constitutional rights in a multicultural, and multi-religious society. As Malaysia continues to grapple with these issues, it becomes increasingly clear that legal reform must not only address jurisdictional clarity but also ensure that the child's best interests, spiritually, emotionally, and legally are at the heart of every decision.

Conclusion

The issue of religious conversion in the context of non-Muslim divorce proceedings in Malaysia reveals deep structural tensions within the country's dual legal system. While the Federal Constitution guarantees freedom of religion, its implementation within the realm of family law has led to significant legal ambiguities and practical hardships particularly for non-converting spouses and children. The jurisdictional divide between civil and Syariah courts creates a legal vacuum where justice is often delayed, and in some cases, denied.

Cases such as *Indira Gandhi* and *Subashini Rajasingam* underscore the urgent need for clearer legislative and judicial responses that respect both religious sensitivities and the fundamental rights of individuals. The current legal framework though well-intentioned fails to adequately protect the interests of all parties when religious conversion occurs mid-marriage, especially in relation to custody, maintenance, and matrimonial property.

A harmonised and human-centred approach is essential. Legal reforms must aim to ensure that conversion does not become a loophole to circumvent civil obligations, and that the non-converting spouse is not left in legal limbo. The civil courts must be empowered to maintain jurisdiction over the entirety of civil marriages, even after one party converts, to ensure fairness and legal continuity. Harmonizing the Sharia and Civil Law systems in Malaysia, particularly in divorce proceedings, requires a thoughtful approach that respects the religious sensitivities while promoting fairness and equity (Abdullah, 2024).

Ultimately, safeguarding family integrity and individual rights amidst religious diversity requires not only legal clarity but also political will and societal understanding. Balancing faith and family are a delicate task but one that Malaysia, as a multi-religious nation, must navigate with compassion, coherence, and constitutional fidelity.

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TOWARDS INCLUSIVE GROWTH: EFFECTIVE POLICY INTERVENTIONS TO NARROW INCOME DISPARITIES IN ASEAN

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Abstract: *This study examines income inequality across five (5) ASEAN countries—Indonesia, Malaysia, Philippines, Singapore, and Thailand over the period from 1990 to 2022. Utilizing the Gini coefficient and a static panel data methodology, the research evaluates the effects of key macroeconomic determinants, including government expenditure, inflation rates, unemployment growth, female labour force participation, arable land availability, agricultural value-added, and foreign direct investment (FDI). The empirical findings indicate that higher government expenditure and lower inflation rates contribute significantly to reducing income inequality. Conversely, agricultural value-added, female labour force participation, and arable land exacerbate income disparities. However, the results suggest that unemployment growth and FDI do not exert a statistically significant influence on income inequality within the selected ASEAN economies. These findings underscore the complex nature of economic disparity and emphasize the necessity of targeted policy interventions. Effective fiscal strategies, controlled inflation, and structural labour market reforms are crucial for mitigating inequality and fostering inclusive economic growth in the ASEAN region.*

Keywords*: Gini Coefficient, Income Inequality, ASEAN countries, Static Panel Data, Economic Determinants*

Introduction

Income inequality in ASEAN countries has been a persistent and evolving issue until over the decades. The region has experienced significant economic growth, transforming from a collection of developing economies into a dynamic and diverse economic bloc. However, this growth has not been evenly distributed, leading to varying degrees of income inequality across member states. In the early 1990s, many ASEAN countries were grappling with poverty and underdevelopment. Economic reforms and globalization spurred rapid growth, particularly in countries like Singapore, Malaysia, and Thailand. These nations saw substantial improvements in living standards and reductions in poverty rates. However, the benefits of growth were not uniformly shared, leading to widening income gaps.

The Asian financial crisis of 1997–1998 significantly deepened existing economic disparities within ASEAN, disproportionately affecting lower-income groups and impeding progress in reducing inequality. In the subsequent decade, China's emergence as a dominant global economic force and its integration into the regional economy presented both opportunities and challenges. While certain ASEAN nations experienced substantial gains through increased trade and foreign investment, others faced heightened economic competition, exacerbating income disparities. Similarly, the global financial crisis of 2008–2009 had far-reaching consequences, as widespread economic slowdowns disproportionately impacted vulnerable populations, further reinforcing structural inequalities within the region.

The COVID-19 pandemic has further highlighted and exacerbated existing inequalities, with lower-income groups facing greater health and economic challenges. Despite efforts by governments and regional organizations to address these issues through social protection programs and inclusive growth policies, income inequality remains a critical challenge for ASEAN. Moving forward, addressing this issue will require sustained and coordinated efforts to ensure that economic growth benefits all segments of society. The ASEAN region witnessed adjustments to its expansion. However, growth in the ASEAN economic region remains slower than before COVID-19. The Covid-19 pandemic is much more than a health crisis; it also causes the poverty crisis to increase at a high rate.

Thus, until today income inequality has been one ASEAN countries most pressing challenges since its foundation, and it is consistently in the vanguard of the region's medium and long-term development plans. Understanding the root causes and consequences of income inequality can help in formulating policies that foster social cohesion and political stability. By focusing on income inequality, ASEAN countries can ensure that economic growth translates into improved living standards for all citizens, thereby creating a more equitable and prosperous region. Therefore, using Gini coefficient representing the income inequality a revisited study on this topic is not only timely but also vital for the sustainable development of ASEAN.

Literature Review

Government spending can be a powerful tool to reduce income inequality, but its effectiveness varies depending on how and where the money is spent. Research shows that targeted government spending can significantly reduce income inequality. For instance, Munir and Sultan (2017) found that increased government spending in India and Pakistan led to a reduction in income disparity. Similarly, Turnovsky and Erauskin (2021) analyzed data from 80 nations over 35 years and concluded that productive government spending, such as on education and healthcare, tends to reduce income inequality by enhancing human capital and providing a safety net for the vulnerable.

In Indonesia, Andari (2020) proposed increasing government spending in rural areas to bridge the income gap between rural and urban populations. Amanda (2020) supported this approach, finding that a 1% increase in infrastructure spending could reduce the Gini index for urban areas by 0.0049 points on average. This highlights the potential of strategic government investments to foster inclusive growth. However, not all government expenditure is equally effective. Studies indicate that spending on defence or other non-

social sectors may have a less positive impact on income disparity, emphasizing the need to prioritize expenditures that directly assist lower-income groups.

Besides government spending, inflation also impacts income inequality. Siami and Hudson (2019) found that income inequality and inflation affect each other over the long term in both developed and developing countries, but they are not causally related in the short term. They propose that monetary policy should strive for stable, moderate inflation to manage income inequality effectively over time. Combining monetary policy with fiscal measures can help reduce income inequality and prevent lower-income groups from being disproportionately impacted by efforts to control inflation.

Empirical research has extensively explored the relationship between income inequality and unemployment. While some studies have identified a positive correlation, others have found a negative impact. For instance, Deyshappriya (2017) found that in Asian countries, income inequality increases with rising unemployment rates. However, Esquivias, Sethi, and Iswanti (2021) found that in Indonesia, unemployment negatively affects income inequality, indicating that better jobs, rather than more jobs, are needed to improve income distribution. Policies supporting higher-quality employment may reduce inequality.

In addition to the factors mentioned above, the participation of women in the labor market plays a crucial role in addressing income inequality. Research by Maxwell (1990) indicated that increased female labor force participation helps equalize income distribution among male-headed households and husband-wife families. For male-headed units, this participation reduces the income share of the top quintile, suggesting that integrating women into the workforce lowers the earnings of men in high-wage occupations. A study using data from the Switzerland Household Panel (2000–2014) by Kuhn and Ravazzini (2017) supported these findings, showing that higher female labor force participation continues to equalize income inequality, even in contexts with already high female participation rates. To understand the variations in female labor force participation, we must consider several factors, including non-economic aspects (such as political beliefs, cultural norms, and religion), industry types, demand for female workers, economic development, wage-setting systems, and policies (like labor market and family policies) as noted by Thevenon (2013) and Klasen (2019).

Land-use changes can also influence income inequality. An empirical study by Dib, Alamsyah, and Qaim (2018) in Indonesia highlighted that land-use changes can promote equitable incomes for the environment and local farm households. Employment in rubber and oil palm is crucial for non-farm households, with oil palm being more lucrative and positively associated with household income. Conversely, a study in Vietnam by Li, Tran, La, and Nguyen (2024) found that agricultural land reform drives income growth among middle-income households and reduces income inequality in urban areas. However, the effect is heterogeneous, favouring households with specific land types, which increases income inequality in rural areas despite reducing it in urban regions. Additionally, Yandri (2014) found that income inequality is higher in residential areas compared to agricultural ones. This disparity is particularly evident in suburbs, where residents often commute to urban areas like Jakarta for work. The diverse job opportunities in these residential areas lead to significant income variations, unlike local

neighbourhoods with more homogeneous employment. Consequently, the presence of commuters and varied work types in residential areas contribute to greater income inequality in the region.

The adoption of improved agricultural technologies can also impact income inequality. Wordofa et al. (2021) suggest that adopting improved agricultural technologies can enhance food security and reduce poverty in developing countries. An earlier study by Ding et al. (2011) found that in Yunnan province, about half of the 473 surveyed households adopted improved upland rice technology, resulting in 14-16% higher total incomes for adopters. Additionally, adopters earned more from other cash crops. Despite significant income effects, there was no substantial increase in local income inequality, as lower-income farmers adopted the technology at similar rates to higher-income farmers. This suggests that improved agricultural technologies can benefit all income groups equally.

Lastly, the impact of foreign direct investment (FDI) on income inequality has been a subject of debate, with empirical studies yielding mixed results. For instance, Rezk et al. (2022) found a negative correlation between inward FDI and income inequality in Egypt from 1975 to 2017, a finding supported by Yuldashev et al. (2023) in selected Asian countries. These studies suggest that the presence of human capital enhances the positive effects of FDI on reducing inequality. Conversely, Gam, Oanh, and Dang (2023) observed a non-linear relationship in 36 developing countries between 2008 and 2020, where FDI initially increases income inequality but begins to reduce it once FDI reaches 99% of GDP. Additionally, Wang and Lee (2023) discovered that FDI exacerbates income inequality in countries with high political, economic, and financial risks, while it mitigates inequality in countries with lower risks. This shows that the impact of FDI on income inequality is influenced by several factors, including the specific country or region analyzed, the measure of income inequality used, the model and variables estimated, the control variables included, the methodology employed, and the time period of the study.

Methodology and Data

To determine the impact of macroeconomic variables on income inequality, as measured by the Gini coefficient, data on seven variables covering from 1990 to 2022 on a yearly basis were collected from the Development Indicator Data bank (WDI). A static panel data method is used for data analysis using the Stata 14 program to examine the factors influencing income inequality in five ASEAN countries. The estimation model for income inequality is structured as follows:

$$Ineqit = \alpha + \beta 1GovE + \beta 2Inf + \beta 3Unemp + \beta 4Fem + \beta 5Land + \beta 2Ava + \beta 6FDI + \varepsilon it \quad (1)$$

According to the models, Ineqit is income inequality, which is represented by the Gini coefficient collected from the World Inequality Database (WID) designated international sources revealing how income inequality reacted in Asean region. Government spending as a percentage of GDP is denoted by GovE, while Inf represents inflation rates as measured by the consumer price index. Unemp refers to the growth in unemployment, Fem indicates the percentage of women in the labor force, and Land represents land used for individual purposes.

Agriculture's added value as a percentage of GDP is represented by AVA and lastly FDI denotes the percentage of foreign direct investment in GDP.

To obtain the final results, three-panel static models were tested: the Pooled Ordinary Least Squares Model (POLS), the Random Effect Model (REM), and the Fixed Effect Model (FEM). The equation for the Pooled Ordinary Least Squares Model is:

$$Yi,t = \alpha + \beta 1X\ i,t + \varepsilon i,t \quad \text{----------(2)}$$

To decide between the Pooled Ordinary Least Squares Model and the Random Effect Model, the Breusch-Pagan Lagrangian multiplier test is used. The hypotheses for this test are as follows:

- H0: Choose the Pooled Ordinary Least Squares Model
- H1: Choose the Random Effect Model

Alternatively, the Random Effect Model is expressed as:

$$Yi,t= \alpha + \beta 1Xi,t + (\varepsilon i,t + \mu\ i,t) \quad \text{----------(3)}$$

If the probability of Chi^2 is less than 0.05, H0 is rejected, and the Random Effect Model is chosen. The study can also be extended by employing the Fixed Effect Model, represented by the equation:

$$Yi,t= \alpha i + \beta 1Xi,t + \varepsilon i,t \quad \text{----------(4)}$$

Empirical Results

Table 1: Statistical summary Example

	Ineqit	GovE	Inf	Unemp	Female	Land	Ava	FDI
Mean	0.54769	11.135	4.2814	3.8160	50.609	0.0868	7.7803	5.5262
Minimum	0.3997	5.6935	-1.1387	0.249	41.272	0.0001	0.0265	-2.7674
Maximum	0.67193	18.231	58.451	11.189	66.943	0.3168	19.260	31.621
Std Dev	0.05798	2.5345	5.4274	2.1953	7.6050	0.0965	5.1674	7.2476
Coeff. of Variation	0.10586	0.2276	1.4204	0.5753	0.1503	1.1123	0.6642	1.3115
No of Obs	204	204	204	204	204	204	204	204

The descriptive analysis of the study's results reveals significant variability in the economic indicators across the five ASEAN countries. The mean Gini coefficient is 0.5476887, indicating moderate income inequality. Government expenditure has a mean value of 11.13517, while inflation rate averages at 4.281389. Unemployment growth and female labor force participation present mean values of 5.526192 and 3.81803 respectively. Arable land has a mean value of 50.60852 with agriculture value added shows a mean of 7.780316. Lastly foreign direct investment (FDI) present mean values of 4.281389. The standard deviations and coefficients of variation underscore the diverse economic conditions and policy impacts within the region, emphasizing the need for tailored policy interventions to address income inequality effectively.

Table 2: Correlation

	Ineqit	GovE	Ava	Unemp	Female	Land	FDI	Inf
Ineqit	1.0000							
GovE	0.3536	1.0000						
Ava	0.6526	0.3099	1.0000					
Unemp	-0.1082	-0.4928	0.1708	1.0000				
Female	0.3443	0.3600	-0.2075	-0.4839	1.0000			
Land	0.6723	0.4334	0.2308	-0.4468	0.7183	1.0000		
FDI	-0.5148	-0.1312	-0.6244	-0.0141	0.2257	-0.3944	1.0000	
Inf	-0.0185	-0.3953	0.0866	0.3158	-0.1617	0.0241	-0.2018	1.0000

The correlation matrix shows the relationships between various independent variables. Most variables have low to moderate correlations, indicating varied degrees of association, with no extremely high correlations that might suggest multicollinearity issues. To confirm again the presence of the multicollinearity issue, a variance inflation factor (VIF) analysis is performed. Table 3 summarizes the findings for VIF and tolerance level.

Table 2: Correlation

Variable	VIF	1/vIF
GoE	2.08	0.480711
Inflation	1.45	0.720306
Unemp	1.88	0.533077
Female	5.97	0.167533
Land	6.91	0.144818
AVA	2.25	0.443480
FDI	3.64	0.274821
Mean VIF	3.43	

Gujarati (2007) suggests that the VIF value should be less than 5, and the 1/VIF value should be close to zero. If these conditions are met, then the regression analysis is considered valid. As shown in Table 3, the variables' VIFs are lower than the permissible level, and their 1/VIF values are approaching zero. The results show that the average VIF is 3.43, which is less than the 5 thresholds. This demonstrates that there are no significant multicollinearity issues in regression analysis which conform also in findings in Table 2.

The correlation between error terms across observations was examined using the Breusch-Pagan and Cook-Weisberg tests to see whether the data was heteroscedastic. A frequent problem in panel data analysis is heteroscedasticity, which happens when the error term's variance varies across observations or groups. This can result in inaccurate and inefficient estimations of regression coefficients and standard errors. The test results show a Chi-squared probability of 0.000, which is below the 0.05 significance level. Consequently, it could potentially say that the model is not heteroscedastic.

Table 4: Results POLS, REM and FEM

	POLS	REM	FEM
C	0.41959	**0.41594**	0.3554
	0.000***	**0.000***	0.000***
GoE	-0.00290	**-0.00290**	0.00166
	0.031**	**0.029****	0.401
Inf	-0.001065	**-0.001065**	-0.0074
	0.007***	**0.007***	0.049**
UnEmp	0.001913	**0.001913**	0.00167
	0.192	**0.190**	0.319
Female	0.00178	**0.00178**	0.0010
	0.019**	**0.018**	0.019**
Land	0.25884	**0.25884**	1.2279
	0.000***	**0.000***	0.000***
AVA	0.00672	**0.00672**	0.01141
	0.000***	**0.000***	0.468
FDI	-0.000522	**-0.000522**	0.00052
	0.398	**0.398**	0.482
Inf	-0.001065	**-0.001065**	-0.0074
	0.007***	**0.007***	0.049**
R-squared	0.7443	**0.7443**	0.4705
Prob > F	0.0000	**0.0000**	0.0000

Table 4 presents a comparison of the outcomes from three different models. To determine the most accurate model, a series of tests were conducted. The Breusch-Pagan Lagrangian test, which is typically used to assess the suitability of POLS and REM models, indicated a significant p-value for Chi2, suggesting that REM is the better model. Following this, the Hausman fixed test was employed to decide between REM and FEM. If the null hypothesis is rejected and the Gini coefficients are uncorrelated with the regressors, FEM would be preferred. However, due to an insignificant p-value for Chi2 from the Hausman test, the study could not proceed with FEM. Consequently, the panel data analysis using REM is deemed appropriate for the final analysis.

Based on the results in Table 4, the R-squared value of the regression model is 0.7443, indicating that 74.43% of the variation in income inequality can be explained by the chosen independent variables. The findings reveal that land, AVA, and inflation have the expected magnitudes and are highly significant. The p-values indicate that these three variables are significant at the 1% level. Additionally, female and government expenditure variables are significant at the 5% level. However, FDI and unemployment are not significant at the 1%, 5%, or 10% levels. Notably, government expenditure, inflation, and FDI negatively impact income inequality.

Conclusion and Recommendation

The study highlights the necessity for tailored policy interventions to mitigate income inequality in ASEAN countries. Key findings indicate that enhancing agricultural productivity, controlling inflation, and increasing female labor force participation are effective strategies. These policies can significantly reduce income inequality, as evidenced by the significant impact of land, agriculture value added (AVA), and inflation at the 1%

level, and female labor force participation and government expenditure at the 5% level. The negative effects of government expenditure, inflation, and FDI on income inequality further underscore the importance of prudent fiscal policies.

To address income inequality, policymakers should prioritize the modernizing of agricultural techniques and strategic infrastructure investment to enhance productivity and economic resilience. Implementing fiscal policies that direct government expenditure towards inclusive growth and social welfare programs is essential. Furthermore, advancing female labor force participation through gender equality initiatives and career development opportunities can contribute to economic equity. Future research should explore the impact of education on income inequality, including disparities in access to quality education, the effects of varying educational attainment levels on income distribution, and the role of vocational and technical training in improving employment opportunities. A comprehensive understanding of these factors will support the formulation of evidence-based educational policies aimed at mitigating income disparities and promoting sustainable economic advancement.

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A COMPARATIVE STUDY ON CALCULATION AND PREPARATION METHODS FOR CHEMICAL SOLUTIONS IN TVET EDUCATION

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Abstract: *Malaysia's Technical and Vocational Education and Training (TVET)* Institutions place a strong emphasis on practical abilities and real-world competencies. TVET students who want to pursue careers in technical professions related to chemistry field are required to be able to prepare chemical solutions accurately for R&D and product manufacturing. Errors in basic solution preparation can lead to compromised experiments, damaging products, and increase in production costs. This study aims to find the best approach in chemical solution preparation by using two different calculation methods (theoretical and dilution calculation) and two preparation method (direct weighing and serial dilution). Three participants with different background participate in preparing specific chemical solution from scratch, and their accuracy and efficiency were assessed. Results showed that dilution calculation and serial dilution method favoured by most of the participants. Further findings show that, experience significantly impacted on accuracy and speed of the solution preparation, with students demonstrating higher error rates, particularly in direct weighing methods. These findings can prepare students for real-world laboratory environments, adopting a dual-method instructional approach not only improves accuracy and precision but also builds learner confidence and flexibility in diverse experimental conditions.

Keywords: weighing*; dilution; direct; serial.*

Introduction

Technical and Vocational Education and Training (TVET) institutions are pivotal in equipping students with practical competencies essential for scientific and industrial applications[1], [2]. Among these competencies, the accurate preparation of chemical solutions is fundamental, serving as a cornerstone for various laboratory analyses, product formulations, and quality control processes. In TVET settings, students are typically introduced to two primary calculation approaches for solution preparation are Theoretical Calculation, which involves determining the required solute mass based on desired molarity, and Dilution Calculation, which involves modifying concentrations from existing stock solutions[3]. Correspondingly, the actual preparation techniques commonly employed are Direct Weighing of solid reagents and Serial Dilution of liquids[4]. Each method presents unique challenges and advantages concerning accuracy, ease of application, and suitability for different concentration levels.

Furthermore, limited attention has been given to students comprehension and application of each method or their practicality in real-world laboratory scenarios[5]. This study aims to evaluate both the technical performance and user preference of calculation and preparation methods in preparing sodium hydroxide (NaOH) solutions at two concentration levels (0.1 M and 0.01 M). By assessing the precision, consistency, and accuracy of results across participants with varying levels of experience through pH value. The research seeks to inform best practices in chemical education and promote methods that align with industry expectations.

Literature Review

The preparation of chemical solutions is a vital component of chemistry education and laboratory practice, especially in the context of Technical and Vocational Education and Training (TVET). As students are expected to perform accurate experimental procedures aligned with industrial standards, understanding and applying precise solution preparation methods becomes a core competency. This literature review explores scholarly perspectives on the significance, challenges, and pedagogical approaches associated with direct weighing and alternative techniques such as serial dilution, particularly within TVET frameworks.

Accurate preparation of chemical solutions is a fundamental skill in both educational and industrial laboratory settings. Mastering solution preparation techniques is essential for students to develop a deep understanding of chemical principles and to ensure the reliability of experimental outcomes[6]. This foundational skill is particularly critical in TVET institutions, where practical competencies are paramount.

Direct weighing method, highlighting its widespread use due to its straightforward approach: measuring an exact mass of solute and dissolving it in a specific volume of solvent to achieve the desired concentration. This method is favored for its simplicity and directness, making it a common choice in laboratories when preparing solutions from pure substances. However, potential sources of error such as the hygroscopic nature of certain solutes like sodium hydroxide, which can absorb moisture from the air, leading to inaccuracies in mass measurements[7].

The implications of these potential errors, particularly when preparing solutions at lower concentrations. The study indicates that even minor deviations in solute mass or incomplete dissolution can significantly impact the final concentration of a solution, thereby affecting the accuracy of experimental results[8]. This underscores the importance of meticulous technique and the consideration of alternative methods, such as serial dilution, especially in educational settings where students are still developing their laboratory skills.

Further investigate the pedagogical aspects of solution preparation methods. Their research suggests that while the direct weighing method provides a clear and tangible understanding of solution concentration concepts, incorporating serial dilution techniques can enhance students' comprehension and adaptability in various laboratory scenarios. To promote the use of blended learning in TVET programs, combining both methods to equip students with a comprehensive skill set that aligns with industry practices and expectations[9], [10].

In conclusion, the reviewed literature underscores the importance of solution preparation as a core skill in chemical education and professional practice. While the direct weighing method remains foundational due to its simplicity and clarity, its limitations particularly at low concentrations highlight the value of integrating serial dilution as a complementary technique. For TVET institutions aiming to prepare students for real-world laboratory environments, adopting a dual-method instructional approach not only improves accuracy and precision but also builds learner confidence and flexibility in diverse experimental conditions.

Methodology

This study aims to compare different calculation and preparation methods for sodium hydroxide (NaOH) solutions in a TVET context. Specifically, it evaluates the accuracy and reproducibility of two commonly used preparation methods for 0.1 M and 0.01 M NaOH solutions. The study involved three participants, each performing two trials per concentration using each method.

Chemicals and Reagents

Main reagents use in this experiment is Sodium hydroxide (NaOH) pellets, analytical grade purchased from Sigma-Aldrich and used without further purification unless otherwise stated and distilled water produce form chemistry lab Politeknik Kuching Sarawak. Some of the apparatus uses are Volumetric flasks (250 mL), Beakers (50, 100 mL, 250 mL) and analytical balance (±0.00001 g).

Participants

Three participants form Department of Petrochemical Engineering Politeknik Kuching Sarawak with basic laboratory training, Participant A and Participant B (laboratory personal) with more than 10 years of experience in chemical lab and Participant C (final semester students) were selected. Each participant performed the calculation and preparation of samples procedures independently to assess user variability and method robustness.

Calculation and Preparation Methods

The targeted samples are 0.1 M and 0.01 M NaOH solution that were produced using direct weighing and serial dilution. For direct weighting, NaOH pallet was weighted using analytical balance and then mix with distilled water in a 250 mL volumetric flask. The mixture was then stirred, and the mark of completion is when all the NaOH pallet dissolve completely in distilled water producing clear solution. Serial dilution samples produce when calculated volume of NaOH solution was drawn from 1 M NaOH stock solution then mix with distilled water in 250 mL volumetric flask to produce 0.1 M NaOH solution. The dilution continues by drawing calculated volume of 0.1 M NaOH solution mix with distilled water in 250 mL volumetric flask to produce 0.01 M NaOH solution. Each concentration of samples was produced twice.

Theoretical Calculation and Direct Weighting method

The precise amount of solute (in grams) needed to make a solution from a pure solid material with a given molarity and volume is determined using the theoretical calculation approach. This fundamental chemistry teaching method is based on the following formula [11]:

$$\text{Mass (g)} = \text{Molarity (mol/L)} \times \text{Volume (L)} \times \text{Molar Mass (g/mol)}$$

From Figure 1, **direct weighing method** involves the preparation of chemical solutions by **weighing the exact mass of a solid solute** and dissolving it in a known volume of solvent, typically distilled water, to achieve the desired concentration. This method is commonly used in laboratories when a solution needs to be made from scratch using a pure substance.

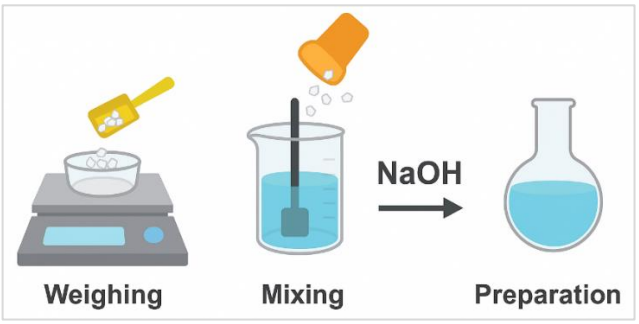


Figure 1: Direct Weighting method of chemical preparation.

Dilution Calculation and Serial Dilution Method

As seen on Figure 2, **serial dilution method** involves the preparation of a dilute solution by **successively diluting a more concentrated stock solution**. This method is widely used in chemistry, biology, and industrial labs where various concentrations of a substance are required[12].

$$M_1V_1 = M_2V_2$$

M_1 = concentration of stock solution
V_1 = volume of stock needed
M_2 = desired concentration
V_2 = final volume of diluted solution



Figure 2: Serial Dilution method of chemical preparation.

Characterization

All prepared NaOH solutions were tested with pH meter to compare the pH value with standard that can evaluate the accuracy and precision of the samples. Ease of preparation, time required, clarity of steps, and potential for error were noted during each method. Feedback was also gathered from TVET instructors on which method aligns better with classroom conditions and student understanding. Quantitative results (pH value) were statistically analysed using mean deviation and percent error from the target concentration.

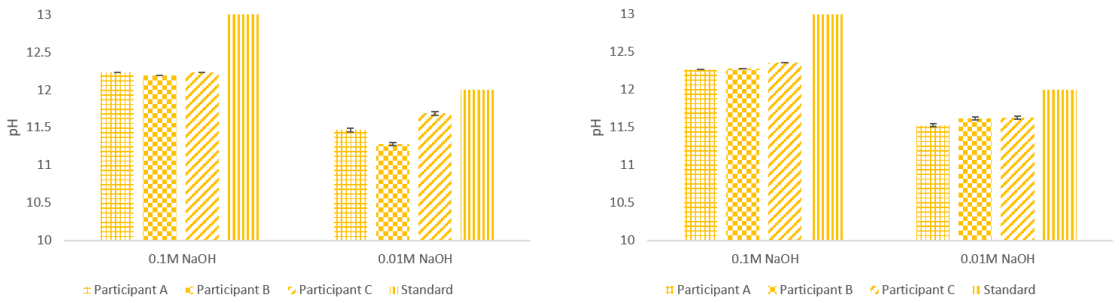
Result and Discussion

Results on Calculation Method

The objective of this study included not only evaluating the technical accuracy of chemical solution preparation methods but also assessing participant understanding and preference regarding calculation methods specifically, Theoretical Calculation and Dilution Calculation. Following a guided instructional session on both calculation approaches, all three participants successfully completed a short assessment requiring them to apply the correct formulas to prepare 0.1 M and 0.01 M NaOH solutions. This outcome demonstrates that with proper guidance and practice, Technical and Vocational Education and Training (TVET) students and laboratory personnel can effectively grasp and apply both types of chemical calculation methods.

Interestingly, despite performing equally well on both theoretical and dilution-based questions, all participants expressed a clear preference for the Dilution Calculation method. This preference appears to stem from their perception that the dilution method is easier to apply in practical settings and reduces the number of calculation steps. From an educational perspective, this preference aligns with common trends in industrial and laboratory practices, where dilution of stock solutions is often favoured for its speed, safety, and convenience.

Results on Direct Weighting and Serial Dilution Method



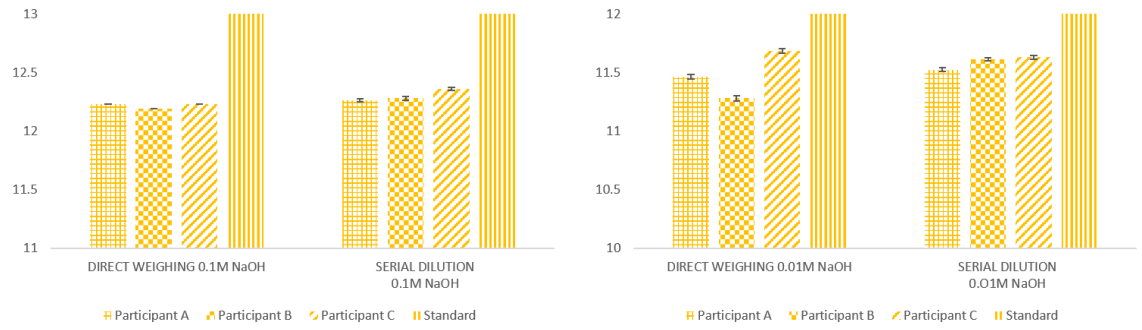
(a) **(b)**

Figure 3: The comparison between of different concentration of NaOH solution for (a) Direct Weighting and (b) Serial Dilution.

From Figure 3 (a), an analysis of pH values from NaOH solutions prepared using the direct weighing technique indicates that all participants consistently recorded values lower than the standard for both 0.1 M and 0.01 M concentrations. For the 0.1 M solution, participants

pH results were closely aligned, displaying minimal variation and relatively good precision, although still falling short of the standard pH value of 13 [7], [8]. This underperformance could be due to factors such as incomplete dissolution of NaOH pellets, slight errors during weighing, or the hygroscopic nature of NaOH, which can absorb moisture and alter its effective mass[13]. In comparison, the data for 0.01 M NaOH showed a wider spread in results and a more pronounced decrease in accuracy, deviating further from the standard pH of 12 [7], [8]. This indicates that at lower concentrations, the direct weighing method is more susceptible to inaccuracies, where even minor errors in measurement or material handling can significantly affect the outcome. The increased inconsistency and reduced precision at the 0.01 M level underscore the challenges of using direct weighing for dilute solutions when high accuracy is essential. These outcomes are consistent with the findings that highlight the interpretive value of error bars in assessing data precision [6]. The need to select suitable representations of variability such as standard error of the mean (SEM) to ensure accurate depiction of precision [14]. Misunderstandings around confidence intervals and error bars can lead to misinterpretation of data reliability, reinforcing the need for correct analytical approaches in scientific reporting[15].

As seen in Figure 3 (b), In the Serial Dilution method, participants A, B, and C achieved pH values for both 0.1 M and 0.01 M NaOH that were generally closer to the expected standard compared to the Direct Weighing method. For 0.1 M NaOH, all participants recorded pH readings between 12.2 and 12.3, slightly below the standard pH of 13, but consistent across individuals, indicating good reproducibility and minimal deviation [7], [8]. At 0.01 M, the pH values ranged from 11.45 to 11.6, with all participants achieving results that were nearer to the standard value of 12 compared to their performance using Direct Weighing [7], [8]. The smaller error bars seen in this method suggest improved precision that emphasize that narrow error bars reflect low variability and higher measurement reliability[6], [15]. These results confirm that Serial Dilution is not only more user-friendly but also produces more accurate and consistent outputs, particularly at lower concentrations where volumetric accuracy plays a more critical role [10]



(a) **(b)**

Figure 4: The comparison between preparation method of (a) Direct Weighting and (b) Serial Dilution for 0.1 and 0.01 NaOH solution.

As seen in Figure 4 (a), for the preparation of 0.1 M NaOH, both Direct Weighing and Serial Dilution methods resulted in pH values lower than the standard for 0.1 M NaOH, which is approximately pH 13 due to the full dissociation of NaOH in aqueous solution [7], [8]. All participants (A, B, and C) demonstrated relatively consistent results across both methods,

with very narrow error bars indicating high precision. Narrow error bars typically represent low variability and a high degree of repeatability in measurements [16]. However, there was no significant difference in accuracy between the two methods at this concentration, as both methods yielded results clustered around pH 12.2 to 12.3. Participant C using Serial Dilution recorded a slightly higher pH, aligning more closely with the standard, suggesting slightly better performance in that case. Overall, Direct Weighing and Serial Dilution performed similarly in terms of both consistency and deviation from the target pH at the 0.1 M concentration level.

From Figure 4 (b), for 0.01 M NaOH, more noticeable differences emerged between the two preparation methods. The pH values from Direct Weighing were more spread out and lower than those from Serial Dilution, with Participant B showing the lowest reading 11.28, indicating potential error in either weighing or dilution accuracy. At lower concentrations, errors in weighing small quantities or incomplete dissolution of hygroscopic NaOH solids can significantly impact final concentration and pH [13]. In contrast, the pH values obtained via Serial Dilution were closer to the standard value of approximately pH 12 and more consistent across participants, particularly for Participants B and C, whose results were slightly above pH 11.6. Furthermore, the error bars for Serial Dilution were generally tighter, implying better repeatability and control over solution preparation [14].

Across both concentrations and preparation methods, it can be concluded that while Direct Weighing is effective for higher concentrations, its precision decreases at lower concentrations due to the difficulty of accurately handling small masses and ensuring complete solute dissolution especially for hygroscopic substances like NaOH [13]. Serial Dilution, on the other hand, demonstrated greater overall reliability, particularly at 0.01 M, producing pH values that were not only closer to the theoretical standard but also more consistent across users. The method reduces direct contact with reactive solids, limits material loss, and allows for better control of solution accuracy through volume-based measurements. This makes it highly appropriate in both educational laboratories and industrial settings, where reproducibility and safety are critical. For TVET institutions, it is advisable to teach both methods, while emphasizing Serial Dilution for its accuracy, efficiency, and alignment with industry practices.

Conclusion

This study comprehensively examined both the technical accuracy and user preference of two core chemical calculation and preparation methods Theoretical Calculation and Dilution Calculation within the context of Technical and Vocational Education and Training (TVET). All participants, following structured instructional guidance, demonstrated a sound understanding of both methods and successfully applied them to prepare 0.1 M and 0.01 M sodium hydroxide (NaOH) solutions. This finding underscores the effectiveness of targeted education in building essential laboratory competencies among students and staff. Despite similar performance on assessment tasks, participants consistently expressed a preference for the Dilution Calculation method. This preference likely stems from the perception that it is more intuitive, involves fewer steps, and aligns more closely with practical laboratory practices, particularly where stock solutions are routinely used.

Experimental comparisons between the Direct Weighing and Serial Dilution preparation methods revealed that while both could produce reasonably accurate results at higher

concentrations (0.1 M), the reliability of Direct Weighing significantly declined at lower concentrations (0.01 M). This reduction in accuracy was attributed to common issues such as the hygroscopic nature of NaOH, difficulties in measuring small masses, and incomplete dissolution of solid pellets. Conversely, Serial Dilution consistently yielded pH results that were closer to the standard values and displayed narrower error bars indicating higher precision, improved repeatability, and better control over final solution concentrations. These advantages were particularly evident at 0.01 M, where even small errors in mass or volume can greatly affect the accuracy of results.

Overall, the findings strongly support the inclusion of both theoretical and dilution calculation training in TVET programs, with an emphasis on Serial Dilution for practical applications. The method's compatibility with standard laboratory procedures, ease of implementation, and enhanced reliability make it especially suitable for educational and industrial environments that demand consistent and accurate solution preparation. By integrating both conceptual understanding and hands-on training, TVET institutions can better equip learners and technicians with the skills necessary to meet industry standards, improve laboratory outcomes, and promote safe and efficient work practices.

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REVISITING POVERTY: PROBLEMS IN THE ERA OF INCREASING GLOBAL TRADE PROTECTIONISM

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Abstract: *Poverty is a multifaceted issue which can disrupt social order if the poor are ignored. It is then not surprising that countries are concerned about alleviating poverty; the United Nations' 17 Sustainable Development Goals (SDGs) has 'No Poverty' as its first goal because all poor men, women and children suffer in terms of mental health, well-being and general deprivation in accessing goods and services. As a microcosm of the world at large, Malaysia has been committed to overcoming poverty. For example, it has been successful in beating poverty for the past 40 years – absolute poverty rates declined from 20.7% (1984) to 0.4 (2016) – only for it to surge again to 6.2% (2022) after the Covid-19 pandemic (OpenDOSM, 2023). Similarly, world poverty rates rose after the pandemic (The World Bank, 2022), posing renewed challenges. However, on 2nd April 2025, a new era of global trade protectionism began with the United States (US) announcing a 10% baseline tariff on all its trading partners and reciprocal tariffs on certain countries. Will this era impact all affected countries' economy and in turn, their prosperity as well as their poor? Will these poor be disproportionately affected more, just like how climate change and the Covid-19 pandemic have adversely impacted them? In this preliminary paper, I have outlined a two-pronged goal: (1) to revisit poverty by outlining possible problems faced by the poor in this new global trade protectionism era and (2) to briefly explore possible solutions to poverty. Methodologically, this paper is based on secondary research of existing literature. Finally, Gemini and DeepSeek, the artificial intelligence (AI) chatbots, were used for brainstorming.*

Keywords: *Poverty; multifaceted; Sustainable Development Goals (SDGs); solutions; global trade protectionism;*

Introduction

Free trade is touted as a way to enhance global wealth for every country. However, while the world's wealth has risen tenfold since 1950 (Macionis, 2015), not every country has enjoyed these benefits equally. In 2024, 92 countries in the world, including Malaysia, enjoyed a trade surplus with the United States (US) (Caporal, 2025). However, on 2nd April 2025, the US government announced the imposition of 10% baseline tariffs on all its trading partners and other reciprocal tariffs (henceforth written as the "US tariffs2025" in this paper) on certain countries (Ernst & Young, 2025). Malaysia, which mainly exported palm oil, machinery and electronics to the US (TheEdgeMalaysia, 2025), has been imposed with a 24% reciprocal tariff (except for semiconductors) but now given a 90-day reprieve in view of further trade negotiations with the US. These US tariffs2025 vary from country to country – even within the Association of Southeast Asian Nations (ASEAN) – but they affect the entire free trade ecosystem globally. This changed international trade scenario is a sign of more trade protectionism which threatens the current thinking about more free trade which

has collectively enhanced the wealth and prosperity of many small countries including Malaysia in ASEAN.

For example, the US tariffs2025 could be as high as 3,521 percent on solar panels made in four ASEAN countries – Malaysia, Thailand, Cambodia and Vietnam – to counteract unjust pricing and purported subsidies from China which they have received (Milad, 2025). Will such trade protectionism be considered as globally sustainable? How will this impact countries, their Gross Domestic Product (GDP) and in turn, their poor? Before the author outlines some possible impacts on the poor, let us take a look at the definition of poverty.

Poverty has been defined in various ways by different scholars but the World Bank defined poverty as "pronounced deprivation in well-being" (Haughton & Khandker, 2009). It has a wide scope of socio-economic dimensions which affects the poor's access to services, and respectable career, their ability to articulate viewpoints and preference, their social status, and their power to negotiate as well as to avoid human trafficking incidents and /or forced labour (United Nations Global Compact, n.d.).

When explaining poverty, the economic definition usually categorizes poverty into two aspects, i.e., either absolute poverty where one's survival is threatened and relative poverty which measures one's poverty in relation to others' wealth or the national income average. There is also the psychological dimension of poverty which is known as subjective poverty when one feels deprived of something despite the economic indicators showing otherwise. But poverty is not only about not having enough income or food to eat. Poverty can also point to the poor's lack of capability to live the life they want as propounded by Nobel Laureate Amartya Sen (Internet Encyclopedia of Philosophy, n.d.).

According to the World Bank, economically, almost 700 million people live in extreme poverty around the world, and they survive on less than US$2.15 per day (The World Bank, 2024). Eradicating extreme poverty by 2030 is also the first of the 17 United Nations' Sustainable Development Goals (SDGs). Unfortunately, the World Bank in its Poverty and Shared Prosperity 2022 report mentioned that because of the Covid-19 pandemic and its subsequent negative economic repercussions, SDG No. 1 'No Poverty' and by implication, SDG No. 2 'Zero Hunger', cannot be achieved by 2030 (The World Bank, 2022).

Moreover, poverty, inequality, exploitation and discrimination are topics which are usually researched together, along with class, income, age and other non-income dimensions such as the poor's socio-cultural and psychological makeup. Therefore, the intersectionality theory of gender, race and class is also a common theory used when studying multi-dimensional levels of disadvantages (see Crenshaw as cited in Samie, 2025; The Editors, 2020).

Literature Review

The perspectives on poverty are numerous and can be categorized into two polarized theories which outline (a) individual deficiencies and (b) broad, macro theories such as Sociology's Structural-Functional Theory, the Social-Conflict Theory, and others which deal with socio-economic, geographic and political factors.

According to Wright (1992), the American general public usually view the causes of poverty in a dichotomy, with strong support for viewing poverty as personal failings due to the poor's purported lack of ability, low ambition and even low intelligence. The opposite spectrum are those who view poverty as a structural or societal issue such as the lack of available jobs or educational opportunities, etc…

Wright (1992) also cited numerous research showing that those in the upper and middle classes and those who have higher authority and affluence – Caucasian, men, above 50 and Protestant – generally have tendencies towards viewing poverty as personal failings while all income classes together with the poor themselves show strong support for blame-the-poor argument over their lack of good values in professionalism and commitment.

More importantly, Wright (1992) cautioned and critiqued the role played by scholars in the victim-blaming processes in their work. She termed these as "academic victim blaming" and named anthropologist Oscar Lewis (1959, 1966) and American politician-cum-social scientist Daniel Patrick Moynihan (1965) as examples of scholars who had engaged in victim-blaming by cloaking their work as logical, scientific scholarship.

In the following paragraphs, I shall outline the perspectives or theories of poverty which encompass both the individual theories and the macro/societal theories.

Blame the Poor Theories

One of the most common views of poverty is that the poor must take responsibility for their own situation (Macionis, 2018). This is a theory which attributes poverty to the poor themselves and for those who show strong support for this perspective, they usually view the poor with disdain and view poverty as a stigma. This is because in cultures which value self-reliance such as in the US, class is a matter of individual talent and effort since society provides enough opportunities to those who seize the day (Macionis, 2018).

However, this theory contradicts Merton's Strain Theory (1938) which suggests that society does not provide enough opportunities for all groups to achieve economic success and therefore, disadvantaged groups have limited access to opportunities which can ensure their achieving the American dream of economic success (Sameti et al., 2012).

Moreover, anthropologist Oscar Lewis who popularized the 'culture of poverty' concept in his work had listed 50 traits which he considered as shared by 20 percent of the poor (as cited in ScienceDirect, 2025) in his study of Latin American cities' poor people. These traits were said to be transmitted intergenerationally within families and blamed for impeding such individuals from breaking out of their 'psychological pathology' and hindering these poor from capitalizing on available opportunities (as cited in ScienceDirect, 2025). The poor are said to be victims of their own dysfunctional subculture or culture (Addae-Korankye, 2019) as they transmit a set of beliefs, values and skills which continue to trap them in intergenerational poverty. Nonetheless, Wright (1992) had called Lewis' 'culture of poverty' work as a type of 'academic victim blaming'.

Blame the Society Theories

There are a comprehensive set of theories which place poverty squarely on structural issues and that institutions can engender systemic unfairness which disadvantages minorities such as the poor.

The 'Post-Modern' type of Structural-Functional Theory

The traditional structural-functional theory or paradigm suggests that instead of viewing poverty and inequities as dysfunctional, they should be viewed as serving important functions for the society because they allow 'dirty' work to be taken up by those in the lower hierarchies as well as motivate 'talented' people to undergo training and take up better paying jobs (see the Davis-Moore Thesis, 1945). This, in turn, ensures social harmony, equilibrium and order. In other words, poverty serves an important function, ensuring the smooth operation of society. But criticisms of the Davis-Moore Thesis abound (Macionis, 2018).

In what I now call the 'post-modern' structural-functional theory with a critical lens, poverty and inequities are considered as dysfunctional because it can cause disharmony or conflict, criminality and social disorder. So, these two lenses of structural-functional theory are equally important because they explain how social structures operate and how they can perpetuate and maintain poverty.

The Social-Conflict Theory

Drawing heavily from Karl Marx, the social-conflict theory is another macro paradigm which explains poverty. Among other things, this paradigm or theory views poverty as a result of dominant groups maintaining their power and wealth via labour exploitation, laws, policies and social norms which are in line with their dominant values and beliefs.

The capitalist-industrial system, just like the agrarian system before it, is also inherently unequal due to technological advances, and only equal employment laws had helped mitigate poverty and inequities (see Gerhard Lenski's theory of inequality and the Kuznets Curve) (Macionis, 2018; Ricardo, 2025). Moreover, according to this theory, capitalism generates conditions which maintain poverty despite the poor's endeavours and striving. Sameti et al. (2012) concurred and attributed this view to the socio-economic and political systems of a society.

Other Macro Theories

Morrill and Wohlenberg (1971) whose work was reviewed by Elgie and Ulch (1973) suggested that there is a "geography of poverty" in the sense that there are regional and global differences in the incidence of poverty. For example, some areas experienced more industrialization and became more prosperous than other places. Bradshaw (2006) concurred that poverty is very serious in certain areas compared to other parts of a country or region. In agreement, Knifton and Inglis (2020) found that their home city Glasgow, Scotland in the United Kingdom has the highest concentration of poor people with the poorest mental health outcomes. They also highlighted that there is a direct relationship

between poverty and poor mental health. Furthermore, longevity in Glasgow is the lowest in the whole of Scotland.

Abdulai and Shamshiry (2014) also mentioned the Theory of Cyclical Poverty. In pre-industrial societies such as agrarian ones, cyclical poverty can happen to individuals and households when natural disasters such as flood or drought hit, leaving the families with food shortages. In industrial and post-industrial/postmodern societies, cyclical poverty occurs when there are economic fluctuations such as recessions or other economic crises.

Free Trade and Tariffs

The World Trade Organization (WTO), established in 1995, is a significant body which regulates global trade between countries by promoting free trade, ironing out trade disagreements, and giving technical help and training to member countries, among its many functions (Jegede, 2023). It is a vital body for promoting the world's economic growth (Ibid). Free trade has benefited trading member-nations globally resulting in overall higher quality of life (Patterns of Power, n.d.) via enhanced exports, lower consumer prices and a wider range of choices (Pettinger, 2019). However, Bhalla and Silvio (2022) counter-argued that free trade has actually caused more poverty and inequality in the developing countries by giving an example of India where trade liberalization has led to higher poverty rates in rural areas while in Brazil it was in urban areas.

The US tariffs2025 is aimed at addressing its current trade deficits (Ernst & Young, 2025) by imposing varying degrees of reciprocal tariffs on specific countries like ASEAN (i.e., from 24% to 49%), China, Canada and Mexico, leading to an unstable global trading scenario. These expose countries to higher risks of poverty if not handled properly.

Furceri, Hannan, Ostry, and Rose (2019) reported that higher tariffs led to significantly lower domestic output and productivity in an analysis of 151 countries between 1963 and 2014. Tariff increases also caused more unemployment, enhanced inequality and increased real exchange rate, but only small consequences on the trade balance. Dinopoulos, Heins and Unel (2024) concurred by stating that the 2018-2019 global trade war had caused an overall lower welfare, unemployment and income inequality.

Methodology

This paper has used secondary data analysis of existing literature such as online peer-reviewed journal articles and other Internet resources. The author has searched the Internet using terms such as 'poverty', 'consequences of poverty', 'perspectives on poverty' and 'American Trump tariffs'. Moreover, the author has utilised Gemini and DeepSeek, the artificial intelligence (AI) chatbots, for brainstorming and feedback. The answers provided by these two chatbots were double-checked and verified using peer-reviewed articles and other Internet sources.

Results and Discussion

This part of the paper outlines (1) possible problems faced by the poor in view of this new era of global trade protectionism and (2) to explore possible solutions to poverty. Global trade protectionism has many repercussions and one country imposing tariffs often leads to

reciprocal tariffs from other countries, causing a trade war. Recent examples include the US-China and the US-Canada trade wars.

High tariffs on small countries can affect their coffers and this in turn will affect welfare payouts for the poor, the sick, the disabled, the elderly and children. For example, in Malaysia, the solar panel exports to the US have been imposed with 34.4 percent tariffs while Thailand, Vietnam and Cambodia are similarly hit with high duty (Milad, 2025). Moreover, trade wars between the US and China placed smaller countries, such as ASEAN, in a difficult position because they are juggling between these superpowers to avoid backlash from seemingly siding one superpower over the other.

Historically, poor governance, economic problems and in turn poverty can cause social unrest and disorder. For example, this has happened in many countries such as old Russia, France, Cuba, Germany and China. Additionally, Marx is famously quoted as advising the working class to start a revolution because they have nothing to lose but their shackles.

Factors Leading to Poverty

The poor still face many problems in today's more digital world, increasingly threatened by climate change, and an escalating global trade war induced by the US tariffs2025.

Unemployment

In Malaysia, the Goodyear tyre manufacturing plant in Shah Alam shuttered its plant at the end of 2024 with 550 job losses (Fernandez, 2025). At the end of 2025, Continental Tires will also close down its factory in Kulim, Kedah causing about 950 job losses. Moreover, the entire supply chain of businesses associated with these plant closures will be negatively impacted as well (Ibid). In societies where men are expected to be primary breadwinners, unemployment and the loss of income can lead to increased risk of divorce or separation (Gonalons-Pons & Gangl, 2021), lower self-esteem (Alvaro, Garrido, Pereira, Torres & Barros, 2019), significant stress and high rates of mental disorders (Yang, Niu, Amin & Yasin, 2024) as well as suicides (Franke, Schmidt & Neumann, 2024).

Without adequate financial planning, a breadwinner's unemployment can also cause a household to suddenly plunge into debt (making them vulnerable to predatory financial loans) and poverty, resulting in higher incidence of mental distress like low self-esteem, anxiety, depression and loneliness (Antipova, 2021; Petersen et al., 2022).

Inflation

According to Iacurci (2025), the higher tariffs for the world will likely hurt the American poor more than the rich because they raise food and clothing prices within the US. Food and clothing make up a larger share of a poor household's budget than a rich household. This holds true for the poor in Malaysia as well where they spend 40% of their income on food (Wong, 2022).

Similarly, in countries where tariffs are imposed, an even higher cost of living is forecast for the poor. This is because food, clothing, and utility prices are expected to soar while the

margin of earnings and the salary increase have not caught up. This widened the at-risk population if unforeseeable events were to happen to a family.

Furthermore, Nur Farah Zafirah et al. (2022) reported that inflation correlates positively with Malaysia's crime rate in the short-term. For example, it forecast that if the inflation rate were to rise by 1%, crime rate in the country would spike by 0.7 percent. In other words, inflation points to reduced purchasing power, higher cost of living and stronger feelings of deprivation which induce criminal activities.

Climate Change

Climate change destroys crop production, reduces income growth, deepens political unrest and encourages internal as well as external migration. It further exacerbates inequality in countries. Climate change is deeply unequal and affects the poor and poor countries more badly than others (Bhargawa & Bhargava, 2023).

Increased incidence of natural disasters in the past 10 years as a result of climate change have displaced people and pushed many into poverty since their livelihoods were affected. This, in turn, affects their mental and physical health outcomes. They also experience food and water shortages and many decide to migrate, unravelling their respective countries' development attainments, and creating a dire climate refugee situation (Bhargawa & Bhargava, 2023). According to Scopp (2025), climate-displaced people are not recognized in the 1951 Refugee Convention and as a result, they don't enjoy the rights and privileges accorded to conventional refugees in foreign lands, increasing their vulnerability to exploitation and deprivation. For example, refugee children don't have access to formal education in Malaysia (Choong, 2024).

Digitalization

While the gig economy – created by digitalization – generated more flexibility and good chances for its workers to balance multiple roles and diversify their income, it also highlighted vulnerabilities in times of crises such as the gig workers' lack of social protection benefits which exacerbated their monetary insecurity (Nurul Syifaa, 2024; Uchiyama et al., 2022), potentially creating pockets of poverty.

Moreover, the digital literacy gap disadvantages the poor unless training and better Internet connectivity are given to equip them to compete and find suitable employment. The Malaysia Digital Economy Corporation Sdn Bhd (MDEC), a government body, has quite a few such programmes to help bridge the digital gap in the country.

Implications of Poverty

The consequences of poverty are numerous, and they are briefly listed in the following paragraphs.

Predatory Financial Loans

The unemployed and the poor easily fall victim to non-collateral financial loans and other such scams. In Malaysia, there is the infamous issue of loan sharks, the high interests they

charge and their intimidation tactics in ensuring repayment (Jassmine Shadiqe, 2025; Mohd Farhaan Shah, 2025). These loans are fatal attractions for the poor. On the other hand, micro-loans or micro-finance offered to the poor by Bangladesh's Grameen Bank, pioneered by the renown Nobel Laureate Muhammad Yunus, are so beneficial for its community and encourages entrepreneurship amongst the poor, especially women (Grameen Bank, 2025).

Mental Health Problems

The most pressing issue is that of poor mental health such as anxiety, depression, alcohol or drug abuse and suicides as a result of unemployment, climate-induced crises and digitization such as increased usage of social media. For example, in the study by Knifton and Inglis (2020), the poor in Glasgow were commonly found to experience stigma and adverse childhood events (ACE) like abuse and family dysfunctions leading to psychological problems. For children with ACE, it is a strong predictor for higher risk of mental health problems and drug as well as alcohol abuses in their adulthood (Hughes et al. 2017), further trapping them in poverty.

Therefore, it is suggested that a strong network of social support among its population and government aid are needed to mitigate such negative outcomes. This will be in line with the United Nations' 17 SDGs that have highlighted the importance of goal no.3 'Good health and well-being'.

Suicide Rates

According to Bantjes et al. (2016), about 75% of suicides happen in low- and middle-income countries where poverty rates are high. Moreover, the correlation between economic variables and suicide is obvious.

Globally, men disproportionately has a higher risk of suicide due to mental health problems such as depression with symptoms like aggression, alcohol use and risky behaviour (Cleary, Griffith, Oliffe & Rice, 2023).

Crime Rates

Crime rates usually go up when unemployment and/or inflation rates go up as reported by Sringa (2023) and Nur Farah Zafirah et al. (2022) respectively. For example, Picardo (2024) stated that unemployment affects the spending income of families, cuts into their purchasing power and reduces an economy's output. Inflation also negatively affects a household's purchasing power.

Other Social Problems

There is a general agreement in research findings that despite multiple other factors, poverty is a significant predictor of higher crime rates, especially in Africa (Sringa, 2023) and of drug abuse/addiction in the US which then lead to more poverty, serious illnesses and poorer mental health outcomes for the destitute (Kleinkopf, 2022).

Poverty exposes women and girls to increased vulnerability such as child or early marriages, domestic violence, sexual exploitation including trafficking (UN Women, 2014) and

prostitution (Meshelemiah, 2005). Children born of child and early marriages are also more likely to remain poor and don't enjoy an education (Cornish-Spencer, 2018).

In low-income countries, poverty is the main factor which prevents girls from attending school and acquiring good life skills which can in turn help them get out of poverty (Girls' Education Challenge, 2024; World Bank Group, 2025). Gender equality is also the fifth goal in the United Nations' 17 SDGs while reduced inequalities is the tenth of the SDGs.

Poor children and adolescents also experience malnutrition which can cause stunting and lower cognitive development (Wong, 2022). For example, Malaysia has among the highest cases of childhood stunting in the region where children aged 5 years old and below are too short for their age while 1 in 12 adolescents experience stunting (Parenthood, 2022).

Exploring Possible Solutions to Poverty

If poverty were personal failings, Addae-Korankye (2019) suggested that the poor should be encouraged to increase their self-help approaches and governments should stop aid for those who can work except for the disabled, the elderly and children. However, social and educational programs should instil self-awareness and self-motivation in the poor so that they have the strength and confidence to reshape their visions, re-train in new skills, and start new trades.

Meanwhile, smaller countries with scarce resources should strengthen trade relationships with countries of their regions, such as ASEAN, and with other parts of the world in the face of the US tariffs2025 as suggested by the Singaporean Prime Minister Lawrence Wong (Times of India, n.d.). This will minimize the impact of this new global trade protectionism era.

If poverty is structural, governments should institute policies which address social disadvantages and enhance the poor's capabilities by investing in good quality education, healthcare and strengthening the social protection system. Countries should also support the development of micro, small and medium-sized (MSMEs) enterprises by giving them low interest rates, training and technical assistance (Ibid) to stimulate growth and alleviate poverty. The experience of Bangladesh via Grameen Bank's microfinance for the poor should be emulated. Finally, governments should encourage economic sustainability via the Environment, Social and Governance (ESG) approaches, address labour exploitation issues and promote good governance such as corruption reduction drives.

Conclusion

As the world grapples with the US tariffs2025, countries should take note of Bhalla & Silvio's (2022) counter argument that free trade has actually impoverished some developing countries. As such, there is no sure certainty that all is doom for small countries even though the Singaporean Prime Minister Lawrence Wong has warned us of an upcoming storm (Times of India, n.d.). There is a need to prepare mentally and change "business as usual" mindsets in this 'end of the free trade' era in order for countries to ride out this tide successfully. Finally, in crises, countries have the opportunity to be more creative, innovative and proactive in finding solutions to their problems.

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INTERACTIVE EDUCATION TOOL IN CHEMISTRY OF PETROCHEMICAL PROCESSES COURSE

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Abstract: *At Politeknik Kuching Sarawak (PKS), the Department of Petrochemical Engineering offers a single program, Diploma in Process Engineering (Petrochemical)(DPE) which highlights the need for effective and innovative teaching approaches within this specialized field. Chemistry of Petrochemical Processes course, a critical component of the curriculum, poses significant learning challenges for many students due to its complex concepts, abstract molecular structures, and traditional teaching methods that often fail to cater to diverse learning styles. An analysis of the Chemistry of Petrochemical Processes course during the Session I 2022/2023 semester revealed stagnant performance, particularly in Course Learning Outcome 1C (CLO1C), which involves applying basic chemistry principles to petrochemical processes. Low scores were consistently observed in Topic 2: Alkanes and Alkenes. To address this issue, a Continuous Quality Improvement (CQI) initiative introduced an integrated education tool combining Oh! My Chemistry app, Kahoot! and Padlet during lecture and study weeks. This blended approach aimed to improve student engagement, understanding, and performance. The research methodology included reviewing course outcome reports, identifying learning gaps, engaging with academic leadership, and implementing the tools during targeted sessions such as Klinik Ilmu I Can We Can (ICWC). Post-implementation analysis showed improved student interest and comprehension in the targeted topic. Assessment data revealed a noticeable increase in scores for both Test 1 and Final Examination Question 2, indicating that the integration of these tools positively impacted learning outcomes. In conclusion, the use of these interactive platforms within a blended learning model proved effective in enhancing student achievement and supports the continued use of integrated digital tools in teaching and learning processes.*

Keywords: *Blended Learning, Integrated Educational Tools, Organic Chemistry, Student Performance, Continuous Quality Improvement (CQI).*

Introduction

Politeknik Kuching Sarawak (PKS) was established in 1988 and was the fifth polytechnic institution founded in Malaysia under the then Ministry of Higher Education. Its primary aim was to address the growing demand for a skilled workforce and to strengthen the global competitiveness of Malaysia's petrochemical industry. PKS has since carved out a niche in the field of petrochemical engineering through its Department of Petrochemical Engineering, locally known as Jabatan Kejuruteraan Petrokimia (JKPK). This department exclusively offers the Diploma in Process Engineering (Petrochemical), or DPE, a

specialized program designed to produce competent technologists for the petrochemical sector. DPE programme will take six

semesters to complete, five academic semesters at their respective polytechnics and one semester of industrial training at relevant industries during the final semester. There are six specialisation courses under DPE which are Chemistry of Petrochemical Processes (semester 2), Process Instrumentation and Control (semester 3), Petrochemical Process Technology and Petrochemical Polymer (Semester 4) as well as Petrochemical Production Processes (semester 5). The DPE program is fully accredited by the Malaysian Qualifications Agency (MQA) and recognized by the Board of Engineers Malaysia (BEM) through the Engineering Technology Accreditation Council (ETAC), ensuring that it meets national standards for quality and relevance in engineering technology education.

Developing an integrated educational tool for teaching and learning entails the seamless combination of various digital components designed to support students, educators, and administrators in achieving effective learning outcomes. Such a tool typically includes several core features such as a Learning Management System (LMS) for organizing and delivering course materials, interactive content delivery to engage students actively, communication and collaboration tools to facilitate interaction, assessment and feedback mechanisms to monitor progress, analytics and reporting for data-driven decision-making, and a content repository to store and manage educational resources. In the context of this study, three integrated educational tools have been selected to enhance the Teaching and Learning (T&L) process includes Oh! My Chemistry, Kahoot! and Padlet. These tools were chosen for their ability to promote active learning, foster student engagement, and support collaborative activities. The implementation of these tools is planned during both the lecture week and study week, providing a dynamic and interactive learning environment that aligns with modern educational strategies. Oh! My Chemistry is an app in which is a tool that use a Microsoft Excel to build it. In addition, Oh! My Chemistry app is subject specific platform developed to deliver interactive chemistry content. Meanwhile, Kahoot! is a gamified learning application that engages students through real-time quizzes and formative assessments, and Padlet is an interactive digital board that supports collaborative knowledge sharing and reflective learning.

Problem Statement

Although organic chemistry plays a crucial role in the study of chemistry and other scientific disciplines, many students consistently struggle to perform well in the subject. This under achievement from several challenges, including the need for strong foundational knowledge, limited conceptual clarity, and difficulties in visualizing molecular structures and reaction mechanisms. Additionally, traditional teaching methods often fail to address the varied learning preferences of students. These issues collectively lead to reduced student confidence, lower academic outcomes, and increased dropout rates where organic chemistry is a key requirement. An analysis of student performance in the Chemistry of Petrochemical Processes course during Semester I of the 2022/2023 academic session indicated a stagnation in achievement related to Course Learning Outcome 1C (CLO1C). This learning outcome (LO) focuses on the ability to apply fundamental chemical principles within petrochemical processes. The assessment data, which includes both continuous assessments and final examination results, demonstrated no observable improvement in students' performance for this particular outcome. Further analysis revealed that Topic 2: Alkanes

and Alkenes was a major contributing factor to the low achievement scores. Many students struggled with understanding and applying the concepts presented in this topic, which significantly affected their overall performance in CLO1C. In response to this issue, a Continuous Quality Improvement (CQI) initiative was implemented with the aim of enhancing students' understanding and improving performance in both continuous and final assessments. As part of this initiative, an interactive educational tool was introduced to facilitate a more engaging and student-centred learning environment. This tool integrates game-based and collaborative digital platforms, specifically designed to reinforce conceptual understanding and encourage active participation.

Table 1: Number of Students Achieving More Than 50% For Test 1 And Final Exam

No	Academic session	Number of students	Percentage of students achieve more than 50% for Test 1 (Question 1 and 2)	Percentage of students achieve more than 50% for Final Exam (Question 2)
1.	I 2021/2022	15	73.33%	26.67%
2.	II 2021/2022	34	94.12%	47.06%
3.	I 2022/2023	22	50.00%	36.37%

From Table 1 above, it shows that a drastic decline trend in Test 1 from academic session I 2021/2022 to I 2022/2023. This worrying on decline trend of students achieving more than 50% also happens on Final Exam. Concerned about the declining performance trend, the course coordinator for Chemistry of Petrochemical Processes initiated a proposal to the Head of the Petrochemical Engineering Department and the Head of the Diploma in Process Engineering (Petrochemical) Programme to introduce a new approach to teaching and learning. An analysis of the Course Outcome Review Report (CORR) available on the i-Exam Sistem Pengurusan Maklumat Pelajar (SPMP) revealed that a significant number of students demonstrated poor understanding and performance on examination questions related to alkanes and alkenes. Given the foundational importance of these topics since students encounter alkanes and alkenes extensively throughout the semester and it became clear that improvements in instructional strategy were necessary. Following a formal discussion, both academic leaders concurred with the proposal and agreed to implement an integrated educational tool alongside conventional teaching methods to enhance student comprehension and engagement. Utilizing integrated educational tools in teaching and learning offers numerous advantages that greatly improve both teaching effectiveness and student achievement. These tools enable educators to bring together a variety of instructional resources and strategies within a single, unified platform, simplifying and enriching the learning experience for everyone involved. By embedding technology into everyday classroom practices, teachers can create lessons that are more interactive, engaging, and tailored to meet the diverse needs and learning preferences of their students.

Integrated educational tools foster collaboration in real time, provide immediate feedback, and support the use of multimedia content, all of which help sustain student engagement and enhance understanding. They also contribute to more efficient classroom management by consolidating teaching materials, assignments, assessments, and communication in one convenient location. This integration not only saves time but also allows teachers to monitor progress more effectively and make data-driven instructional decisions. For students as the learners, these tools encourage active participation, creativity, and independent learning.

Students are given multiple ways to interact with content such as through videos, interactive tasks, discussion forums, or project work, making the learning experience more inclusive and student focused.

Moreover, engaging with integrated educational technology helps students build essential digital skills that are critical for success in today's academic and professional landscapes. In essence, incorporating integrated tools into education enhances the overall quality of teaching, supports personalized learning, and fosters a collaborative classroom culture that leads to deeper understanding and sustained academic growth.

Research Objectives

The objectives of this research project are:

iii. To examine the effectiveness of using Oh! My Chemistry, Kahoot! and Padlet as the integrated educational tool for teaching and learning purpose.
iv. To analyse students' grading performance before and after using Oh! My Chemistry, Kahoot! And Padlet for the topic of alkanes and alkenes.

Literature Review

The literature review for this research paper is tabulated in Table 2 as below.

Table 2: Findings On Integrated Interactive Educational Tool in Chemistry

No	Findings	Journal Title	Author, Year
1.	This study investigates the effectiveness of gamification tools, specifically Kahoot! in improving the academic performance course. This quantitative research with a pre-experimental design analysed the impact of Kahoot! quizzes.	Kahoot! as a tool to enhance learning for engineering students in economics & management courses.	Navarro-Castillo, Y., Pablo-Lerchundi, I., Morales-Alonso, G. (2025)
2.	The experimental group exhibited a notable decrease in stress and anxiety levels, alongside enhancements in self-efficacy and academic performance following the intervention.	Effect of using gamification of "Kahoot!" as a learning method on stress symptoms, anxiety symptoms, self-efficacy, and academic achievement among university students.	Alsswey, A., Malak, M.Z. (2024)
3.	Integrating game-based learning as a formative assessment strategy can effectively equip students with the necessary skills and knowledge.	Application of game-based online learning platform: Kahoot a formative evaluation tool to assess learning.	Myriam, J.C. (2023)
4.	Students actively participated in the chemistry lessons and effectively grasped the concepts related to molecular weights.	Using the E-Learning Gamification Tool Kahoot! to Learn	Ghawail, E.A.A., Yahia, S.B. (2023)

		Chemistry Principles in the Classroom.	
5.	The study highlights Padlet's adaptability in higher education, particularly its ability to facilitate student collaboration, enable faculty to share resources effectively, and support engagement during academic conferences. It emphasizes Padlet's pivotal role in creating interactive learning environments and promoting the seamless exchange of information between students and educators.	Padlet: The multipurpose web 2.0 tool.	Waltemeyer et al. (2021)
6.	Padlet's impact on collaborative learning and feedback literacy among students. The research indicates that Padlet's asynchronous and anonymous features promote deeper discussions, increased participation, and constructive feedback, thereby enhancing students' confidence and engagement.	Padlet: a tool for fostering collaborative learning and feedback literacy in dental education.	Rath, A. (2024)
7.	Padlet's application in collaborative learning within a master's program for secondary education. The study identifies six key uses of Padlet, including research resource gathering, class resources, class diaries, FAQs, brainstorming, and online dialogue, highlighting its multifaceted utility in classroom settings.	Using Padlet for collaborative learning.	Beltrán-Martín (2019)

Methodology

The following steps outline the research methodology to be applied:

i. Analysing the Course Outcome Review Report (CORR) including data from the final examination and other assessments.
ii. Identifying students' areas of weakness by evaluating performance against targeted learning outcomes and assessment results.
iii. Conducting discussion with the Head of Department (HoD) and Head of Programme (HoP) to validate findings and gather input.
iv. Exploring suitable integrated educational tools that can be adopted to address the identified weaknesses.
v. Implementing the selected tools such as Oh! My Chemistry, Kahoot! and Padlet during the lecture weeks as part of the teaching strategy.
vi. Evaluating student performance following the implementation to assess the impact of the educational tools on learning outcomes.

The integrated educational tools that will be implement throughout this research project are Oh! My Chemistry, Kahoot! and Padlet.

Oh! My Chemistry as an Integrated Educational Tool

Oh! My Chemistry is an app where the tool that is used to build the app is Microsoft Excel. Using Microsoft Excel to build educational games offers a range of pedagogical, practical, and technical benefits, especially in teaching science subjects like chemistry. Microsoft Excel can be used to build games for teaching and learning which offers numerous benefits that enhance both student engagement and instructional effectiveness. One of the primary advantages is that it promotes active learning, where students are no longer passive recipients of information but instead interact directly with content through quizzes, matching exercises, or simulated experiments. This hands-on approach fosters critical thinking and problem-solving skills, as learners must apply their knowledge to complete tasks or solve puzzles within the spreadsheet environment. Microsoft Excel also supports self-paced learning, allowing students to revisit activities, practice repeatedly, and receive instant feedback through built-in formulas or conditional formatting, which visually reinforces their understanding (e.g., colour changes to indicate correct or incorrect answers).

From a practical standpoint, Microsoft Excel is widely accessible installed on most computers and available online, making it a convenient and cost-effective tool for educators. It is also highly customizable teachers can easily adjust the content, difficulty, or layout of games to align with different learning objectives or student levels. For example, a chemistry teacher might create a game where students match molecular formulas to compound names or classify hydrocarbons, all within a spreadsheet. Moreover, Microsoft Excel enables real-time data analysis, automatically capturing student responses and allowing educators to monitor progress and identify areas of weakness quickly. Incorporating game-based elements in Microsoft Excel helps create a more engaging and enjoyable learning experience, especially for subjects that students often find challenging, such as chemistry. The visual and interactive nature of Excel games support formative assessment, providing valuable feedback for both students and instructors. Additionally, such games can be used in collaborative settings, encouraging teamwork and communication among peers. Overall, using Microsoft Excel as a platform for educational games not only makes learning more dynamic and interactive but also empowers teachers with a versatile tool to enhance classroom instruction.

Kahoot! As an Integrated Educational Tool

Kahoot! is a game-based learning platform that has proven to be highly effective in supporting teaching and learning, particularly in blended or interactive classroom environments. In the context of chemistry education especially for topics such as alkanes and alkenes, Kahoot! offers a dynamic and engaging approach that encourages active participation and enhances student understanding. The platform allows educators to create interactive quizzes, known as "kahoots," which students can answer in real time using their smartphones, tablets, or computers. This format transforms traditional assessments into enjoyable learning experiences, promoting both student engagement and formative assessment.

For educators, Kahoot! provides a variety of pedagogical benefits. It enables engaging formative assessments that can be used to evaluate students' grasp of key concepts such as naming conventions, isomerism, and chemical reactions in a fun and interactive manner. The platform also offers instant feedback, allowing instructors to identify common misconceptions such as confusion between alkanes and alkenes and to adjust their teaching strategies accordingly. Furthermore, Kahoot! fosters motivation and participation, even among typically reserved students, by introducing a competitive element that boosts enthusiasm for challenging or abstract topics like reaction mechanisms. The quizzes are highly customizable, enabling teachers to design content-specific questions with supporting visuals, such as molecular structures or reaction pathways. Additionally, the platform includes reporting tools that allow teachers to track student progress, analyse performance data, and export results for further review or parent-teacher conferences.

From the students' perspective, Kahoot! enhances the learning experience through active recall practice, which strengthens memory retention through repetition and competition. The immediate feedback provided during the quizzes helps students learn from their mistakes and encourages self-reflection. Kahoot! also promotes peer learning, as students often discuss questions and answers collaboratively, benefiting from shared insights and strategies. Most importantly, Kahoot! makes learning enjoyable and memorable, helping to transform complex or traditionally dry content such as hydrocarbon nomenclature and reaction mechanisms into an engaging and interactive classroom activity. The use of a leaderboard system adds a gamified element that motivates students to perform well, while maintaining a low-pressure environment conducive to learning.

Padlet as an Integrated Educational Tool

Padlet is a versatile and interactive online bulletin board that allows students to post a wide range of content, including text, videos, audio clips, images, links, and documents. One of its greatest strengths is that it enables real-time collaboration, allowing students to instantly view and engage with their classmates' contributions. This fosters a sense of connection and active participation, which is especially valuable in both in-person and online learning environments.
As an educational tool, Padlet supports collaborative learning by shifting the focus from one-way communication with the lecturer to a more dynamic, peer-driven exchange of ideas. It encourages students to share their thoughts, respond to others, and co-create knowledge, thereby enhancing critical thinking and community building.

Using Padlet offers numerous advantages for students in both traditional and digital classrooms. One of the key benefits is its ability to support real-time collaboration. Students can post content and instantly see contributions from their peers, promoting active participation and immediate feedback. This interactivity encourages student voice and self-expression, as Padlet allows for diverse formats such as text, audio, video, images, and links that catering to various learning styles and preferences. Another advantage is its role in enhancing peer learning. Students gain insights by engaging with each other's work, which broadens their understanding and fosters a collaborative learning environment. Padlet is also extremely user-friendly, making it accessible for students of all ages and skill levels. Its compatibility across devices like smartphones, tablets, and computers adds to its convenience. Furthermore, the platform boosts student engagement and motivation through its visually appealing and interactive design. It encourages creativity and critical thinking

by enabling students to present ideas in multimedia formats and explore content in non-linear ways. Importantly, Padlet also helps build a sense of classroom community. By sharing their work on a common platform, students feel more connected to their peers, which is especially valuable in remote or hybrid settings. Additionally, using Padlet helps students develop essential digital literacy skills, preparing them for future academic and professional environments. The tool is flexible and can be used across various subjects for activities such as brainstorming, project collaboration, showcasing portfolios, or reflective writing. Lastly, teachers can maintain a safe and respectful online space by controlling permissions for posting and commenting, making Padlet a secure platform for student interaction and idea-sharing.

Padlet offers a wide range of benefits for teachers, making it a powerful tool to enhance teaching and learning. One of its primary advantages is that it facilitates interactive and collaborative learning environments where teachers can engage students more actively. By allowing students to post their responses, ideas, and projects in various formats such as text, images, videos, links, and audio. Teachers can cater to diverse learning styles and encourage creativity. Padlet also serves as a real-time formative assessment tool, enabling educators to monitor student understanding, identify misconceptions, and provide immediate feedback. This helps tailor instruction more effectively to meet students' needs. Additionally, Padlet simplifies lesson planning and resource sharing, as teachers can organize materials, instructions, and multimedia content on a single board that's accessible to all students. It also promotes inclusive participation, as even shy or reluctant students often feel more comfortable contributing in a digital space. With its flexible layout options and user-friendly interface, Padlet can be seamlessly integrated into any subject or grade level. Moreover, it supports reflective teaching by providing a visual archive of student learning over time, which teachers can use to evaluate progress and adjust strategies. Overall, Padlet empowers teachers to create more engaging, personalized, and interactive educational experiences.

Padlet is also praised for its user-friendly interface, making it accessible even for those with minimal technical experience. Despite its simplicity, it is highly dynamic and adaptable to a variety of teaching strategies and learning activities. The platform is available in both a free basic version and a more feature-rich pro version, giving educators flexibility based on their needs and resources.

Result and Discussion

There are three interactive educational tools that has been applied throughout the lecture week which are Oh! My Chemistry, Kahoot! and Padlet.

Oh! My Chemistry

The Oh! My Chemistry app is developed using Microsoft Excel as its primary platform. This choice allows for a user-friendly interface and interactive features tailored to support students in their chemistry learning. The figures provided below illustrate how end users specifically students will interact with the app throughout their study sessions. To guide users effectively, a detailed, step-by-step explanation is included, outlining the entire process from the initial launch of the app to the completion of its features. This structured approach ensures that students can navigate and utilize the app efficiently for their academic benefit. The step-by-step explanation is tabulated in Table 3 as follows:

Table 3: Findings on Integrated Interactive Educational Tool in Chemistry

Step	Explanation	Figure
1.	When students open the Microsoft Excel file, they will be presented with the user interface of the Oh! My Chemistry app. The Welcome Interface of the Oh! My Chemistry App is the first screen that students see when they open the application. It is designed to be engaging and intuitive, providing a clear starting point for users as they begin their learning journey. This interface typically features the app's title, branding elements, and a simple navigation menu or buttons that guide students to key sections such as the introduction, lessons, or quizzes. The welcome screen may also include brief instructions or motivational messages to encourage students to explore the content. By offering a user-friendly and visually appealing entry point, the welcome interface helps set a positive tone and makes it easy for students to get started with their chemistry studies.	1: Welcome Interface of the Oh! My Chemistry App.
2.	Next, students will click on the Introduction button, which will take them to a dedicated page providing an overview of the app. This section outlines the objectives, course details, and intended learning outcomes to help students understand the purpose and structure of the content.	2: Interface of Introduction of Oh! My Chemistry.
3.	On this page, students will explore topics related to chemical bonding and the general formula of alkanes. After reviewing the material, they can proceed by selecting various alkane options to continue their study in more detail.	3: Interface of Alkanes.
4.	Once a student selects the alkane they wish to study such as ethane, for example. They will engage in balancing the combustion reaction for that compound. To assist them, helpful hints are provided, including the number of carbon atoms and a general template for balancing combustion reactions of alkanes, which serve as guides throughout the learning process.	4: Interface of balancing the chemical reaction of combustion in Alkanes.
5.	On this page, if the student enters incorrect values for x and y on this page, a pop-up message displaying "Try Again" will appear, prompting them to reattempt the question.	5: Interface of combustion in Alkanes if students get wrong answer.
6.	At this page, if the student students enter the correct values for x and y, a pop-up message saying "Correct" will appear, confirming their successful input.	6: Interface of combustion in Alkanes if students get correct answer.
7.	On this page, students will learn about the number of carbon atoms and the corresponding prefixes used in naming alkanes, with guidance	7: Interface of the

	provided through helpful tips displayed alongside the molecular structure of each alkane.	number of carbon and prefix in Alkanes.
8.	At this page, if the student students enter the correct values for number of carbon and prefix, a pop-up message saying “Correct” will appear, confirming their successful input.	8: Interface of number of carbon and prefix in Alkanes if students get correct answer.
9.	The interface designed for students to scan the QR code provides a seamless and efficient way for them to quickly access their individual score reports. This feature displays a clear and easily scannable QR code on the screen, which students can use with their smartphones or other QR code readers.	9: Interface for students to scan the QR Code to access their score.
10.	The Final Interface of the Oh! My Chemistry App serves as the concluding screen that students encounter upon completing their learning activities within the app. This interface is thoughtfully designed to provide a clear summary or closing message, reinforcing the end of the session. It may include options for students to review their progress, access their results, or navigate to additional resources for further study. Additionally, this screen often features interactive elements such as buttons for scanning a QR code to view detailed scores, links to feedback forms, or prompts to revisit specific topics. The final interface plays a crucial role in wrapping up the learning experience, ensuring students leave the app with a sense of accomplishment and clear direction on their next steps.	10: Final Interface of the Oh! My Chemistry App.

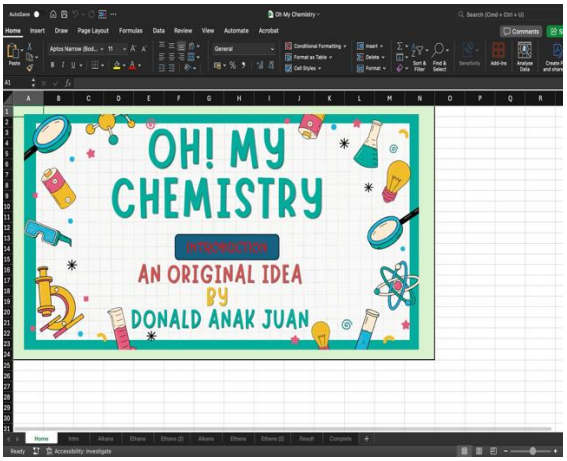


Figure 1: Welcome Interface of the Oh! My Chemistry App

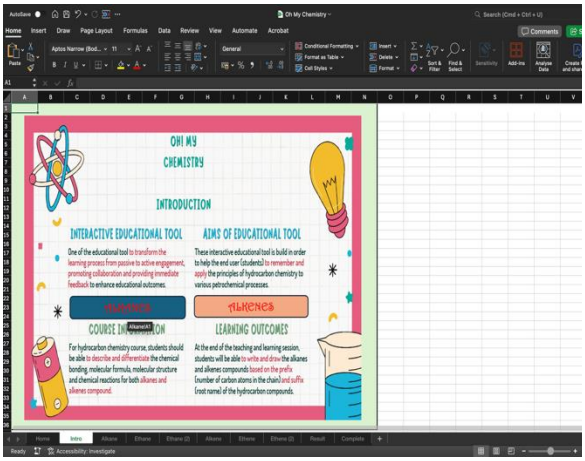


Figure 2: Interface of Introduction of Oh! My Chemistry

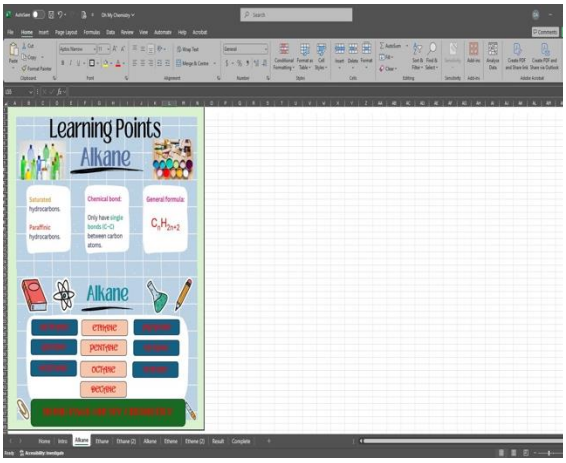


Figure 3: Interface of Alkanes

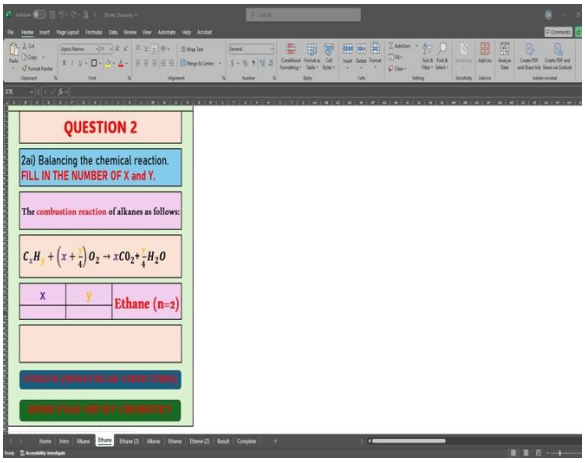


Figure 4: Interface of balancing the chemical reaction of combustion in Alkanes

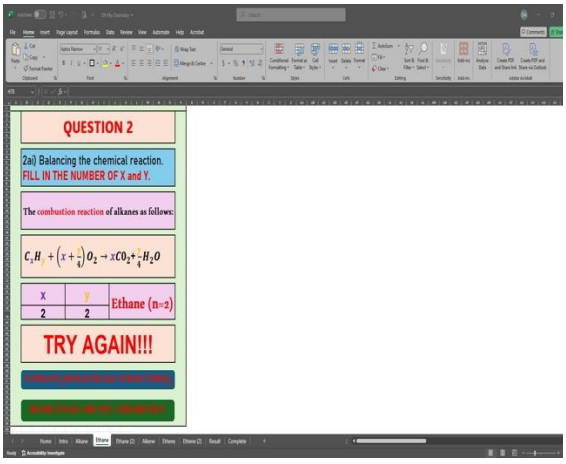


Figure 5: Interface of combustion in Alkanes if students get wrong answer

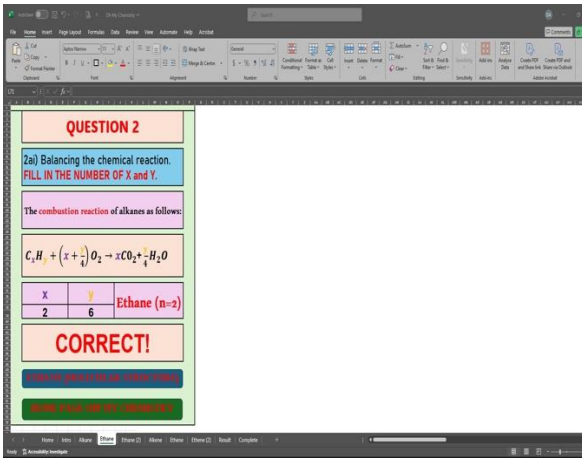


Figure 6: Interface of combustion in Alkanes if students get correct answer

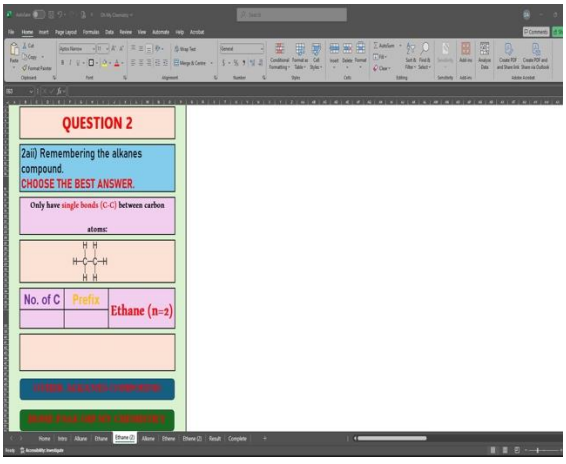


Figure 7: Interface of the number of carbon and prefix in Alkanes

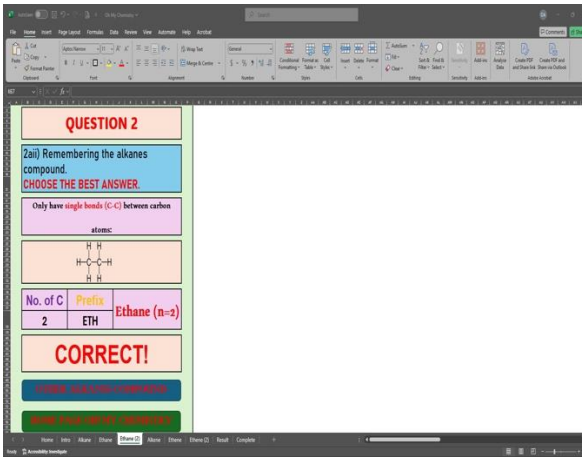


Figure 8: Interface of number of carbon and prefix in Alkanes if students get correct answer

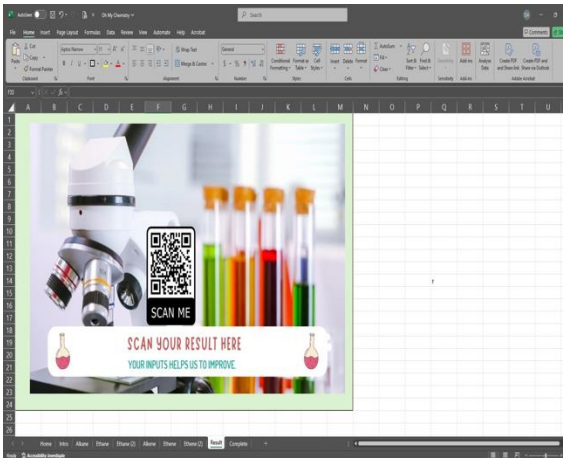


Figure 9: Interface for students to scan the QR Code to access their score



Figure 10: Final Interface of the Oh! My Chemistry App

Oh! My Chemistry can be access and download through Curriculum Information Document Online System (CIDOS) on Chemistry of Petrochemical Processes platform. CIDOS is an online learning management platform developed by the Department of Polytechnic and Community College Education (JPPKK) under Malaysia's Ministry of Higher Education. It serves as a central hub for teaching and learning activities across Malaysian polytechnics and community colleges. Through CIDOS, students and lecturers can access curriculum documents, educational resources, and interactive tools such as quizzes, assignments, forums, and chat features. The platform also enables users to track academic progress and performance, supporting a blended learning approach that combines face-to-face teaching with online engagement. This system plays a key role in enhancing the flexibility and accessibility of higher education in Malaysia.

Kahoot!

To create a Kahoot! game for the Oh! My Chemistry app, begin by logging into user Kahoot! account at https://kahoot.com. Once logged in, click on the "Create" button and choose "New Kahoot" to start building the quiz. Give the game a relevant title, such as Oh! My Chemistry Quiz, and add a brief description if desired. Next, start adding questions related to the chemistry topics covered in the app, such as chemical bonding, molecular structure, molecular formula, number of carbon and prefix for alkanes, and alkenes. Each question can be formatted as multiple choice or true/false, and the Oh! My Chemistry Quiz can be enhancing engagement by adding images, diagrams, or time limits. For each question, include at least one correct answer and one or more distractors to test students' understanding. Once all questions are added, click "Done" to save the quiz. To begin the activity with students, teachers can share the Kahoot! game by providing a unique game PIN or link. This allows students to join the session easily and engage in a fun, interactive quiz that reinforces the concepts they've learned through the Oh! My Chemistry app.

Figure 11 below illustrates the Kahoot! quiz interface focused on the topic of ethane. In this section of the quiz, students are presented with a multiple-choice question (MCQ) related to the correct prefix for ethane. Four possible answer choices are displayed on the screen, each in a separate-coloured box. Students are required to select the correct answer by clicking on the corresponding box. The game is time-based, so the quicker a student

responds with the correct answer, the more points they earn. This competitive element encourages active participation and motivates students to recall information quickly, as they aim to score the highest marks and rank above their classmates. The interactive and fast-paced format makes the learning process both engaging and effective, reinforcing key concepts from the Oh! My Chemistry app in a dynamic classroom environment.

For Figure 12 below displays the Game PIN screen for the Kahoot! quiz on alkanes. This interface appears right before the quiz begins and is used to allow students to join the game session. When the teacher launches the Kahoot! quiz, a unique Game PIN is automatically generated and displayed on this page. Students are required to open the Kahoot! website or app on their devices and enter this Game PIN in order to join the specific quiz session. The Game PIN acts as a secure and simple access code, ensuring that only those with the code can participate in the live quiz. This setup helps maintain an organized and controlled game environment within the classroom. Once students have entered the correct PIN and joined the session, their usernames will appear on the host's screen, confirming their participation. This interface plays a crucial role in connecting the class to the quiz in real time and marks the beginning of an engaging, interactive review activity cantered around the topic of alkanes.

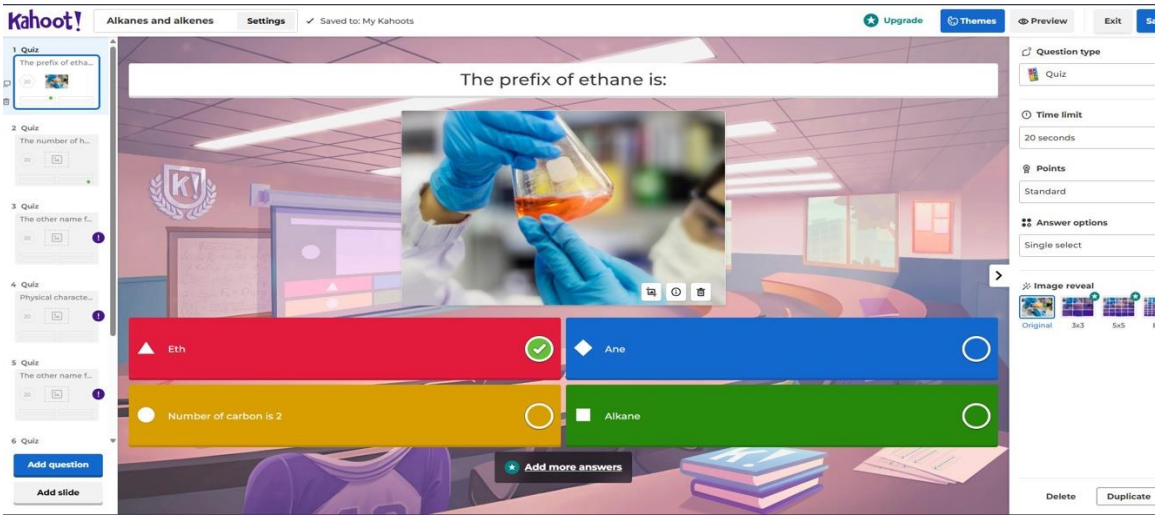


Figure 11: Interface of Kahoot! Quiz mode for ethane

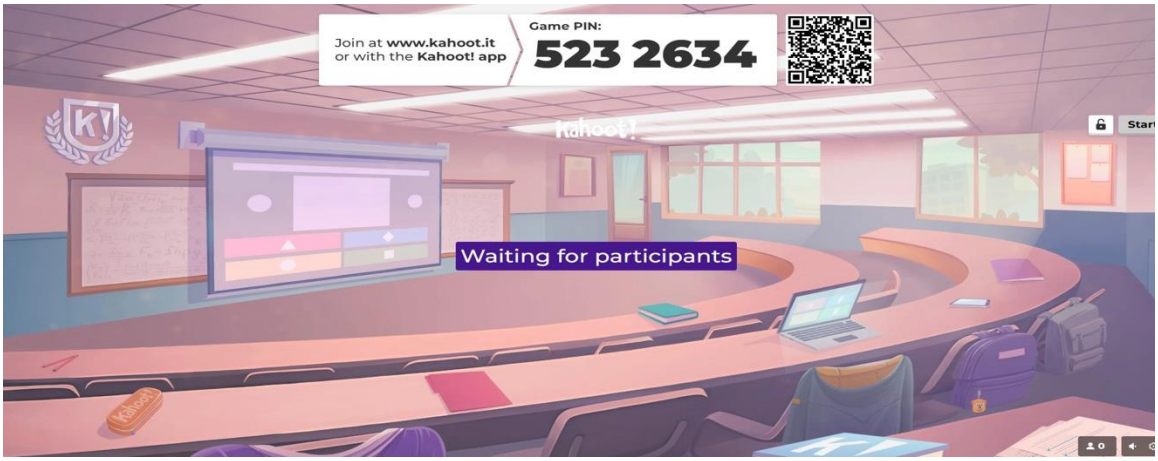


Figure 12: Interface of Kahoot! Game Pin

Padlet

Padlet is a highly effective digital tool for enhancing the teaching and learning of Chemistry of Petrochemical Processes. It provides a collaborative online platform where teachers and students can post, organize, and share content such as notes, videos, diagrams, links, and images in a visually engaging format. In the context of petrochemical chemistry, Padlet can be used to create interactive boards that display topics like the structure and reactions of alkanes and alkenes, industrial applications, or process flowcharts. Students can contribute by posting their own findings, questions, or reflections, encouraging active participation and peer learning. Teachers can also use Padlet for formative assessments, group projects, or real-time feedback. Its flexibility and ease of use make it a valuable tool for visualizing complex chemical processes, fostering collaboration, and supporting a more engaging and student-centred learning environment.

Figure 13 below illustrates how Padlet functions as a digital discussion board, providing students with a platform to express their thoughts and opinions on a given topic related to the Chemistry of Petrochemical Processes. This interactive space allows each student to post their responses in real time, fostering a collaborative and engaging learning environment. Beyond simply sharing their own ideas, students can also read and respond to the contributions of their peers, promoting meaningful dialogue and peer-to-peer learning. The layout of Padlet supports various types of content, including text, images, links, and videos, making it a versatile tool for discussion and knowledge sharing. By encouraging interaction and reflection, Padlet helps students develop a deeper understanding of the subject while also building communication and critical thinking skills.

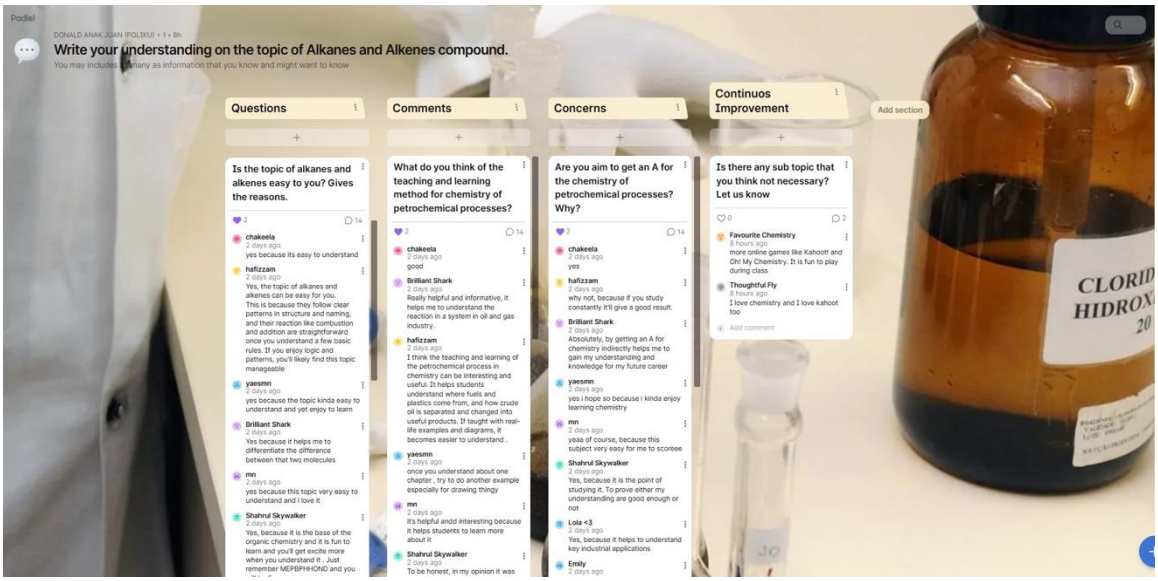


Figure 13: Interface of Padlet for Chemistry of Petrochemical Processes course

NAMA PROGRAM:	KLINIK ILMU I CAN WE CAN (ICWC)
PENGANJUR:	JKPK PKS
TARIKH:	03, 10, & 24/03/2023
BILANGAN PESERTA:	25

BIL	PERKARA	BILANGAN RESPONDAN				
		1	2	3	4	5
		Sangat tidak memuaskan	Tidak memuaskan	Sederhana mememuaskan	Memuaskan	Sangat memuaskan
	Penilaian Penceramah					
1	Tajuk-tajuk ceramah bersesuaian dengan matlamat program			1	3	21
2	Penyampaian penceramah jelas, menarik dan mudah difahami			1	2	22
3	Isi kandungan ceramah relevan dan mudah diikuti			2	2	21
4	Penggunaan alat bantuan mengajar (ABM) amat berkesan			2	3	20
	Penilaian Pelaksanaan Program					
5	Suasana tempat kursus yang kondusif			1	4	20
6	Perancangan dan pelaksanaan program telah dibuat dengan lancar				3	22
7	Masa yang diperuntukan bagi setiap aktiviti adalah sesuai				4	21
	Penilaian Keberkesanan Program Terhadap Peserta					
8	Berlaku peningkatan pengetahuan/pemahaman berbanding sebelum mengikuti kursus ini			1	2	22
9	Lebih berkeyakinan untuk menguruskan diri dengan lebih baik di masa akan datang			1	2	22
10	Pada keseluruhannya program ini adalah berjaya dan bermanfaat.				5	20
	JUMLAH RESPON	0	0	9	30	211
	JUMLAH	0	0	27	120	1055
	JUMLAH KESELURUHAN	1202				
	SKOR = Jumlah Keseluruhan /Bilangan Peserta	48.08				
	Tidak Berkesan	1-10				
	Kurang Berkesan	11-20				
	Agak Berkesan	21-30				
	Berkesan	31-40				
	Sangat Berkesan	41-50				

ULASAN URUSETIA: Program berjalan dengan lancar seperti yang dirancang

Figure 14: Interface of Questionnaire Response of Chemistry Petrochemical Processes course

During the lecture weeks, students participate in a specialized learning session called Klinik Ilmu "I Can We Can" (ICWC), designed to enhance their understanding of key chemistry concepts, particularly focusing on chemical bonding and the nomenclature of alkanes and alkenes. This clinic provides targeted academic support, encouraging active learning and deeper comprehension of these challenging topics. Figure 14 below presents the summarized results obtained from the student responses to the Klinik Ilmu "I Can We Can" questionnaire. This visual representation reflects the overall feedback collected after the session, highlighting students' perceptions of the clinic's effectiveness. The data showcases a generally positive response, with a majority of students indicating that the session enhanced their understanding of the subject, particularly in mastering concepts related to chemical bonding, alkanes, and alkenes. The Figure 14 displaying percentages of response towards the organising of Klinik Ilmu "I Can We Can" (ICWC), offering clear insight into how students benefited from the program. This feedback serves as valuable evidence of the clinic's impact on learning outcomes and student engagement. After completing the Klinik Ilmu "I Can We Can" session, students provided positive feedback through the questionnaire, indicating that the program was both engaging and beneficial to their understanding of the subject. Many students expressed that the clinic helped clarify challenging topics, particularly in areas such as chemical bonding and the naming of alkanes and alkenes. They appreciated the interactive and student-friendly approach used during the sessions, which made learning more enjoyable and less intimidating. Several responses highlighted increased confidence and interest in the subject matter as a direct result of the clinic. Overall, the feedback suggests that Klinik Ilmu "I Can We Can" was effective in supporting student learning and played a valuable role in reinforcing key chemistry concepts in an encouraging and supportive environment. Following their involvement in the Klinik Ilmu ICWC sessions, students demonstrated noticeable improvements in both their grasp of

the subject matter and their interest in the topic of alkanes and alkenes. This indicates that the clinic effectively supports their conceptual learning and boosts motivation. At the conclusion of the semester, student performance is formally assessed, and their achievements are documented in the Course Outcome Report and Review (CORR). The data from CORR show a significant increase in scores, particularly in Test 1 and Final Examination Question 2 for the Chemistry of Petrochemical Processes course. These results reflect a positive academic impact of the ICWC initiative, highlighting its effectiveness in reinforcing students' knowledge and academic performance.

Conclusion

A blended classroom model combines the best of both digital and face-to-face learning providing the educational tool even more powerful. The data indicates a consistent increase in student achievement for Topic 2, as reflected in both Test 1 and Question 2 of the Final Examination. This positive trend suggests that the integration of the educational tool into the teaching and learning process has contributed to enhanced student understanding and performance. The implementation of a blended classroom model which merges the advantages of digital platforms with traditional face-to-face instruction has further amplified the effectiveness of the educational tool. This hybrid approach fosters greater student engagement, interactivity, and accessibility. Moreover, the integration of three key educational tools such as Oh! My Chemistry, Kahoot!, and Padlet have successfully fulfilled the main objectives set for teaching and learning (T&L). These tools support interactive content delivery, real-time assessment, and collaborative learning, making them highly effective for both instructors and students in the chemistry classroom.

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INTEGRATING CHATGPT IN HIGHER EDUCATION: GLOBAL BEST PRACTICES, CHALLENGES, AND LESSONS FOR MALAYSIA

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Abstract: *ChatGPT is no longer a futuristic concept. It is now a tool widely used by educators and students around the world. Since its release in late 2022, ChatGPT has created waves in higher education, changing the way people approach assignments, feedback, and learning support. It is a global trend that invites both excitement and anxiety. ChatGPT can make work faster and learning easier, but it also brings ethical problems like plagiarism and dependency. Educators worry that students may misuse it or stop thinking critically. In Malaysia, the conversation around ChatGPT is still new. Many students and lecturers use it informally, but there are no official rules or proper training. The gap between urban and rural access also causes concern. This paper explores the issues and challenges of ChatGPT in higher education both globally and in Malaysia. It also presents best practices from countries that are leading in AI adoption. This paper hopes to provide ideas on how to use ChatGPT responsibly and make it part of a better learning experience, not a shortcut. The goal is to help Malaysian institutions prepare for a future where AI is part of education, while protecting the values of honesty, creativity, and fairness.*

Keywords: *ChatGPT, higher education, AI literacy, academic integrity*

1.0 Introduction

The swift advancement of artificial intelligence (AI) technologies, especially generative AI, is transforming the realm of worldwide higher education. ChatGPT, created by OpenAI and launched in late 2022, has become one of the most transformative and impactful technologies, proficient in generating human-like responses, composing essays, coding, and assisting with other academic activities (OpenAI, 2023). The debut has initiated prompt discussions regarding its impact on teaching and learning, prompting essential inquiries about pedagogy, academic integrity, and student participation.

The incorporation of ChatGPT into academic settings is a complex endeavor. Universities and educators worldwide are reacting with a blend of enthusiasm and prudence. ChatGPT offers novel opportunities for individualized education, automated feedback, and enhanced student engagement. Conversely, it presents hazards like plagiarism, excessive dependence, and the deterioration of critical thinking (Heung & Chiu, 2025; Altun et al., 2024). This contradiction emphasizes the necessity for strategic and ethical execution.

In the Malaysian environment, discourse surrounding ChatGPT is still developing. Despite increasing utilization by students and informal acceptance by educators, numerous institutions lack institutional protocols, digital preparedness, or faculty training concerning

AI in education (Sabzalieva & Valentini, 2023). Malaysian universities, in pursuit of aligning with Education 4.0 objectives and the national digital economy plan, find the integration of AI tools like ChatGPT not merely relevant but imperative.

This conceptual paper seeks to:

i. Examine global best practices in the implementation of ChatGPT within higher education systems.
ii. Identify significant difficulties and challenges, particularly concerning academic integrity, pedagogy, and policy.
iii. Examine how these experiences can influence the Malaysian higher education sector.

This paper provides a roadmap for Malaysian institutions to ethically and effectively utilize ChatGPT, balancing innovation with pedagogical integrity, through a structured thematic assessment of recent academic literature (2023–2025).

2.0 Literature Review

Opportunities of Chatgpt in Higher Education

The use of ChatGPT in higher education has triggered a surge of scholarly interest globally, with numerous studies evaluating its pedagogical benefits, risks, and ethical implications. A review of 30 recent sources (2023–2025) reveals recurring themes organized around opportunities, challenges, and best practices.

Several benefits are widely reported across international contexts:

i. **Teaching Efficiency**: ChatGPT helps educators streamline repetitive tasks such as quiz generation, assignment feedback, and content summarization (Levy & Pérez, 2024). In resource-limited settings, this can free up time for deeper engagement.
ii. **Student Autonomy and Motivation**: Students who interact with ChatGPT outside the classroom report greater confidence and independence in learning (Bai & Yang, 2024). The tool acts as a 24/7 study assistant, enabling just-in-time learning.
iii. **Personalized Support**: Particularly for students with disabilities or non-native speakers, ChatGPT can provide tailored responses and multilingual support (Lin & Chen, 2023).
iv. **Enhancing Engagement**: When used interactively, ChatGPT fosters inquiry-based learning, role-playing, and critical dialogue, especially in fields like Hospitality and Tourism (Altun et al., 2024).

Emerging Best Practices

Scholars and institutions worldwide are experimenting with structured integration strategies:

i. **AI Disclosure Policies**: Institutions in the U.S. and U.K. now mandate students to declare ChatGPT use in their submissions (FitzGibbon, 2023).

ii. **Critical Engagement Assignments**: Tasks that involve critiquing or annotating AI-generated content promote higher-order thinking (Lopez & Vega, 2023).
iii. **Assessment Redesign**: Replacing traditional essays with experiential projects, oral assessments, and real-world case studies reduces AI misuse (Nguyen & Pham, 2024).
iv. **Curriculum-Level AI Literacy**: Singapore and South Korea have introduced national frameworks integrating AI ethics and literacy into school curricula (Park & Kim, 2025).

3.0 Research Methodology

This conceptual paper is based on a systematic thematic literature review and qualitative synthesis of academic and institutional research from 2023 to 2025. As a non-empirical study, it does not involve direct data collection but relies on secondary sources to draw insights on ChatGPT integration in higher education.

Research Design

A conceptual research design was adopted to develop a holistic understanding of the global discourse on ChatGPT. According to Jabareen (2009), conceptual frameworks can unify fragmented knowledge through interpretation and categorization. This method is appropriate given the rapid evolution of AI-related educational practices and the urgent need for synthesized guidance.

Literature Search Strategy

Academic articles were sourced using keyword-based searches in Scopus, Web of Science, ScienceDirect, Google Scholar, and institutional repositories. The search focused on peer-reviewed publications, national policy briefs, and organizational reports. Key search terms included "ChatGPT in higher education," "AI and assessment," "academic integrity and AI," "AI literacy in universities," and "experiential learning with ChatGPT."

Only English-language articles published between January 2023 and May 2025 were included. In total, 30 key references were selected based on their relevance, credibility, and practical value.

Analytical Framework

Thematic analysis was used to categorize recurring patterns into three main domains:
i. Opportunities (e.g., personalization, engagement, productivity)
ii. Challenges (e.g., ethical risks, skill erosion, institutional gaps)
iii. Best practices (e.g., disclosure protocols, policy innovation, curriculum redesign)

4.0 Discussion and Findings

Challenges and Ethical Concerns

Table 1: Comparison of ChatGPT Challenges in Higher Education – Global vs Malaysia

Issue/Challenge	Global Findings	Malaysian Context	Sources
Academic Integrity	AI-generated work often submitted without disclosure. Tools are unreliable.	Few tools or training to detect misuse. No unified academic policy.	Dalgic et al. (2024); Brown & Singh (2023); Sabzalieva & Valentini (2023)
Critical Thinking Decline	Overreliance hinders engagement with higher-order skills.	Educators stick to rote learning. Lack of critical thinking pedagogy.	Sun & Deng (2025); Lopez & Vega (2023); Khalid & Ibrahim (2024)
Digital Literacy Gaps	Students and staff unsure how to verify or use ChatGPT ethically.	Readiness varies; rural areas have poor access.	McGrath & Zhang (2024); Khalid & Ibrahim (2024)
Lack of Institutional Policies	Only 10% of universities have formal AI policies.	Less than 15% in Malaysia have such policies.	UNESCO (2023); Sabzalieva & Valentini (2023)
Equity in Access	AI improves access but rural gaps persist.	Uneven access to devices and internet.	Lin & Chen (2023); Khalid & Ibrahim (2024)

As institutions experiment with integrating ChatGPT into classrooms, several ethical and operational challenges have surfaced. These challenges vary by region and institutional maturity but consistently involve issues of academic integrity, cognitive development, equity, and governance. This section provides a comprehensive expansion of each theme, backed by empirical findings.

Academic Integrity

AI-generated content has presented new challenges in upholding academic integrity. Students can now generate whole projects, reports, and reflections with no effort, prompting worries regarding authenticity and educational effects. Dalgıç et al. (2024) report instances in tourism and hospitality programs where as much as 40% of submissions exhibited indications of AI authorship.

Detection systems like Turnitin's AI module and GPTZero are still evolving and susceptible to false findings. Furthermore, Malaysian institutions presently lack established protocols to categorize or sanction AI-enabled misbehavior (Sabzalieva & Valentini, 2023). This regulatory ambiguity results in inconsistent enforcement, permitting the unfettered abuse of AI. Effective approaches encompass obligatory AI-use disclosure regulations, the incorporation of AI ethical knowledge into course syllabi, and the formulation of honor codes tailored for digital learning contexts.

Overreliance and Critical Thinking Decline

Although ChatGPT can facilitate learning, excessive dependence may impede profound understanding. Sun and Deng (2025) caution that students use ChatGPT for summarization, mathematical problem-solving, or text paraphrase frequently circumvent analytical processes such as comparison, evaluation, or application of concepts. This contradicts the objectives of Bloom's higher taxonomy levels—Analyze, Evaluate, and Create.

In the Malaysian educational system, where rote memorization prevails, the risk is significantly heightened. Students could utilize ChatGPT as a means of expedience, thus hindering the development of fundamental academic competencies. Educators must consequently transition to examinations that appraise cognitive processes, including reflective notebooks, annotated AI replies, and oral defenses.

Digital Literacy and Equity Gaps

Access and readiness continue to be inequitable. McGrath and Zhang (2024) discovered that digital literacy is significantly stratified according to socio-economic status. Students in urban areas like Kuala Lumpur may regularly utilize ChatGPT and online learning tools, whereas their counterparts in Sabah and Sarawak encounter connectivity challenges and insufficient access to digital gadgets.

The digital divide also encompasses educators. A countrywide poll conducted by Khalid & Ibrahim (2024) indicates that 55% of community college professors feel inadequately qualified to assess or oversee the use of ChatGPT. In the absence of comprehensive digital training, the advantages of AI may exacerbate existing disparities.

Institutional Readiness and Policy Gaps

According to UNESCO (2023) and Sabzalieva & Valentini (2023), a limited number of institutions worldwide has comprehensive plans for the integration of AI. Malaysia does not possess a coordinated policy framework from the Ministry of Higher Education (MOHE). Consequently, the determination of ChatGPT usage is delegated to individual instructors, resulting in inconsistencies.

Deficiencies in policy result in an absence of standard operating procedures for disclosing AI usage, delineating allowed and banned applications, and aligning grading and rubrics. Best practices from industrialized nations indicate that explicit institutional standards mitigate misuse and foster new applications of AI. Malaysia should prioritize the formulation of campus-level and national-level policies that are both protective and facilitative.

Global Best Practices and Comparative Insights

To understand how ChatGPT can be responsibly and effectively integrated into higher education, it is useful to examine strategies adopted by countries with advanced digital learning ecosystems. This section compares best practices from selected developed

countries, Asian nations, and Malaysia, focusing on transparency, pedagogy, access, and policy support.

Table 2: Global Comparison of ChatGPT Best Practices

Country/Region	Best Practices	Observations/Analysis
United States	AI disclosure policies, reflective use, integration in digital literacy (FitzGibbon, 2023).	Comprehensive, transparency-focused.
United Kingdom	Formal guidelines, oral assessments, ethical use handbooks (Levy & Pérez, 2024).	Strong alignment with integrity preservation.
South Korea	National curriculum, teacher training, smart classroom initiatives (Park & Kim, 2025).	Government-led and systematic.
Singapore	Equity-driven access, ethics integrated into curriculum (Tlili et al., 2023).	Strong national support and infrastructure.
India	Workshops, pilot integrations, motivational studies (Sharma & Dhawan, 2024).	Fast adoption with behavioral focus.
Malaysia	Pilot use by lecturers, informal adoption, limited policy (Sabzalieva & Valentini, 2023; Khalid & Ibrahim, 2024).	Grassroots-driven and uneven. No national framework.

United States

Numerous colleges in the U.S. have implemented disclosure policies mandating students to declare the usage of ChatGPT in their coursework (FitzGibbon, 2023). Reflective assignments regarding the correctness and dependability of ChatGPT are more prevalent. AI ethics is progressively integrated into digital literacy curricula.

United Kingdom

British institutions like the University of Edinburgh and King's College London have introduced formalized handbooks for educators on managing AI tools. Oral assessments, coursework defenses, and real-time feedback methods are widely encouraged to minimize AI misuse (Levy & Pérez, 2024).

South Korea

South Korea has embedded AI into its national education framework. The Ministry of Education supports smart classroom initiatives and funds teacher training programs to increase AI fluency. Public universities are piloting AI-integrated curricula and assessment redesign (Park & Kim, 2025).

Singapore

Singapore integrates AI literacy across technical and academic institutions. It emphasizes equitable access, ensuring students from lower-income backgrounds have tools and support

to use AI meaningfully. AI ethics modules are mandatory in many higher education programs (Tlili et al., 2023).

India

India is exploring AI implementation through workshops and experimental pilot programs across universities. Studies show that AI engagement is higher when students are motivated and well-informed about AI's limitations and use cases (Sharma & Dhawan, 2024).

Malaysia

Malaysia is currently in the early adoption phase. While lecturers in public and community colleges have begun experimenting with ChatGPT in formative tasks, there is little institutional support or formal training. Policy development is fragmented, and ethical guidelines are mostly absent (Khalid & Ibrahim, 2024).

Implications For Malaysia

The findings from global research, thematic analysis, and policy reviews carry several strategic implications for Malaysian higher education institutions. These implications span multiple dimensions including pedagogy, curriculum design, infrastructure, governance, and national policy.

Policy Development and Governance

Malaysia currently lacks a coordinated national policy on AI integration in higher education. To address this, the Ministry of Higher Education (MOHE), in collaboration with agencies such as the Malaysian Qualifications Agency (MQA) and MyDigital, should develop a national framework that outlines ethical AI use, institutional responsibilities, and implementation timelines. Institutions should also be required to formulate internal policies covering AI use, definitions of academic misconduct related to AI, and measures to ensure assessment integrity. Additionally, AI ethics should be integrated into existing quality assurance mechanisms. The establishment of such frameworks would help support consistency across institutions while providing clear expectations for both students and educators. Such frameworks can support consistency across institutions and provide clear expectations for students and educators.

Curriculum And Assessment Redesign

To mitigate AI misuse while harnessing its potential, institutions must reform evaluations to prioritize thought, originality, and practical application, including methods such as oral examinations, experiential projects, and live defenses. AI literacy ought to be integrated into both general education and specialized courses. Furthermore, assessment rubrics must be revised to appraise not only the caliber of student work but also their ethical utilization, inventiveness, and rationale in the application of AI tools such as ChatGPT.

Faculty and Student Training

Capacity development is essential for successful integration. Faculty members are required to participate in workshops aimed at developing AI-resilient assessments, supervising and instructing students in ethical AI utilization, and incorporating AI technologies into pedagogy to enhance personalization and inclusion. Students should undergo a systematic onboarding process encompassing critical subjects such as AI ethics, bias recognition, quick engineering, and competencies for validating AI-generated results.

Infrastructure and Equity

To prevent the emergence of technological inequities, investments should be made to improve broadband and device access, particularly in rural and underserved regions. Both the government and higher education institutions should also consider providing institution-licensed access to secure and educationally tailored AI tools, ensuring that the benefits of AI are equitably distributed among all learners.This ensures that AI benefits are shared equitably.

Stakeholder Collaboration

Ultimately, effective AI integration necessitates cooperation across all parties. University leadership is essential for maintaining vision alignment, whereas faculty members assist by developing teaching methodologies. Students must actively participate in the ethical integration of AI, while industry partners should offer innovation and feedback mechanisms to enhance educational practices. Policy-makers are essential for formulating explicit restrictions and providing incentives. A collaborative plan should be jointly formulated to rigorously monitor national advancements in AI integration within the higher education sector.

5.0 Limitations

As a conceptual paper, this study lacks primary empirical data and does not evaluate intervention outcomes. It also assumes a general level of institutional capacity in interpreting and implementing AI frameworks. Nonetheless, it provides a robust knowledge base to inform future empirical studies and policy dialogues.

6.0 Conclusion

The incorporation of ChatGPT into higher education presents both challenges and opportunities for Malaysia. As AI increasingly influences the educational sector, institutions must address its ethical ramifications while using its transformational capabilities. This article presents a thorough overview of worldwide best practices, identifies key issues, and suggests actionable methods based on current research.

The main themes identified in the review encompass the dual nature of ChatGPT: it enhances efficiency and personalization while simultaneously provoking issues over plagiarism, superficial learning, and disparities in access. Global examples, including the U.S., U.K., Singapore, and South Korea, demonstrate that effective integration necessitates

a well-defined regulatory framework, curriculum reformation, AI literacy education, and inclusive infrastructure.

The consequences for Malaysia are both urgent and exciting. Through the formulation of a cohesive national policy, the integration of AI ethics into higher education, and the investment in both technological and human capital, Malaysia may not only maintain alignment with global innovation but also spearhead the establishment of a balanced, human-centered AI pedagogy.

ChatGPT should ultimately be viewed not as a replacement for human intellect, but as a catalyst for improved, more reflective, and equitable learning experiences. Organizations that embrace foresight, adaptability, and integrity will be well situated to thrive in the era of intelligent education.

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THE IMPORTANCE OF ISLAMIC WORK ETHICS IN MOTIVATING THE NON-TECHNOLOGY BACKGROUND EDUCATORS FOR ARTIFICIAL INTELLIGENCE (AI) APPLICATION IN EDUCATION

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Abstract: *With the awareness of Islamic Work Ethics (IWE) and its implementation as an individual's commitment as an educator, this study intends to see the motivating factors that caused the non-technology background educators to stay inspired in grasping the knowledge on artificial intelligence (AI) and includes the AI tools implementation while educating. AI tools can be an easy application for those with technology fundamentals, but it can be hard for those who are not inspired by these tools. Using a qualitative research method, an in-depth interview session has been conducted with six participants who are the educators at private higher education in Malaysia. All participants were non-technology background educators, ranging in age from mid-30s to 50s. The data were analysed manually where thematic analysis has been used throughout this study. Findings showed that all participants agreed that IWE awareness, such as effort and commitment, has driven them to seek knowledge on AI tools. Additionally, institutional support and personal satisfaction have caused them to include AI in their teaching and learning performances.*

Keywords: *Islamic Work Ethics (IWE), artificial intelligence (AI), non-technology*

Introduction

Application of artificial intelligence (AI) in teaching and learning seems to be crucial these days. Beginning year 2019 when COVID-19 hits the world, the pedagogies of teaching and learning transformed immediately. Studies on digital transformation focusing on digital skills, data literacy and computational thinking has been the highlights in many research studies (EIT Digital, 2022; Momin Iqbal, 2023, Nurul Farhanah & Rohaiza, 2024). This has made educators to self-equip themselves with the necessary skills in integrating the AI tools in order to support their personalised learning, such as getting automated feedback, creating educational materials or designing the learning pathways (Kaswan et. Al., 2024; Zaman, 2024). It should be taken into consideration that AI not only providing advantages, but also it creates challenges and ethical concerns among the educators (Zaman, 2024). Hence, academics need to explore how AI tools can give disadvantaged to the field of education if

educators are not aware on this transformation. However, to explore on this matter requires effort and time among the educators. This field can be interesting to the people who do have IT background, but it can be challenges for those who need to grasp the knowledge from scratch and do not have any interest in doing so.

With the challenges that educators must equip themselves with AI tools, knowledge and application, few studies have been conducted in getting the perceptions of students and lecturers towards the application of the generative AI. Interestingly, Mwakalinga (2024) found that knowledge of AI between educators and students have a huge gap of 72%:22% ratio, which address the concern of the level of knowledge among educators on AI before they prepare the teaching and learning to the students. This huge gap also creates an issue where educators need to re-shape their perception on AI by not only looking at AI to facilitate the learning, but also to making sure students are embracing the AI without replacing their human capability of thinking (Holmes, 2019; Mwakalinga, 2024). Unfortunately, with the high expectations, not only to self-equip themselves with the application of AI tools, mastering it in the teaching and learning pedagogies, but the consideration on the workloads also bear by the educators should be highly pay into attention because it self-learning for AI tools will definitely taking some time to be mastered with. Hence, this study intends to:

1. Identify educators' opinion on the use of AI in teaching and learning
2. Analyse the importance of Islamic work ethics in motivating educators to search for new knowledge (AI)
3. Investigate the motivation to include AI in teaching and learning

Literature Review

Educators And Technology: What Happen To Non-Tech Savvy Educators?

The integration of technology in education has transformed teaching and learning practices across all levels. From Learning Management Systems (LMS) to interactive digital tools and virtual classrooms, technology has become a fundamental component of modern pedagogy. However, not all educators have adapted seamlessly to this shift. A significant challenge persists for non-tech-savvy educators who struggle with adopting and integrating digital tools effectively. This literature review explores the intersection of educators and educational technology, focusing particularly on the barriers, experiences, and support strategies for non-tech-savvy educators.

Researchers such as Selwyn (2014) and Ertmer & Ottenbreit-Leftwich (2010) have highlighted the potential of technology to enhance student engagement, facilitate differentiated instruction, and extend learning beyond the classroom. The COVID-19 pandemic further accelerated this trend, forcing rapid adoption of digital tools by educators regardless of their prior experience (Trust & Whalen, 2020).

Tondeur et al (2017) explained that non-tech-savvy educators face multiple challenges when integrating technology into their teaching. Many educators feel intimidated by the complexity of new technologies. Some educators demonstrate resistance due to fear of failure, lack of perceived usefulness, or comfort with traditional methods (Howard, 2013).

This resistance can be intensified by age-related factors, where older educators may be less exposed to or trained in digital tools.

Unfortunately, non tech-savvy educators frequently have inadequate digital literacy, making it difficult for them to successfully incorporate technology into their lessons (Alfina et al., 2024; Nurul Farhanah & Rohaiza Rokis, 2024). This findings has been mentioned too by Rahim et al. (2023) as many teachers were not proficient in creating interactive digital content or using even the most basic learning management systems. Furthermore, professional development frequently falls short of meeting the practical needs of instructors who are not tech-savvy, and training opportunities are not always distributed fairly.

Meanwhile, Sahin et al. (2022) mentioned although some institutions provided training, it was frequently too general or theoretical to address the actual difficulties faced by educators in the classroom. Non-tech savvy educators also often experience anxiety or fear of failure when using unfamiliar technology. One of the issue addressed by educators found in Lee and Chow (2023), educators expressed concerns over making mistakes in front of students or losing classroom control due to tech failures.

Some educators also frequently lack time to explore the technology, and this is seen as a major obstacle. Preparing tech-based materials or learning new tools outside regular teaching hours also will add to their workload (Hamzah et al., 2024). Consequently, non-tech savvy teachers often revert to traditional methods.

Work Ethics as The Motivation

Motivation is an important factor to drive a person to practice work ethics and value in any work setting. Work ethics determine how a person approaches their daily tasks in view of the fact that they have passion and enjoy their work. The passion they have will bring them to high productivity and quality. Therefore, a strong work ethic will motivate a person to explore better chances to upskill themselves including searching for a new knowledge in delivering their job including educators.

In psychology there are two types of motivation; which are intrinsic and extrinsic. According to Lisa Legault (2016), intrinsic motivation (IM) refers to engagement in behavior that is inherently satisfying or enjoyable such interest, enjoyment, and inherent satisfaction. Meanwhile, extrinsic motivation (EM) refers to performance of behavior that is fundamentally contingent upon the attainment of an outcome that is separable from the action itself for example, instrumental motivation and noninherent motivation. Motivators such as money or satisfaction can produce intrinsic and extrinsic motivation due to the fact that they generate desire for the consequence of the activity. In the case of educators with non-technology background, the motivation bring them to seek knowledge in AI tools, can derived from intrinsic motivation (such as acknoweldgement of the presence of IWE) or extrinsic motivation (institutional support).

Damian (2021) study work ethic is connected on the one hand with autonomous motivation, including intrinsic motivation, and on the other hand with extrinsic motivation, with the striving for success, which is the result of work. After empirical verification the findings could become a base for training programs and shape the way of influencing people's motivation, morale, attitude towards work and job satisfaction. It shows a person with strong

ethics committed to continuous self-improvement and actively seeks opportunities to upskill as they believe the outcome of the work.

Personal Branding and Islamic Work Ethics

Abun et al. (2022) investigated how work ethics affect employee performance. The results showed that elements like moral perspective, intrinsic drive, and work attitude have a big impact on task performance and lessen unproductive behaviours. This highlights how important moral work attitudes are to improving overall job performance. Rahim et al. (2024), work ethics have a favourable impact on work commitment in the context of Malaysian service organisations. According to the study, workers who have high ethical standards are more likely to be more dedicated to their companies, which is mediated by more drive at work.

A recent study looked at the connection between job performance, work ethic, and intrinsic motivation in the manufacturing sector. Strong work ethics boost intrinsic motivation, which in turn improves job performance, according to the study's findings. This finding is especially pertinent to high-risk industries where efficiency and safety depend heavily on ethical behaviour and motivation. This shows that work ethics can be used as a tool to motivate educators that have non-technology background to learn more about AI and can use AI as tools for teaching purposes.

As IWE focuses on four important components, which are effort, competition, transparency, and morally responsible conduct (Ali, 1988), this study intend to analyze the gap which may falls to the study as many existing study on Islamic work ethics (IWE) uses quantitative study instead of qualitative study and different substance of fields, such as banking and economic (Abdul Shukor, Abdul Wahid, Mohamad Ghozali & Nor Azmi, 2010; Azharsyah & Nor ‘Azzah, 2013; Ali, 1988; Ali & Al-Kazemi, 2007; Ali & Al-Owaihan, 2008), instead of education.

Methodology

This research used qualitative research method to inquire in-depth understanding on the awareness of educators on IWE and their inspiration to implement it despite of the challenges they have, focusing on the needs in implementing AI in their teaching and learning pedagogies. Six educators coming from different private university institutions were interviewed in investigating the importance of IWE. All participants were non-technology background educators as this study intended to analyze the spirit of IWE as a motivator in urging educators to learn AI. The participants ranging from mid-30-s to 50s and have more than four years of experience in teaching at higher education institution. These criteria were set to investigate their experience through out the transformation of including technologies (such as AI) in teaching and learning pedagogies in comparison to the period before Covid-19 hit us. The findings were analyzed manually using thematic analysis. Using six phases of procedures suggested by Braune & Clarke (2006), this study managed to get few important key points reflecting to the research objectives presented in the Introduction earlier.

Results And Discussions

This research focuses on six non-technology background educators for application of AI in teaching and learning. By using qualitative method, in-depth interview session was conducted to analyze the findings for three research objectives mentioned. Using thematic analysis focusing on educator's opination on AI tools, the importance of Islamic work ethics and the motivation to use AI in teaching and learning are the focus for this research.

(i) Educators' opinion and knowledge on AI tools

All participants in this research agreed that coming from non-technology background should not be the reason why they could not self-equipped themselves with the AI application. Hence, even though they have limited knowledge in AI tools and application, all participants are aware about their level of knowledge in this context. All participants highlighted their own level of knowledge in AI in their own words, with the concern of time constraint and limited access to the knowledge of AI.

Camelia who shared her experience in teaching, mentioned that she used to write her teaching-contents on the white board. However, she needs to change her teaching pedagogies when Covid-19 came and requires educators to utilize the online tools. Camelia, who have been teaching for 8 years was struggling to utilize the online tools due to her limited knowledge in AI tools and application.

> *I know that we cannot reject AI usage in our students' assignment, hence, I must **embrace** it. However, I must admit that my knowledge on AI is very **limited**.*

However, Camelia also agrees that there is no way for her to against online application tools, rather to embrace the tools available. For Camelia, it is important for educators to embrace the transformation and get along with the changes we have currently.

The same feedback given by Aisya, who also have 8 years of experiences in teaching. However, due to her work-constraint, she needs to figure out possible ways in expanding their knowledge in AI tools and application.

> *AI is important these days, so, I need **to learn** too on how to use AI in my teaching and learning. Unfortunately, due to time constraint because of high teaching workload, I always have **problem** to catch up the latest update on AI tools. For example, if students already know how to utilize Canva within few second, it took me few days to understand this thing (laugh).*

Danial, who has been teaching for 25 years, mentioned that his limited knowledge is not the only problem he is facing to self-equipped himself with AI tools and application in teaching and learning, rather the feeling of non-technology savvy educator like him felt overwhelmed most of the time because they need to utilize AI in their teaching and learning pedagogies.

> *Earlier, I only thought that AI can help me to facilitate the teaching and learning, through games, but now it's **beyond** that. I can actually use it for automated grading, getting data-driven insights, helping me with materials formulation… but,*

> *everything requires me to learn and I am very **bad at technology** (laugh). I wish I can learn things quickly, so that I can enhance my teaching pedagogies.*

Based on this feedback, this research identifies that with the limited knowledge that the educators may have on AI application in teaching and learning pedagogies, they are fully aware that AI utilization is important in this field these days. However, the challenges that they may face while acquiring their knowledge in AI may delay their process of learning these AI tools to be implemented in their teaching and learning pedagogies. For instance, Aisya highlighted her constraint on her high teaching workloads, while Danial admitted his non-technical savvy has caused them to have dilemma in self-equipping themselves with AI knowledge. As a result, for these findings, this study focuses on the second research objectives, which is to identify the importance of Islamic ethics in motivating educators to enhance their knowledge in AI tools.

(ii) The importance of Islamic work ethics in motivating educators to search for new knowledge (AI)

When universities were expected to implement different method of teaching and learning, such as online and hybrid learning, the incoming tool from generative AI has also creates some concern among the educators, especially on AI's misuse among the educators and students in their education setting.

> *We cannot avoid using these AI tools, but my concern is **dishonesty**. Not only among the students who may completing their assignments using ChatGPT, but also among the lecturer, I mean… those days we crack our head to create our own questions… now, you just prompting (laugh).*

This feedback has been given by Danial, from his observation among the young educators that he met. Admitting that he is not good in utilising tools like the young educators, he shared his concern on ethical consideration that educators must kept in this profession.

> *Work ethics is very important because I see myself as the **model** for my students. So, if we ourselves did not portray a good one, then, what do you expect from the students? (frown face). Wherever you go, your work ethics must be good. Hence, all staff, I mean… educators, practice and preserve your work ethics. The acknowledgment, the presence, we are the one who have to do it.*

Danial also added that if a worker is aware about work ethics:

> *They should know what they have to do. It is not about putting **effort,** it is about amount of **amanah** (responsibility) that you have with you. Same goes to AI too, I know I know nothing about this, but, I have to learn. Effort to learn is part of work ethics.*

This feedback has also been agreed by Erman, who experienced in teaching for four years. New in the industry but have little knowledge in AI because his majoring is in social sciences, that does not hinder him from learning AI tools.

> *With the changes we have at this moment**, work ethics** seems to be a motivation for me to do good, to be good to myself, my work, my students and my organization. Yes, in the first place, I worked for my KPI, now, I am more focusing on my **self-career** improvements. Hence, any trainings provided by my university, I will just attend it if I am free. Willing to learn is part of work ethics that I stand for.*

The same connotations have been mentioned by Batrisya, who were in the education field for eight years and been trusted with multiple roles of position instead of lecturer only.

> *I think knowing what you need to do is important as part of our work ethics. **Self-improvement** is part of the work ethics which will driven my work ethics. If I am being calculative, I will not go for the headship, like being the Head of Department (laugh)… we have a lot of things to do as a lecturer… but, since I know every position carries its responsibility, then, why not… but, must do it accordingly… and that is where ethics comes in (smile).*

Through this feedback under this section, this study found that all participants are aware about the importance of the implementation on work ethics. The same keywords on "responsibility", "career-development" has been repeated by the participants to show the presence of work ethics while they are fulfilling their job and responsibilities as an educator. Not only that, but even though key performance index also (KPI) has always been the indicator for workers to complete their tasks, it is not the main focus among the educators as they are indeed needed to enhance their knowledge in different areas when it is necessary. In the discussion of AI, even though many institutions did not make it compulsory to use AI in teaching and learning, however educators are expected to improve their knowledge on this.

(iii) Motivation to include AI in teaching and learning: institutional support & personal satisfaction

Apart from work ethics and its implementation, this study intend to search for the motivation in learning AI for their teaching and learning pedagogies. This section highlighted two findings which are personal satisfaction and support system.

(a) Personal satisfaction

Being an educator requiring them to meeting students most of the time. Juggling their own tsks, such as teaching, consulting, supervising, they also need to make sure they pick up new knowledge, such as AI application and tools. Be that as it may, it is not easy for those people who are non-tech savvy. Difficulties such as lack of motivation and fixed mindset is the biggest hurdles need to be taken out by the educators in embracing AI. This study found that one of the important motivations in learning AI even though they are the non-tech background educator, is the passion in their profession.

> ***Positive feedback** from students, especially when they understand what we teach, they value our effort to use new teaching and learning methods, like putting some games in my slides, seeing they enjoy it… I am more than happy.*

Batrisya responded that students' feedback is one of the key motivations for her to stay in this career. Even though the pathways is changing these days, receiving positive feedback from the students is part of the motivation among the educators. This feedback also given by Camelia, who is in the industry for more than four years. "Appreciation" is the word that she used in defining the factors which motivating her to spend time in learning the AI tools and application.

> *My students **appreciate** my efforts, my presence… they did that all the time.*

Danial, in his feedback, not only addressing his effort in teaching and learning, rather he again highlighted the word of responsibility (*amanah*) and worship (ibadah) as part of his personal satisfaction in doing works.

> *I value my profession as part of **ibadah**… if we are expected to add more value, add more effort to our teaching and learning, we should do it, right?*

From all connotations, this study found that personal satisfaction, includes receiving students' feedback, appreciation by the students, the value of Amanah and ibadah, has become the key points explained under personal satisfaction which driven the educators to sacrifice their time and add more effort in improving their teaching and learning pedagogies. With the limited knowledge and time they might face, these factors are important in upskilling their knowledge and skills, and at the same time improving their pedagogies in their profession.

(b) Support system

As many professions suggest, the main thing in work must comes with passion, external support is also important to making employees stay at any organizations. In education field, since many were expected to change their pedagogies, support system is a must-provided value need to be offered to the employees. In this study, the non-tech background lecturer shared their experiences where three of them, who came from the same institution were not provided to any trainings by the organizations. Educators were expected to learn by themselves when world first hit by Covid-19 and everyone needs to change their teaching and learning platforms into online settings.

> *It was **so tough** that time… I know nothing… Zoom? Google Meet? I know nothing, for real.. then… we received circular saying that we can use any of the platform to teach our students… (laugh) I was… eh… if I want to recall back, I am happy I am still here, surviving (laugh).*

Danial, from one private institutions share his experience, when no support system been provided to the staff in utilizing the tools. He also added that for one year and half, there is no standardize rules outlined by the management, but to make sure the classes is executed as been scheduled. Hence, the word "confused", "uncertain" and "stress" were used in his feedback on no support system provided for that period. Erman, who is also teaching from the same university as Danial, also shared the same experience.

> *I just begin my career, Covid-19 hit us. I was having hard time to do my classes. When I asked my colleagues, they are also **struggling**… to recall back, it was very*

> *bad because **no clear instruction** given. The platform listed like GoogleMeet or Zoom are the available platform to conduct our class. But, there is limited time to use it. For example, Zoom only work for 45 minutes… so, after that, I have to set new class at Zoom. That is our own initiative to figure out the solutions (sigh).*

Accordingly, through this feedback, this study found it is crucial for institution to provide support system, such as trainings and trainers to be available when new things were expected to be implemented by the educators at that time. The inaccessible of support system caused many educators having stress and burn out due to the feeling of incapable and worthless in their career journey.

Unlike Danial and Erman, Hawa, Aisya and Batrisya mentioned that they received institution support when they need to implement online learning. Simple and clear instruction, standardize platform and trainers to guide them (on-the-spot technical support through hotline number was provided to the educators if they have any problems while conducting their classes. These three participants came from two different institutions but provided with support system. Hence, it helps in motivating them to fulfil the career expectations given by the university management and the stakeholders, parents and students. Hawa stated the support system provided by the management was crucial and helps her to conduct her lesson from home. Despite of challenges such as wifi connection issues, she was happy to receive immediate feedback when it is necessary through hotline number provided by the management to the lecturer if in case, they are having issues while conducting their classes.

> *Support provided by the management, such as **hotline number**, really helps me at that time. Simple things like I do not know how to upload slides etc, seems to be very easy to IT people, but, not me (non-tech background lecturer). Thinking of that alone makes me stay. Why? Because my friends from other university was struggling badly that time (laugh). We were in our whatsapp group, so, with the assistance I get from my university, I shared it to my friends. They said I am blessed to have this organization…*

Aisya, in her sharing mentioned about the support system she received was online classes such as tutorial to implement or using the online tools.

> ***Free online courses** were provided to us by the management. It is online and recorded classes, we can actually check it.*

Meanwhile Batrisya was mentioning about new team or department was set up by the university to provide more assistance, such as trainers and trainings in making sure the educators can conduct their classes accordingly and manage to include the element of games in teaching and learning pedagogies because the management emphasized on engagement with students in online class.

> *The university set up **Research & Development Team**... We learned Kahoot, for example, and we can use university account because they bought for us in our teaching and learning session.*

The outcome from this section highlights the importance of institutional support in motivating educators to implement any changes in teaching pedagogies. As mentioned earlier, the AI application can be easy for high-tech background educators but it creates difficulties to the non-tech savvy educators.

Discussion

All educators intend to bring values to education. However, the rapid transformation of technology in education has brought significant changes in teaching and learning pedagogies.

With different exposures, experiences and study background, expectations to adapt technologies in education has caused stress to some educators, especially to those non-tech background lecturers. This issue could be happening due to many reasons, mainly to the willingness in embracing new pedagogies will administering their profession as an educator. Adeboye (2025) mentioned reluctant to learn something new, especially involving mindset, myth, such as “technology will make us all lazy”, and absence of motivation, often seen as the main caused leads to hesitation in learning technological tools.

Knowing the fact that there are challenges too happening between the emergence of AI tools, this study intended to observe the importance of IWE in driving the motivation of educators in learning the AI tools, for teaching and learning pedagogies. It has been found that positive correlation between IWE and motivation to learn and apply AI despite of hurdles they might face as a non-tech background educators. Hence, this study highlights the importance of Islamic work ethics and its awareness among the educators. The consciousness in IWE implementation will stimulate more initiatives among the educators in enhancing their pedagogies of teaching and learning.

As the influence of external motivation such as personal satisfaction and institutional support is important, this study suggests more consistent and practical training provided to the educators to be effectively engage and updated with the recent information. Peer mentoring programs as suggested by Adeboye (2025) seems to be one of the effective wat to support the non-tech savvy colleagues. By mentoring processes, mentors with more tech-savvy knowledge can foster more collaborative learning environment in integrating technology in this field of profession.

Conclusion

The AI application is a continuous discussion which always requires educators to enhance their knowledge in technology. In this study which focusing on non-technology background educators, it should not be the reason for not implementing AI or Generative AI in teaching and learning pedagogies. This transformation, however, requires motivation to educators to enhance their pedagogies of teaching and learning. External motivation such as personal satisfaction and institutional support can be wight as important in delivering the approach of the new learning era. However, this study emphasizes more on the implementation of Islamic work ethics in projecting their career as an educator. The highlights of self-driven motivation will only be possible if each employee are aware and fulfil their work ethics while working. The Choon Jin (2024) found that despite of the challenges faced by the non-tech savvy background lecturer, the educators themselves must always observe their duties

and priorities their personal development too (Nurul Farhanah & Rohaiza, 2024). As a conclusion, this study found that apart from the personal satisfaction and support system provided by the institution, the spirit of upskilling their knowledge and practices must first come from the individual, through how strong their work ethics is as a professional worker.

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BRIDGING ILMU AND AMAL: A MULTIDISCIPLINARY APPROACH TO NARROWING THE GAP BETWEEN LEARNING AND DOING IN LEADERSHIP DEVELOPMENT

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Abstract *: Leadership development often faces a persistent challenge: the gap between what is learned (ilmu) and what is applied (amal). This paper addresses the need for a transformative approach that ensures knowledge translates into behavior change and impactful action. Drawing from educational psychology, McKinsey's Influence Model, the Creative Center for Leadership's strategies, and Islamic teachings, we propose a framework for embedding deep learning and sustained behavioral change in leadership programs.*

Introduction

The acquisition of knowledge alone is insufficient if it does not lead to meaningful action. Prof. Robert Brinkerhoff emphasized, "Learning only adds value when it is transferred to the job and applied in ways that improve performance." Jean Barbazette and Hughes & Jones similarly highlight the importance of transferring knowledge into workplace action. This echoes a core principle in Islamic teachings — that ilmu (knowledge) without amal (action) is incomplete. As stated in the Qur'an:

"O you who have believed, why do you say what you do not do? It is most hateful to Allah that you say what you do not do."
(Surah As-Saff, 61:2-3)

This paper investigates how we can move from knowing to doing, using a combination of modern psychological models, leadership education practices, and Islamic values.

1. Educational Psychology and the Transfer of Learning

Educational psychologists such as Baldwin & Ford (1988) propose that learning transfer depends on three factors: trainee characteristics, training design, and the work environment. Will Thalheimer adds that "learning transfer is the single most important goal of learning," urging us to design learning experiences that are retained and used in practice.

The Creative Center for Leadership emphasizes the use of experiential learning and reflective practice as mechanisms to embed learning. Kolb's Experiential Learning Cycle — concrete experience, reflective observation, abstract conceptualization, and active experimentation — supports this approach.

2. Mckinsey's Influence Model: Changing Mindsets And Behaviors

McKinsey's Influence Model outlines four key conditions to achieve sustainable behavioral change:

1. Fostering Understanding and Conviction

People need to know why the change matters. In leadership development, this involves aligning personal purpose with leadership actions. In Islamic thought, intention (niyyah) is central. The Prophet Muhammad (PBUH) said:
"Actions are judged by intentions, and every person will be rewarded according to their intention."
(Sahih Bukhari & Muslim)

2. Role Modeling

Leaders must model the behaviors they expect of others. This mirrors the Prophetic tradition of leading by example (uswatun hasanah):
"Indeed in the Messenger of Allah you have an excellent example…"
(Surah Al-Ahzab, 33:21)

3. Reinforcing with Formal Mechanisms

Structures, rewards, and systems must support the desired behavior. Baldwin & Ford stress the need for an enabling work environment. Islamic scholars similarly argue that systems of justice and accountability are necessary for ethical leadership.

4. Developing Skills and Confidence

Training must build the capacity to act. The Prophet (PBUH) trained his companions not only in faith but also in leadership, negotiation, governance, and administration.

3. The Ilmu-Amal Gap: An Islamic Perspective

The Qur'an warns against the hypocrisy of knowledge without action. Islamic scholars like Al-Ghazali cautioned that 'ilm without practice leads to spiritual stagnation. He wrote:

"Knowledge without action is insanity, and action without knowledge is vanity."
(Al-Ghazali, Ihya Ulum ad-Din)

Bridging ilmu and amal requires alignment of inner conviction, behavioral reinforcement, and social responsibility. Leadership training must cultivate not just cognitive knowledge, but also ethical grounding and practical skills.

4. Case Application: Leadership Skills Program

A leadership program designed with the McKinsey Influence Model and Islamic principles incorporates:
• Experiential learning through simulations and real-world challenges.
• Reflective journaling tied to verses of the Qur'an and leadership values.
• Role modeling by mentors grounded in Islamic ethics.

• Accountability mechanisms including peer coaching and performance tracking.

Initial findings show that participants who engaged in structured practice, received timely feedback, and reflected on their spiritual purpose exhibited greater alignment between ilmu and amal.

Conclusion

Narrowing the gap between learning and doing requires more than knowledge dissemination. It demands intentional design rooted in behavioral science and moral philosophy. McKinsey's Influence Model provides a robust scaffold, while Islamic teachings offer a spiritually rich and ethical compass. By uniting educational psychology, leadership theory, and Islamic worldview, we can cultivate leaders who not only know what is right — but who do what is right.

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UTILIZATION OF WASTE TYRES AND ENGINE OIL FOR BITUMEN MODIFICATION

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Abstract: *Bitumen is a material that is widely used in the construction of roads. The production of which is unsustainable as crude oil reserves deplete waste tires (WT) and improper storage of waste engineoil (WEO) can have negative environmental effects and health effects, respectively. Particularly inthe Jalan Matang and Jalan Malihah-Matang where the high number of workshops contribute to the production of a high number of WEO and WTs. However, the mishandling of these waste substances is unjustified since these materials can become a gateway to the sustainable productionof Modified Bitumen. Thus, this work aims to study the physical properties, chemical properties, and the Fourier Transform Infrared (FTIR) spectra of the samples of modified bitumen produced from an increase in the ratio of WT to WEO that has been sourced from the previously mentioned Jalan Matang and Jalan Malihah-Matang areas. This is since the real estate required for the storage of WTs is very cumbersome to acquire. Through this work, it is found that, as the ratio of WT to WEO increases, the FTIR spectra becomes more like that of bitumen. Additionally, the sample with the highest ratio of WT to WEO, Sample 3, exhibits similar characteristics to that of bitumen due to its coloration which is significantly darker and difficult to dissolve clear in paintthinner. From this study, it is found that, when more WT is added into the formulation of modified bitumen, the sample produced exhibit bitumen-like properties, which can be further enhanced fromthe addition of more WT. Which can solve the issue of WTs plaguing the environment.*

Keywords: *Bitumen, Waste Engine Oil (WEO), Waste Tire (WT), Modified Bitumen*

1.0 Introduction

Bitumen is a material widely used for the construction of roads and runways. Although bitumen itself is known to be easily renewable, bitumen originates from crude oil, which is an unrenewable resource that is limited by nature. In 2021, the price of crude oil peaked at 81.78 USD per barrel. Simultaneously, the production of oil in Malaysia fell from 672kbd in 2019 to 573kbd in 2021, leading to the decreased consumption of oil in the country from 868kbd in 2019 to 763kbd in 2021 [1]. The construction output of the country from 2019 to 2021 has been fluctuating and is forecasted to decrease as the crude oil prices are forecast to increase in the coming year [2]. This is alarming, as the population of Malaysia is forecasted reach 35 million by the year 2027 [3], possibly stunting the growth of the nation pre-maturely due to decreasing residential real estate. Which is possibly further hampered by the difficulty of accessing vast areas of land such as in Sarawak due to the lack of road infrastructure [4].

In a post-COVID 19 Malaysia, people will seek to renew their tires and lubrication. Which translates to an increase in the volume of spent petrochemical products, such as waste tires (WT) and waste engine oil (WEO), from vehicle workshops. Which is more significant in

places with a high number of vehicle workshops such as *Jalan Matang* and *Jalan Malihah-Matang*. This high number of WT and WEO is alarming since WTs and WEO are known to be harmful to the environment and human health, which are the source of carcinogens materials as reported by U. Obini and J Afiukwa [4]. One of the possible solutions for the use of WEO and WT is through recycling process as bitumen and to incorporate it into bitumen for improvement of the quality of road constructions.

In this work will be focused on the formulation of WT and WEO mixture for produced bitumen and comparing their physical properties. The analysis of physicochemical properties of synthesized bitumen is conducted by Fourier transform infrared will be described briefly in this paper.

2.0 Methodology

2.1 Materials

The main materials will be used in synthesized bitumen:

- Waste engine oil and waste tires were supplied locally from vehicle workshops in Matang Area
- Aluminum oxide
- Isopropyl Alcohol

2.2 Apparatus and Equipment

- Fume hood
- Beaker
- Hotplate with magnetic stirrer and thermometer
- Analytical balance
- Box cutter
- Heavy-duty scissors
- Tea strainer
- Tweezers
- Spatula

2.3 Preparation Technique

The motorcycle tires had been abandoned for an unknown period, with its threads worn out. Using a box cutter, the tires were cut into large rubber chips that still contain fabric but had their metal content removed as the tires were cut into chips as demonstrated in Figure 1(a). Through trial and error, it was determined that heavy duty scissors were best suited for the task of further cutting the rubber chips into the desired size of less than 2.5mm as presented in Figure 1(b). Finally, the strips were cut into crumbs that were less than 2.5 mm with the use of heavy-duty scissors. The size of the crumbs was determined by placing the crumbs onto a paper sheet with a grid size of 5mm as illustrated in Figure 1(c).

For the WEO, the crackle test is conducted for hydration confirmation. The test was conducted with a hot plate at temperature around 160°C, then with the use of a dropper, a drop of oil is placed onto the hot plate as illustrated in Figure 2 and the drop is observed for sizzling or popping sound. No popping sound indicates the hydration of oil is equivalent

zero or can be neglected. Besides, the filtration of WEO by tea strainer is conducted as illustrated in Figure 3 to ensure the WEO no solid present in samples.

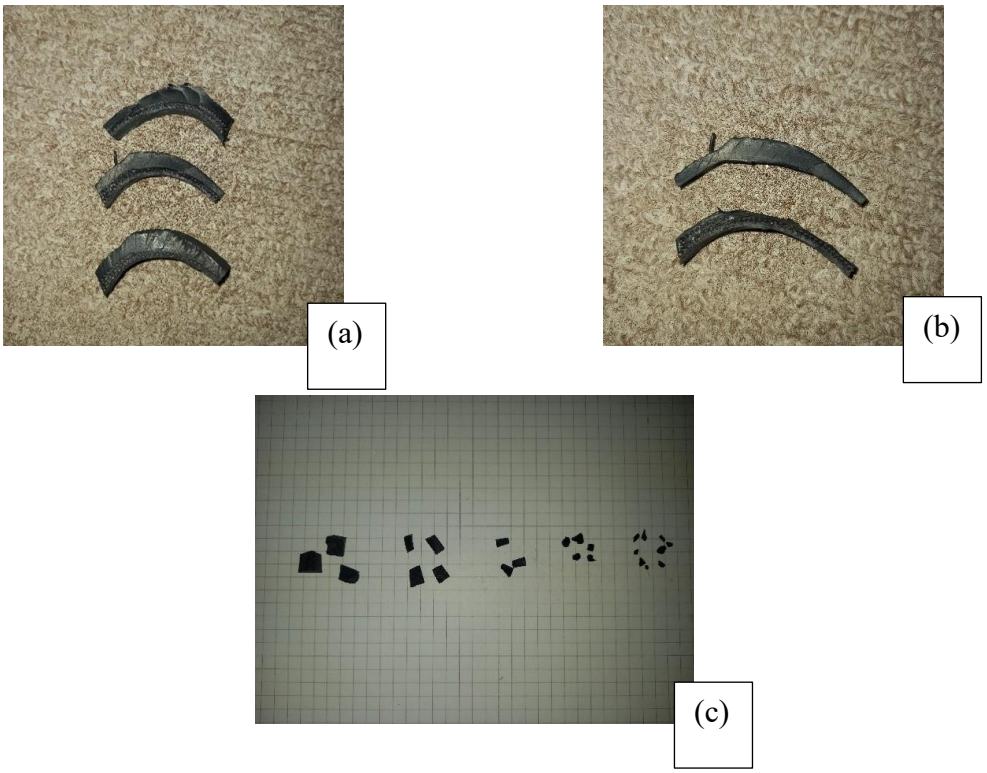


Figure 1 Recycle rubber from waste tires



Figure 2 Crackle test on WEO

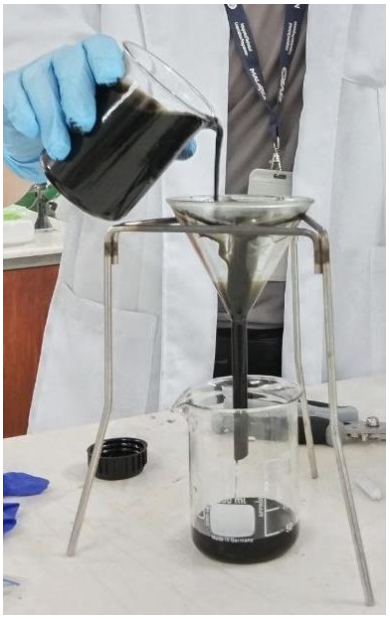


Figure 3 Filtration of WEO by tea strainer

3.2 Formulation of Samples

The composition of WT, WEO, and aluminum oxide is tabulated in Table 1 and the procedure of mixing process bitumen preparation also presented in Figure 4.

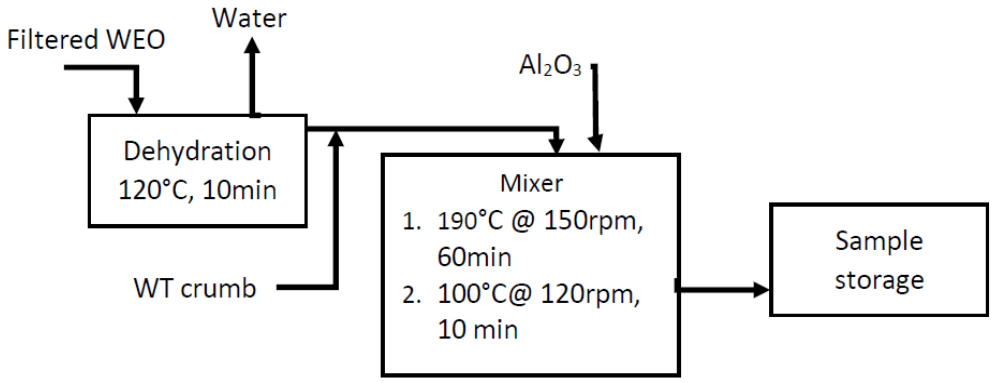


Figure 4 Mixing process of WEO and WT as bitumen preparation

Table 1: Formulation of bitumen from WT and WEO

Sample	WEO (g)	WT (g)	Al2O3 (g)
1	45	5	17
2	45	10	17
3	45	35	17

First 45g of filtered WEO is poured into a 250mL beaker. The beaker is placed onto a hot plate in a fume hood at 120°C until the oil starts to vaporize to ensure that WEO is completely dryand typically lasts 10 minutes. Once WEO begins to vaporize, a measured amount of WT and 1.7g of Al2O3 are added intothe 250mL beaker. Simultaneously, the mixer is started at 150rpm and then heated 190°C for 60 minutes in the fume hood. What results is a non-homogenous mixture of WEO and WT grounds with grey solid residue at the bottom of the beaker. Then the steps are repeated for Sample 2 and Sample 3.

3.3 Solubility Test

For stability test, a drop of the sample and 25ml of paint thinner is added into a beaker and stirred. The dissolution of the drop of sample is observed. A homogeneous liquid indicates good solubility of synthesized bitumen.

3.4 Specific Gravity Test

For specific gravity, record weight of 100ml sample as W_1. Then pour it into 250ml beaker filled with distilled water and record their weight as W_2. Then, record weight of 25ml sample

as W_3 and poured the sample into 250ml beaker and filled with distilled water as well as recorded their weight as W_w. Use the formulation below for specific gravity.

$$Specific\ Gravity, G = \frac{(W_2 - W_1)}{(W_w - W_1) - (W_3 - W_2)}$$

3.5 FTIR Spectroscopy

A drop of the sample is placed onto the crystal using a spatula and the spectra of the sample is recorded through the Micro Lab application. The surface of the crystal is then cleaned with isopropyl alcohol and further sanitized with thinner to ensure the complete absence of the previous sample.

4.0 Result & Discussion

4.1 Surface Observations

Once all three samples have been formulated, all three samples exhibited a similar smell to that of burnt rubber. Sample 1 exhibited a color that was black with hints of brown. Sample 2 displayed a color like Sample 1 with a less intense brown coloration. Sample 3 was purely black in color with no hints of brown color as presented in Figure 5.



Sample 1 Sample 2 Sample 3

Figure 5: Color of samples

4.2 Solubility Test

For the solubility test, all three samples dissolved completely in 25mL of paint thinner with slight agitation required from spatula. The dissolution of Sample 1 and Sample 2 produced a clear brown liquid with white floating residue. Sample 3 produced a black liquid with no residue presentas presented in Figure 6. The floating white residue may have been caused by a salt precipitation reaction caused by the detergents present within the WEO and impurities of the paint thinner.

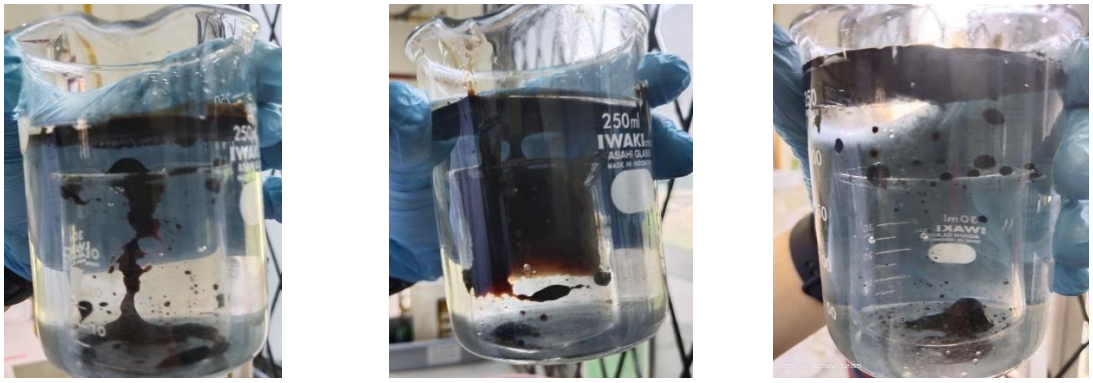


Sample 1 Sample 2 Sample 3

Figure 6: Samples dissolved in paint thinner

4.3 Specific Gravity Test

Each sample was found to be lighter than water. This is since, as presented in Figure 7, all three samples float in water once immersed and the specific gravity is tabulated in Table 2. The cause of this can be attributed to the nature of bitumen used, since this is reclaimed from a higher fraction of crude oil, the specific gravity of thesubstance is inherently lighter as M. Zahedi, [5], points out. Thus, the result of the Specific Gravitytest was inconclusive.



Sample 1 Sample 2 Sample 3

Figure 7: Samples floating in distilled water

Table 2: Specific gravity of samples

Sample	W_w (g)	W_1 (g)	W_2 (g)	W_3 (g)	Specific Gravity
Standard bitumen	302.6	98.60	158.80	304.95	1.040
1	395	27.3	33.5	N/A	N/A

2	395	27.3	34.7	N/A	N/A
3	395	27.3	37.9	N/A	N/A

4.4 Physical Properties

It is found that sample 3 exhibits properties like N. Kamoto et al., [6], findings whereheir accepted sample, Sample 2, is of a pure black color as tabulated in Table 3. Furthermore, the precipitate found within the dissolution of the samples may have been caused by a precipitation reaction from the WEO additives, which the Noria Corporation, attributes to detergents and dispersants [7]. This study wasunable to conclusively determine the specific gravity the samples produced, which may be due to the nature of bitumen, as M. Zahedi, [5], suggests that standard bitumen can range from 0.97 to 1.02. Since this study uses reclaimed waste from a higher fraction of crude oil, the specific gravityis expected to be much lighter.Table 3: Physical properties of samples with comparison from N. Kamoto et al., [6]

Sample	Solubility	SG	Colour
Comparison sample from [10]	N\A	1.089	Pure Black
1	Yes	N/A	Brown, black
2	Yes	N/A	Black, slight brown
3	Yes	N/A	Pure Black

4.5 FTIR Analysis

The spectra FTIR profile all samples presented in Figure 8. In all three samples, where aliphatic (983 – 925 cm^{-1}) and aromatics (896-839 cm^{-1}) is supposed to be present, is likewise present in all cases. Additionally, the range in which hydroxy (3400-3400 cm^{-1}) and carboxy (1730-1670 cm^{-1}) compounds are not supposed to be present, are dulynot in all three samples as reported by S. Weigel et al. [8].

However, in all three samples, the range aromatics compound (1637-1547 cm^{-1}) is supposed not detected in spectra profile. Besides, the spectra of all three samples vary to a small extent at 1000 to 960 cm^{-1}, where indicates the present of sulfoxide compounds and the broadening peak slightly increases from sample1 to sample 3. Sample 2 and 3 display very similar spectra and only differ in the amount of sulfoxide detected.

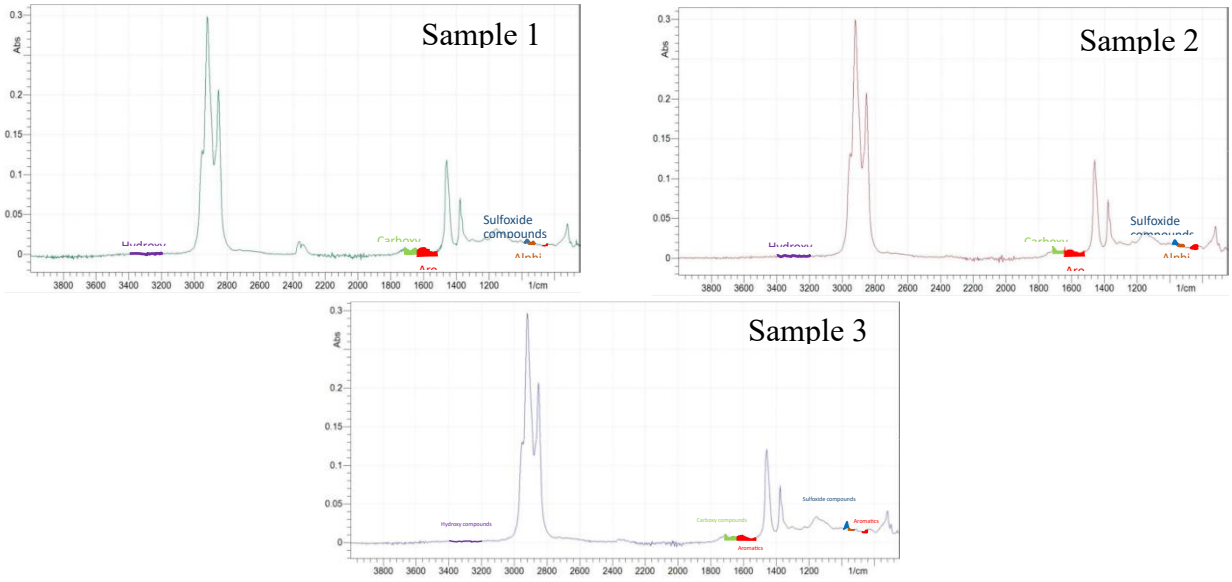


Figure 8 FTIR Spectra of synthesized sample

From the FTIR spectra in Figure 8, sample 1 bears a resemblance to that of WEO. And thus, can be determined to still be WEO and not modified bitumen. Additionally, in all three spectra, it should be noted that the presence of sulfoxide compounds is the most prominent in Sample 3. S. Weigel et al. [15] have concluded that this finding may relate to the characteristic of pure bitumen and attributed to the present of WT [8]. This is as, The Encyclopedia Britannica states that rubber is known to be vulcanized using sulfur[9].

The absence of aromatics (1637-1547cm^{-1}) can be attributed to the reaction of the WEO additives with said aromatics as the Noria Corporation suggests, engine oil additives include but are not limited to, detergents, dispersants, biocides, and rust inhibitors which, are either catalytic orpolar in nature [7]. These chemicals may have interfered with the concentration of aromatics thatare supposed to be present within the sample.

5.0 Conclusion

It can be concluded that this work was successfully able to determine the effect of altering WTs when formulating modified bitumen. This is, as the weight of WT increases, the sample of modified bitumen produced will exhibit more bitumen-like properties. Although all three samples were found to be lighter than water. Sample 3 exhibits, the bestbitumen-like properties, due to its high concentration of sulfoxide compounds and its pure black color after formulation and its dark coloration when dissolved in paint thinner.

However, this work was unsuccessful in determining the effects of increasing WTs, in terms of physical properties, accurately. This is since specific gravity was inconclusive and no quantitative data was able to be obtained. Even so, through the FTIR spectroscopy, there is a clearincrease of sulfoxide compounds present as the weight WT is increased during formulation. Thus, it is recommended that future studies employ the use of calcium oxide to better formulate samples. Since, the aluminum oxide may have been far too inadequate as catalystfor the melting of WT crumbs in WEO. That said, it is also recommended to formulate more volumeper sample to conduct a viscosity test, to better verify the quality of the produced sample. Additionally, further grounding of WT is recommended as the WT

may not have been of adequate size. Lastly it is recommended to devise a method of filtering suspended solids that are present in WEO. This is since the unfiltered solids, although small, may have been abundant enough to have been able to interfere with the melting of WT crumbs.

Acknowledgement

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CONTINUOUS QUALITY IMPROVEMENT USING BOOST IN BALANCE IN MASS AND ENERGY BALANCE COURSE

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Abstract : *POLITEKNIK KUCHING SARAWAK (PKS), established in 1988 under the then Ministry of Higher Education, was the fifth polytechnic founded in Malaysia. It was created to meet the demand for a skilled workforce and to strengthen the competitiveness of Malaysia's petrochemical industries. The Diploma in Polytechnic Education program in Malaysia is designed to provide a balanced emphasis on both theoretical knowledge and practical skills. Education in polytechnics is based on Outcome-Based Education (OBE). The continuous quality improvement* **(***CQI) process is a condition that must be established in every academic program offered. CQI can be implemented and demonstrated by providing a complete report with valid data resulting from the analysis of performance achievements. Based on the Course Outcome Review Report (CORR) for DG30132 Mass and Energy Balance in Session II 2022/2023, the performance in CLO1C has shown stagnation and, at times, a significant decline. To overcome this problem, an interactive education tool which is Boost in Balance has been used during lecture. In conclusion, the percentage of students who passed the final examination showed a positive improvement by using this education tool as a teaching and learning method.*

Keywords: *Mass and Energy Balance, Education tools, CQI, OBE5*

1.0 Introduction

The diploma-level polytechnic education program in Malaysia is structured to ensure a well-balanced integration of theoretical knowledge and practical skills. This educational framework adopts the Outcome-Based Education (OBE) approach, emphasizing measurable learning outcomes. As part of quality assurance, the Continuous Quality Improvement (CQI) process is embedded within each academic program. Its implementation and effectiveness are demonstrated through comprehensive reports supported by valid performance data.

The Department of Petrochemical Engineering (JKPK) at Polytechnic Kuching Sarawak offers the Diploma in Process Engineering (Petrochemical), a program closely aligned with the needs of the petroleum and petrochemical industries, which are rapidly evolving. The department operates under the leadership of a Head of Department, supported by a Head of Programme.

JKPK's academic team comprises lecturers from diverse educational backgrounds, including Chemical Engineering, Electrical Engineering, Mechanical & Plant Engineering, and Chemistry. The department also includes a technician who provides essential technical support. To ensure the program remains relevant in the face of fast-paced technological changes and industry demands, the Department of Polytechnic Education has collaborated

with major industry stakeholders to develop the competency standards for the Diploma in Process Engineering (Petrochemical). This partnership is aimed at equipping students with current knowledge, practical skills, and the right attitudes to succeed in a global and competitive industrial environment. At Polytechnic Kuching Sarawak, the Diploma in Process Engineering (Petrochemical) is one such program designed to meet industry needs. Established in 2011 by the Petrochemical Engineering Department, the program spans three years, with the first cohort graduating in 2014. It provides students with a solid foundation in technical knowledge and practical skills, particularly tailored to the petroleum and petrochemical sectors.

This program equips students with specialized knowledge in process engineering, focusing on the petrochemical industry, enabling them to pursue diverse careers in the field. Graduates are well-prepared for roles such as:

- Assistant Engineer
- Process Technician
- Process Supervisor
- General Technician

The curriculum is designed to prepare students for technical roles involving the operation, management, and maintenance of petrochemical facilities. One of the core courses in the program, Mass and Energy Balance, introduces students to the fundamentals of material and energy balances within chemical process systems. The course emphasizes conceptual understanding and problem-solving skills necessary for analysing and solving real-world chemical process challenges.

The Diploma in Process Engineering (Petrochemical) programme is designed to produce well-rounded graduates equipped with both theoretical knowledge and practical skills in process engineering, in response to the growing demand for skilled professionals in the engineering sector. The curriculum emphasizes key areas such as Mass and Energy Balance, Chemistry, Thermodynamics, Mechanical Plant Equipment, Heat and Mass Transfer, Fluid Mechanics, Separation Processes, Process Control, Instrumentation and Electrical Systems, Process Design, and Reactor Technology.

This three-year programme has been offered by the Department of Petrochemical Engineering at Polytechnic Kuching Sarawak since 2011, with the first cohort graduating in 2014. It is delivered in both Malay and English. The programme received full accreditation from the Malaysian Qualifications Agency (MQA) in December 2012, valid until 2018. In 2019, it further achieved accreditation from the Engineering Technology Accreditation Council (ETAC), ensuring its continued recognition and quality in engineering education.

2.0 Outcome Based Education (OBE)

Outcome-Based Education (OBE) is an educational framework designed to ensure that students can demonstrate the knowledge, skills, and competencies required to meet specific outcomes. This student-centered approach prioritizes the learning process and outcomes over traditional teaching methods. It begins by clearly defining what students should know,

what they should be able to do, and which attitudes and values they should develop. These goals guide the design of the curriculum, teaching strategies, and assessment methods to maximize meaningful learning.

OBE requires a restructuring of both curriculum and assessment practices to emphasize the achievement of higher-order thinking skills and mastery of content. It empowers students by making them aware of their learning objectives, helping them monitor their progress, and encouraging them to take control of their learning journey. As a result, students are more likely to achieve academic success.

Additionally, OBE promotes well-prepared teaching practices and offers students purposeful and engaging learning experiences. It fosters the development of originality, self-motivation, and independence, while equipping them with essential knowledge and practical skills for real-world application.

3.0 Engineering Technology Accreditation Council (ETAC)

The **Board of Engineers Malaysia (BEM)** is responsible for registering Inspectors of Works, Engineering Technologists, Graduate Engineers, and Professional Engineers under the **Registration of Engineers Act 1967 (Revised 2015)**. As part of its mandate, BEM ensures that the educational programs producing engineers, engineering technologists, and engineering technicians/inspectors of works meet quality standards that are aligned with global practices.

To uphold these standards, it is essential to accredit engineering, engineering technology, and engineering technician education programs offered by institutions. The **Engineering Technology Accreditation Council (ETAC)** is the body appointed by BEM to oversee the accreditation of engineering technology and engineering technician qualifications. ETAC comprises representatives from BEM, relevant professional societies, ministries, government agencies, industry employers of engineering technologists and technicians in Malaysia, as well as members of the public. This **Standard** outlines the criteria for accrediting engineering technician education programs in Malaysia. It is intended to guide Institutions of Higher Learning (IHLs) in meeting the minimum accreditation requirements for both existing and newly proposed programs. The Standard incorporates outcome-based elements to promote a **Continual Quality Improvement (CQI)** culture, in line with the principles of **Outcome-Based Education (OBE)**.

4.0 Course Outcome Review Report (CORR)

Based on the Course Outcome Review Report (CORR), student performance in CLO1 (Course Learning Outcome 1) for Session 2 2022/2023 in the course DGP30132 - Mass and Energy Balance indicates a decline in the pass percentage, with CLO1C achievement reaching only 73%.

This suggests that students may have encountered challenges in mastering the fundamental concepts of mass and energy balance, which are crucial for understanding the conversion of unit.

To address this issue, it is recommended to implement the following strategies:

- **Enhanced Tutorial Sessions**: Conduct additional tutorial sessions focusing on problem-solving techniques related to mass and energy balance calculations
- **Interactive Learning Tools**: Incorporate simulation software and interactive modules to provide students with practical applications of theoretical concepts.
- **Continuous Assessment**: Implement regular quizzes and assignments to monitor student progress and provide timely feedback.
- **Peer Study Groups**: Encourage the formation of study groups to facilitate peer-to-peer learning and discussion.

By adopting these measures, it is anticipated that student comprehension and performance in CLO1 will improve in subsequent sessions.

5.0 Continuous Quality Improvement (CQI)

Continuous quality improvement (CQI) is an important element in quality management. This is because CQI is a key factor in improving the quality of education and ensuring that improvements in teaching and learning activities are continuously implemented. [1]

5.0 Education Tools (Online Tools)

To enhance student satisfaction and promote active learning, an interactive educational tool named **Boost in Balance** has been implemented during lectures. This tool comprises a suite of teaching aids and online platforms designed to foster student engagement and participation.

Boost in Balance integrates various interactive elements such as quizzes, simulations, and collaborative exercises, which have been shown to significantly improve student engagement and motivation. By incorporating gamified components and providing real-time feedback, these tools transform traditional learning into an immersive experience, encouraging students to actively participate and take ownership of their educational journey.

Moreover, the use of such interactive tools aligns with active learning strategies, which emphasize student involvement in the learning process through activities like group discussions, problem-solving, and hands-on exercises. These approaches not only enhance understanding and retention of information but also develop critical thinking and collaboration skills among students.

In summary, the adoption of **Boost in Balance** serves as an effective measure to address challenges in student engagement by providing an interactive and student-cantered learning environment that supports active participation and improved learning outcomes.

6.0 Methodology

6.1 Research Design

A mixed-methods approach will be used to assess the impact of Boost in Balance on student engagement, satisfaction, and learning outcomes. This design combines both quantitative and qualitative data to provide a comprehensive understanding of the tool's effectiveness.

6.2 Participants

The study will involve 37 students of DPE3A students from session II 2022/2023 and 72 students from session 1 2023/2024 enrolled in the course where Boost in Balance has been implemented. Students will be selected through purposive sampling, focusing on those who have actively used the tool during lectures.

6.3 Data Collection Methods

A. Quantitative Methods

- Pre- and Post-Implementation Surveys: Administer standardized questionnaires before and after using Boost in Balance to assess changes in:
  - Student engagement
  - Satisfaction with learning
  - Perceived learning effectiveness
- Student Performance Data:
  - Compare performance metrics (quiz scores, assignment results, and final grades) before and after tool implementation.
  - Analyze Course Learning Outcome (CLO) attainment rates.
- System Analytics:
  - Collect usage data from the Boost in Balance platform (e.g., participation rates in quizzes, time spent on simulations, completion of collaborative tasks).

B. Qualitative Methods

- Focus Group Discussions (FGDs):
  - Conduct group interviews with students to explore their experiences, perceived benefits, and suggestions for improvement.
- Instructor Reflections:
  - Collect feedback from lecturers on the tool's integration, student response, and observed changes in classroom dynamics.
- Classroom Observations:
  - Use structured observation checklists to evaluate real-time student engagement during sessions utilizing Boost in Balance.

6.4. Data Analysis

- Quantitative Data:
  - Descriptive statistics (mean, standard deviation) and inferential statistics (paired t-tests) to evaluate differences in engagement and performance pre- and post-implementation.
  - CLO achievement comparison through trend analysis of Course Outcome Review Report (CORR) of Session II: 2022/2023 and Session I: 2023/2024 involve total 109 students.
- Qualitative Data:
  - Thematic analysis of interview and observation data to identify recurring themes related to engagement, learning experience, and tool effectiveness.

7.0 Discussion

Table 1.0 The comparison of Course Outcome Review Report (CORR) of Session II: 2022/2023 and Session I: 2023/2024

Course learning outcome	Session II: 2022/2023 (37 students)	Session I: 2023/2024 (72 students)
All CLOs	43.2%	81.94%
CLO1	73.0%	87.5%
CLO2	43.2%	88.9%
CLO3	100%	100%

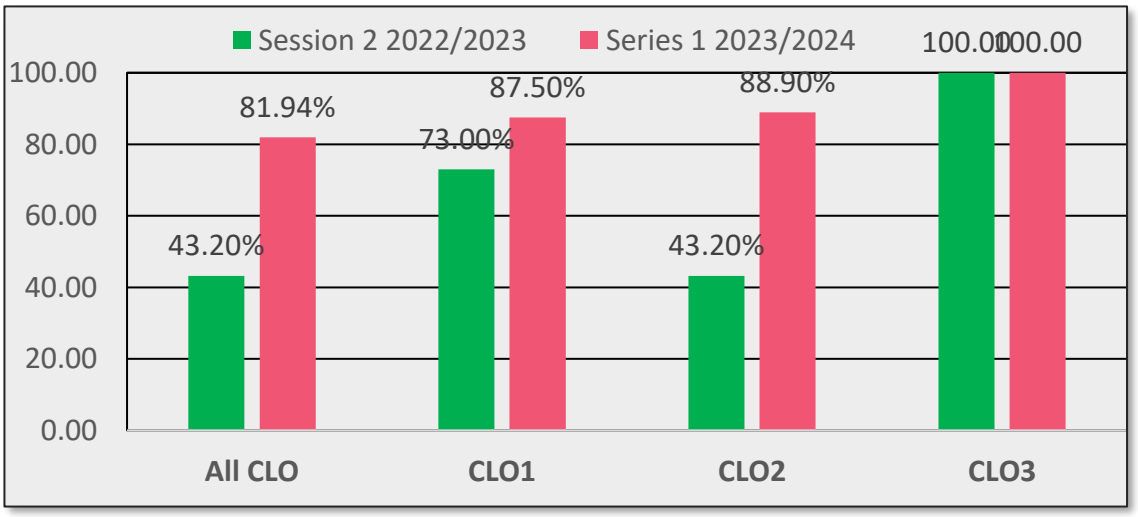


Figure 1.0 The graph comparison of Course Outcome Review Report (CORR) of Session II: 2022/2023 and Session I: 2023/2024

The comparative analysis of the Course Outcome Review Report (CORR) between Session II: 2022/2023 and Session I: 2023/2024 indicates a substantial improvement in students' attainment of the Course Learning Outcomes (CLOs).

Overall, CLO achievement increased significantly from 43.2% in Session II: 2022/2023 to 81.94% in Session I: 2023/2024. This remarkable growth suggests effective interventions were implemented between the two sessions, potentially including enhanced teaching strategies, improved assessment methods, or increased student engagement and support.

CLO1, which evaluates students' understanding of fundamental course concepts, rose from 73.0% to 87.5%. This moderate improvement reflects consistent performance and a successful effort to strengthen foundational knowledge among students.

CLO2 exhibited the most significant increase, leaping from 43.2% in Session II: 2022/2023 to 88.9% in Session I: 2023/2024. This dramatic improvement implies that challenges faced in the earlier session were effectively addressed, possibly through revised instructional approaches, additional learning materials, or targeted remedial sessions.

CLO3 maintained a perfect achievement rate of 100% across both sessions, indicating consistent and effective delivery of the outcomes related to this learning objective. This also suggests that students consistently meet the expectations for CLO3 regardless of sessional changes.

7.0 Conclusion

The comparison highlights substantial progress in achieving course learning outcomes, particularly in CLO2. The findings reinforce the effectiveness of recent pedagogical enhancements and underscore the importance of continuous review and adaptation in curriculum delivery. In conclusion, the percentage of students who passed the final examination showed a positive improvement by using this education tool as a teaching and learning method.

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PERKEMBANGAN SEJARAH DAN SENI BINA JOHOR BAHRU MELALUI PENDEKATAN MORFOLOGI

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Abstrak: *Antara elemen utama dalam menonjolkan identiti sesebuah bandar ialah melalui bangunan warisan dengan menterjemahkan sejarah dan tradisi cara hidup masyarakat terdahulu. Bangunan warisan seringkali dijadikan sebagai satu tarikan pelancongan terutamanya jika bandar tersebut menempatkan bangunan warisan yang berskala besar seperti di Georgetown dan Melaka. Sehubungan dengan itu bagi mempergiatkan aktiviti seperti ini, latar belakang bandar tersebut perlu memainkan peranan dalam usaha untuk menonjolkan objek pelancongan warisan. Atas dasar tersebut, kajian ini akan memperkembangkan skop kajian dengan melihat sejarah perkembangan bandar Johor Bahru dengan menggunakan pendekatan morfologi bandar. Jadi, objektif kajian ini adalah untuk memahami perkembangan Johor Bahru melalui pendekatan morfologi dan mengenalpasti bangunan yang dikategorikan bersejarah masih kekal serta mampu dijadikan tarikan pelancongan atau tidak. Metodologi yang akan digunakan dengan menggunakan kaedah temuduga, kajian rintis dan pengumpulan dokumentasi sedia ada dari pelbagai sumber dan seterusnya akan menghasilkan penemuan yang boleh dirujuk pada peringkat seterusnya. Hasil dari kajian ini diharap agar membantu pihak lain dalam menyediakan sistem maklumat setempat bangunan warisan terutamanaya dalam membantu menyediakan pelan pelancongan Johor.*

Kata Kunci: *Bangunan Warisan, Sejarah Johor, Morfologi Bandar, Johor Bahru*

Pengenalan

Setiap bandar memiliki jalinan ruang masa yang menggambarkan latar belakang sejarah dimana setiap sudut bandar mengandungi kisah-kisah lama dan ia akan disokong dengan struktur seni bina warisan yang menjadi saksi pembangunan di sekitarnya. Dari sudut epistemologi, warisan ditakrifkan sebagai harta pusaka yang diwarisi secara turun temurun dalam sesebuah masyarakat. Pada masa kini, objek bangunan warisan sering dijadikan sebagai pemangkin dalam mempelbagaikan sebarang aktiviti yang boleh menarik minat pelancong. Namun bangunan warisan ini terlebih dahulu perlu melalui proses pemuliharaan supaya ianya dari terus kekal utuh.

Di kawasan kajian yang dipilih iaitu bandar Johor Bahru, melalui rancangan pembangunan Johor Bahru *Transformation Plan* oleh Majlis Bandaraya Johor Bahru yang berhasrat menjadikan pusat bandar Johor Bahru sebagai kawasan warisan dan tempat berkumpulnya aset warisan dan budaya (Keng Khoon, 2020). Melalui pelan pembangunan yang telah digariskan ini, agensi seperti MBJB, Yayasan Warisan Johor, IRDA, *Thinkcity* dan badan NGO telah menganjurkan pelbagai aktiviti yang berteraskan pelancongan warisan. Antaranya seperti sambutan 100 tahun pembinaan Tambak Johor yang dijalankan sekitar

May 2024 dianjurkan oleh Persatuan Arkitek Malaysia (PAM), salah satu aktiviti ialah perlumbaan (*explorace*) yang memerlukan peserta membuat tugasan di lokasi tempat atau bangunan yang memberi signifikan sejarah pada bandar Johor Bahru. Di sini dapat dilihat terdapat keperluan untuk menyediakan kepelbagaian lokasi berasaskan bangunan warisan. Sehubungan dengan itu bagi memperkenalkan bandar ini sebagai sebahagian dari produk pelancongan yang mempunyai nilai sejarah, latar belakang Johor Bahru perlu memainkan peranan utama. Atas dasar tersebut, kajian ini akan memperkembangkan skop kajian dengan melihat sejarah perkembangan bandar Johor Bahru dengan menggunakan pendekatan morfologi bandar.

Penyelidikan berkonsepkan morfologi bandar menjadi pilihan kerana ia akan mengupas dua persoalan asas iaitu ‘di mana’ dan ‘mengapa’ sesebuah bandar itu wujud di samping ia juga mempunyai faktor geografikal dalam pembentukan bandar (Hofmeister, 2004). Melalui pendekatan morfologi bandar ini, kita dapat melihat perkembangan bandar dari sudut sejarah di sesetengah kawasan tersebut sama ada ianya berskala kecil atau besar dan seterusnya mengenalpasti kedudukan bangunan warisan yang berpotensi untuk dijadikan sebagai produk pelancongan.

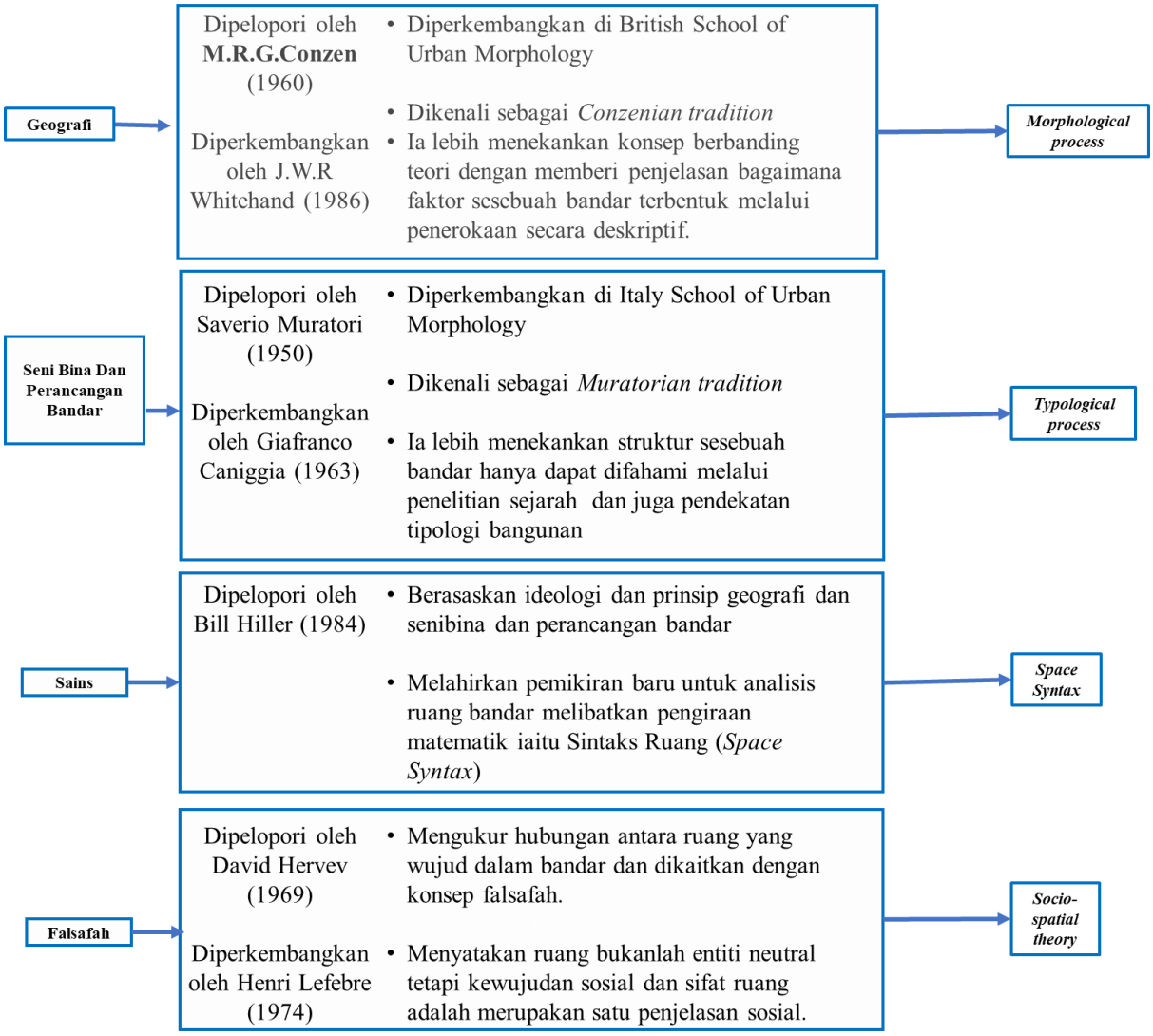
Metodologi Kajian

Objektif kajian digariskan dalam memberi panduan dalam menjalankan penyelidikan ini. Ia sepertimana yang dinyatakan berikut; Memahami perkembangan Johor Bahru dari sudut sejarah melalui pendekatan morfologi bandar dan; Mengenalpasti bangunan warisan yang masih kekal dan berpotensi dijadikan pelancongan. Bagi mencapai objektif pertama, metodologi kualitatif akan digunakan dalam memperolehi maklumat dari golongan sejarawan, penduduk yang tinggal kawasan petempatan lama, serta dari pegawai yang bertanggungjawab menjaga hal ehwal sejarah. Selain itu, data juga dikumpul dengan menggunakan data sekunder iaitu melalui penceritaan sejarah dari buku dan penulisan serta arkib sejarah. Dalam konteks menjalankan analisis pemetaan sejarah Johor, gambar-gambar lama amat membantu dalam memahami perkembangan sejarah pada zaman tersebut. Bagi mencapai objektif kedua pula, kaedah kualitatif akan digunakan dimana langkah pertama yang dijalankan adalah dengan mengumpulkan maklumat seni bina warisan yang ada dari pelbagai pihak. Hasil metadata yang diperolehi akan dinilai dan ditapis dengan mengambilkira beberapa faktor fungsi asal dan fungsi semasa bangunan tersebut. Seterusnya, kajian rintis dijalankan dalam mengenalpasti keadaan semasa seni bina tersebut di samping turut melihat potensinya sebagai objek pelancongan.

Penyelidikan ini dijalankan di Johor Bahru memandangkan ia merupakan pusat pemerintahan Johor sejak 1865 lagi dan memiliki sejarah yang unik jika dibandingkan dengan bandar Melayu lain yang telah wujud sekian lama. Dari segi lokasi, Johor Bahru mempunyai kedudukan yang strategik di mana ia merupakan pintu masuk utama dari arah selatan melalui Singapura. Dalam merangka sebarang konsep pentadbiran dan pengurusan warisan sesuatu tempat, sistem pentadbiran yang berbeza menjadi faktor penghalang utama dalam menterjemahkan pelaksanaan inisiatif dan pelan pembangunan yang dicadangkan (Paulino, Lozano, & Prats, 2021).

Kajian Literatur

Kertas kerja ini terlebih dahulu perlu memahami maksud sebenar morfologi dan bagaimana ia diperkembangkan melalui beberapa pengkaji yang telah menghasilkan analisis perbandaran. Secara dasarnya, bagi memahami struktur fizikal dan ruang (*spatial*) sesebuah bandar, ia perlu dianalisa melalui proses formasi dan transformasi asas teori rekabentuk bandar seperti kaedah morfologi di mana ia adalah salah satu cabang penyelidikan telah banyak digunakan sejak 1960-an lagi. Menurut Mosharraf (2023) ilmu morfologi ini dipelopori oleh M.R.G Conzen pada tahun 1960 dengan memperkenalkan kaedah *morphogenetic* bagi memahami, menguruskan dan menganalisis landskap bandar. Jadi dalam konteks kajian ini morfologi bandar ditafsirkan sebagai sebuah kajian dalam melihat perkembangan sebuah bandar dari sudut transformasi dengan melihat struktur fizikal pembangunan seperti bangunan, infrastruktur dan elemen topografi seperti bukit dan sungai.



Rajah 1.1 : Ganeologi kajian dalam morfologi bandar

Sumber: Diadaptasi dari Nor, Harun, and Mohamed (2017) dan Mosharraf (2023).

Berdasarkan rajah 2.1 di atas, dapat difahami bahawasanya pendekatan morfologi ini pada asalnya dimulakan dalam oleh Conzen pada 1960 dan diperkembangkan pada empat cabang utama penyelidikan iaitu geografi, seni bina dan pelancongan, sains dan falsafah. Apa yang menarik, ideologi ini diperkembangan melalui dua negara di Eropah dengan kefahaman yang berbeza iaitu di British ianya lebih menjurus kepada konsep geografi, manakala di Itali ianya lebih kepada konsep seni bina dan perancang bandar. Namun, bermula 1984, Bill Hiller mula menggabungkan dua pemahaman ini dari sudut sains dan ianya berkembang menjadi *space syntax*. Manakala dari sudut falsafah, pendekatan morfologi ini turut diketengahkan sebagai *socio-spatial theory*. Secara kesimpulannya, terdapat perbezaan pendekatan yang digunakan iaitu geografi dan senibina perancangan lebih bersifat sejarah and deskriptif tentang pembentukan bandar dan tipologi bangunan. Manakala melalui pendekatan *space syntax*, lebih menggunakan analisis kuantitatif yang memberi tumpuan pada hubungan spatial bandar melalui pengiran saintifik. Pendekatan falsafah pula menekankan bahawa ruang mencerminkan hubungan sosial dan kuasa.

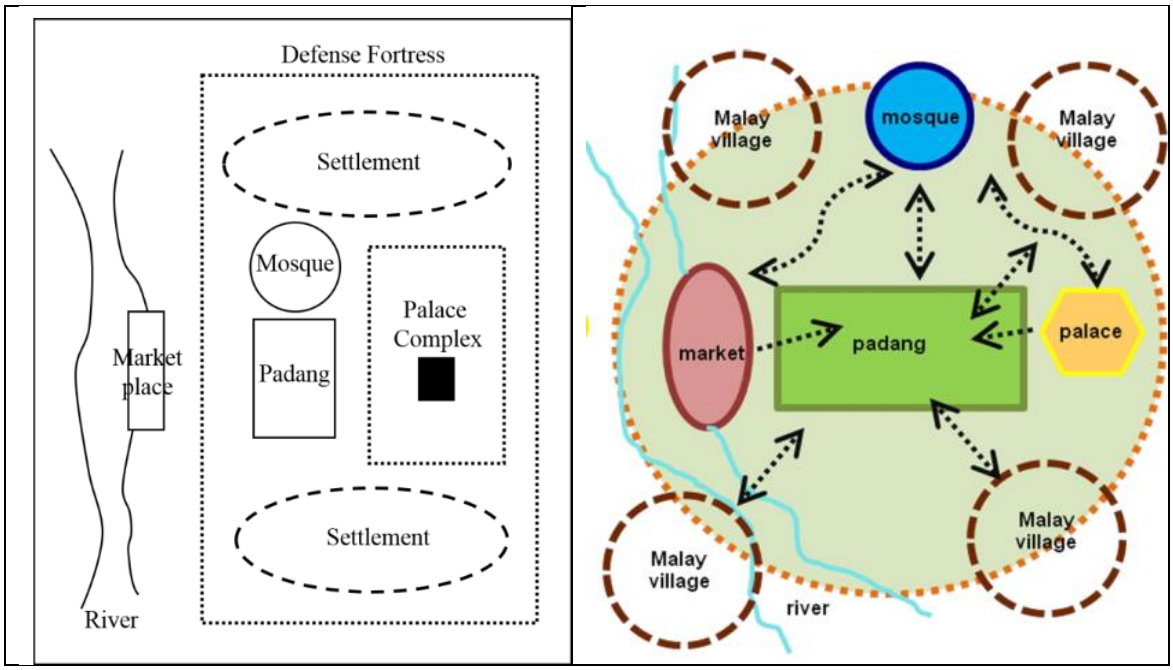
Elemen Morfologi

Setiap bandar mempunyai karektor atau sifat yang tersendiri yang terhasil dari gabungan topografi dan alam binaan, geologi, bahan binaan tradisional serta jenis laluan yang akan mencerminkan identiti bandar tersebut (Norberg-Schulz, 1988). Rupa bentuk bandar perlu difahami melalui tiga fundamental elemen fizikal iaitu bangunan (termasuk kawasan *pocket area*, plot tanah dan bentuk jalan. Ia akan lebih lebih jelas jika dikaji dari aspek sejarah memandangkan objek seperti bangunan akan mengalami transformasi atau proses penggantian rupa bentuk (Scheer, 2015). Manakala (Moudon, 1997) menyatakan morfologi boleh dibentuk oleh empat fizikal yang utama iaitu bangunan, jalan, plot dan ruang terbuka (*open space*). Sementara itu, (Mohamed, 2018) berpendapat terdapat tiga elemen utama dalam morfologi iaitu; i) Elemen struktur bandar; ii) Elemen spatial (ruang); iii) Elemen *townscape* (rupabentuk bandar). Secara keseluruhan, elemen morfologi bandar dapat difahami dengan mengambikira gabungan elemen fizikal iaitu bangunan, jaringan jalanraya dan juga plot ruang terbuka. Hasil dari dapatan elemen yang boleh diterapkan dalam morfologi ini ia mampu menghasilkan kerangka teori dan konseptual dalam menghasilkan inventori perubahan morfologi bandar yang dijadikan asas dalam perancangan pemuliharaan bandar warisan. Pendekatan morfologi bandar juga perlu menggunakan kepelbagaian elemen mengikut disiplin kajian serta pengkaji juga perlu kreatif dalam untuk mengintegrasikan kefahaman morfologi. Namun bagitu, elemen yang akan digunakan haruslah bersesuaian dengan tempat kajian dan juga perkembangan sejarahnya.

Elemen Morfologi Bandar Tradisional

Setelah melihat pemahaman mengenai pendekatan kaedah morfologi dari luar negara, kita akan meninjau pendekatan kajian perbandaran di Malaysia berkaitan dengan bandar lama Melayu. Bandar Melayu tradisional adalah merujuk kepada bandar yang dibina atau diteroka oleh Kesultanan Melayu (Ossen, Idid, & Abidin, 2010). Ia disokong oleh (Shukri, Wahab, & Jamala, 2021) di mana bandar Melayu tradisional diformasi berdasarkan kepakaran dan pengaruh kesultanan terhadap masyarakat setempat. Istilah ini juga boleh merujuk pada bandar kesultanan Melayu di mana susunatur pembentukan bandar tidak dipengaruhi oleh dasar pembangunan penjajah. Antara bandar yang dikategorikan sebagai

bandar Melayu tradisional ialah iaitu Alor Setar, Klang, Seri Menanti, Kuala Terengganu dan Kota Bharu (Azemi, 2013).



Rajah 1.2 : Model Bandar Melayu Tradisional Yang Yang Merujuk Elemen Bandar Melayu Lama Mempunyai Persamaan Dari Segi Kedudukan Kompleks Istana, Padang, Masjid Dan Pasar.

Sumber (Shukri, Wahab, & Jamala, 2021) kiri dan (Ossen, Idid, & Abidin, 2010) kanan

Menurut Abd Aziz, Bahaluddin, and Mansor (2012) yang mengkaji ruang sosial yang dijadikan tumpuan aktiviti kemasyarakatan pada pekan melayu lama, elemen seperti seperti jalan, kawasan lapang berbentuk linear, ruang semi-nodal dan ruang nodal yang ada di kawasan tersebut menjadi ruang interaksi sosial bagi masyarakat setempat. Ruang sosial ini seterusnya boleh menghasilkan strategi seperti memelihara aktiviti guna bangunan yang menonjolkan ciri kebudayaan disokong dengan menonjolkan elemen landskap perbandaran. Menurut Ossen et al. (2010), antara elemen yang dijadikan panduan ialah dengan melihat kedudukan istana, masjid, padang, pasar dan kampung. Sementara itu, melalui Shukri et al. (2021) menyatakan petempatan bandar Melayu adalah bergantung pada kedudukan sungai dan pada kebiasannya mempunyai tembok sebagai kubu pertahanan. Ini dapat disimpulkan bahawa bandar melayu tradisional mampu mencerminkan identiti konsep perbandaran yang tersendiri melalui gabungan unsur institusi kesultanan, ruang sosial yang berpusat pada pusat pentadbiran (istana) dan diadaptasi elemen geografi serta keperluan pertahanan. Namun, terdapat juga kelemahan kajian dari hasil sintesis ini iaitu kajian yang dijalankan lebih menumpukan ciri bandar melayu tradisional secara berasingan tetapi kurang perbandingan sistematik dengan bandar kolonial seperti evolusi dan susunatur bandar.

Morfologi Bandar Johor Bahru

Mengambilkira pendekatan yang diperkenalkan M.R.G Conzen dan Saverio Muratoni yang menekankan aspek sejarah serta tipologi bangunan dan seterusnya dengan menggabungkan kefahaman yang diperolehi dari pendekatan elemen bandar tradisional yang menekankan aspek kesultanan melayu, pemahaman mengenai perkembangan bandaraya Johor Bahru

dapat diperolehi dengan melihat sejarah awal kewujudan bandar ini dari sudut pemerintahan kesultanan, perkembangan ekonomi dan petempatannya.

Sejarah Johor Bahru

Bagi mendapat kefahaman mengenai perkembangan bandar Johor Bahru, ianya harus bermula pada pemerintahan Temenggung Daeng Ibrahim. Pada awalnya kerajaan Johor meliputi kawasan pentadbiran yang luas merangkumi Negeri Johor, Singapura dan Riau-Lingga. Pada waktu ini, sistem pentadbiran kerajaan Riau-Lingga -Johor telah terbahagi kepada kawasan Riau-Lingga dibawah pemerintahan Sultan, Temasik/ Singapura pula dibawah pentadbiran Temenggung manakala Pahang diletakkan dibawah pentadbiran Bendahara (Basri & Haron, 1978). Seterusnya setelah kematian Sultan Mahmud Shah III pada tahun 1812 yang tidak menamakan pengganti, terdapat konflik takhta berlaku ditambah dengan campur tangan penjajah, ianya membawa kepada Singapura telah jatuh ke tangan British dan Riau-Lingga jatuh kepada kepada Belanda melalui perjanjian Anglo-Dutch pada tahun 1824 (Puteri, 2018). Pada tahun 1855, di bawah pemerintahan Temenggung Daeng Ibrahim, pihak British tidak senang Teluk Belanga dijadikan pusat kerajaan Negeri Selat, maka Temenggung Ibrahim menyeberang ke Kuala Sungai Segget dan mendarat di tebing kanan bukit Tanjung Puteri dan mengisytiharkan kawasan tersebut sebagai ‘ Bandar Iskandar Puteri’. Seterusnya kerja-kerja merintis dan membina bandar Iskandar Puteri dijalankan hasil usaha bersama beberapa orang tokoh pembesar Johor, antaranya Encik Abdullah bin Mohd Tahir dan Dato’ Jaafar bin Mohammad, Menteri Besar Johor yang pertama (Thukiman, 2011).

Setelah kemangkatan Temenggung Ibrahim pada 1862, puteranya Temenggung Abu Bakar dan seterusnya menggunakan gelaran Sultan Abu Bakar secara rasminya memindahkan pusat pentadbiran dari Teluk Belanga ke Iskandar Puteri. (M. A. Abdullah, 2012). Di bawah pentadbiran DYMM Sultan Abu Bakar, beliau dinobatkan sebagai “Bapa Johor Moden” kerana berjaya mengasaskan sistem pentadbiran moden yang cekap. Apa yang menarik, ketika negeri lain di Semenanjung Tanah Melayu sedang bergelut dengan menghalang perebakan kuasa British, Sultan Abu Bakar berjaya melentur perluasan kuasa British tersebut dengan menjalinkan satu interaksi yang harmoni sehingga akhirnya memberikan impak yang positif kepada kerajaan Johor sendiri (Muhammad & Alezender, 2023).

Perkembangan Pembangunan Johor Bahru

Sistem Kangchu dan Tambak Johor memainkan peranan besar dalam perkembangan bandar Johor Bahru. Sejarah awal pelaksanaan sistem Kangchu tidak dapat diketahui. Tetapi, berdasarkan rekod menunjukkan sistem Surat Sungai ini telah mula dijalankan di Johor sejak tahun 1844, di Riau pada abad ke 18 dan di Singapura awal abad ke 19 dan seterusnya berkembang ke Johor. Dalam sistem kangchu, peneroka Cina yang ingin mengusahakan penanaman gambir dan lada hitam akan menerima surat kebenaran dari pemerintah Johor yang dinamakan “Surat Sungai” dan ditandatangani oleh Sultan Johor (Huen, 2000). Pelaksanaan sistem ekonomi pertanian komersial ini menyebabkan jumlah penduduk Cina di Johor bertambah secara mendadak apabila seramai 97 orang Kangchu mengendalikan 97 buah ladang gambir dan lada hitam (Lim, 2000). Namun, perkembangan ekonomi Johor yang bergantung dengan perladangan gambir dan lada hitam tidak dapat bertahan lama apabila kegemilangannya mula merosot pada awal abad ke 20 dan ketika itu juga munculnya sistem perladangan getah secara besar-besaran yang menimbulkan ancaman pada

perladangan sistem Kangchu (Syakir, 2021). Walau bagaimanapun, dalam konteks perkembangan pembangunan Johor Bahru, sistem Kangchu ini turut menjadi faktor dalam perkembangan pentadbiran pembandaran, pengangkutan, keselamatan dan pengurusan harta tanah.

Selain sistem kangchu, Selat Tebrau juga memainkan peranan besar dalam perkebangan Johor Bahru kerana ianya merupakan satu-satunya pemisah antara negeri Johor dan Singapura. Syarikat perkhidmatan feri Sungai Segget telah menguruskan pelabuhan Sungai Segget di antara suku tahun ketiga abad 1800-an dan apabila peningkatan trafik semakin tinggi, British mula berhasrat membina tambak antara Johor Bahru dan Woodlands. Kerja pembinaan Tambak Johor disiapkan dalam masa empat tahun bermula 1919 (Samsudin, 2022). Tambak Johor telah dibuka dengan rasmi oleh Sir Laurence Guillemard pada tahun 1924 seterusnya menjadikan perhubungan antara Johor Bahru dan Singapura menjadi lebih mudah dan dekat. Panjang tambak ini berukuran 1065 meter dan terdapat dua landasan keretapi serta jalanraya serta sebuah pembentung air di bahagian hujung untuk menyekat sampah sarap. Sewaktu perang dunia kedua meletus, perhubungan antara Johor Bahru dan Singapura telah terputus apabila bahagian '*tow bridge'* diletupkan. Namun, setelah mencapai kemerdekaan, cadangan penubuhan pusat kastam dan imigresen dilaksanakan bagi menjaga sempada kedua-dua buah negara.

Petempatan Awal Johor Bahru

Kebanjiran pelbagai kaum yang datang ke Johor Bahru bermula ketika pentadbiran Sultan Abu Bakar dan Sultan Ibrahim, di mana pada waktu itu baginda telah mewujudkan konsep masyarakat secara muafakat. Sultan Ibrahim telah mengizinkan setiap kaum membina rumah ibadah masing-masing bagi menunjukkan mereka tinggal di Johor Bahru tanpa mendapat halangan dari pemerintah. Antara rumah ibadah yang dibina pada waktu itu ialah :-

1. Masjid India Dato' Ahmad Awang yang dibina oleh jemaah India Muslim di Johor Bahru. Ia dibina pada tahun 1951 sebagai surau dan telah dinaiktaraf sebagai masjid pada tahun 1970. (Sumber: Kajian Lapangan Pengkaji)
2. *Johor Old Ancient Temple* dibina pada tahun 1870-an oleh sekumpulan komuniti Cina yang diketuai Tan Hiok Nee. (Sumber: Kajian Lapangan Pengkaji)
3. Kuil Sri Raja Mariamman dibina pada tahun 1911 di Jalan Ungku Puan dan Jalan Trus di mana ia menjadi lokasi penempatan awal masyarakat India pada waktu itu. (Sumber: Kajian Lapangan Pengkaji)
4. Sikh Gudwara Sahib dibina pada tahun 1916 dan terletak di Jalan Trus. Ia dibina oleh kaum Sikh yang bekerja sebagai polis dan pegawai Sultan Johor yang pada waktu memohon sebidang tanah dengan Sultan Ibrahim bagi tujuan pembinaan Gudwara. (Sumber: Kajian Lapangan Pengkaji)
5. *The Vicar Church of Immaculato Ceonception*, sebuah gereja yang dibina pada tahun 1883 setelah dikurniakan tanah oleh Sultan Abu Bakar dan dinamakan '*Our Lady of Lourde*s'. Kemudian ia dibina semula dengan lebih teratur oleh Rev. Fr. C. Saleilles pada tahun 1921 dan mendapat sumbangan oleh Sultan Ibrahim pada waktu itu (Sumber: Kajian Lapangan Pengkaji).

Selain itu juga, di waktu yang sama terdapat beberapa buah kampung yang wujud sejak dari zaman pemerintahan Sultan Abu Bakar (jadual 2.2) di sekitar Johor Bahru. Senarai petempatan ini akan dijadikan mercu tanda asas (*base landmark*) dalam menjalankan analisis morfologi yang akan dihasilkan.

Jadual 1.1 Kampung lama yang telah dikenalpasti.

Bil	Nama Kampung	Bil	Nama Kampung
1	Kampung Asap	9	Kampung Ah Siang
2	Kampung Dato' Barat	10	Kampung Pahang
3	Kampung Dock/ Kampung Tambatan	11	Kampung Wong Ah Fook
4	Kampung Kubor/ Mahmoodiah	12	Kampung Encik Melukut
5	Kampung Tarom	13	Kampung Encik Am
6	Kampung Kandang Ayam	14	Kampung Pahang
7	Kampung Encik Isa	15	Kampung Gertak Merah
8	Kampung Wadi Hana	16	Kampung Ngee Heng

Sumber (Samsudin, 2022)

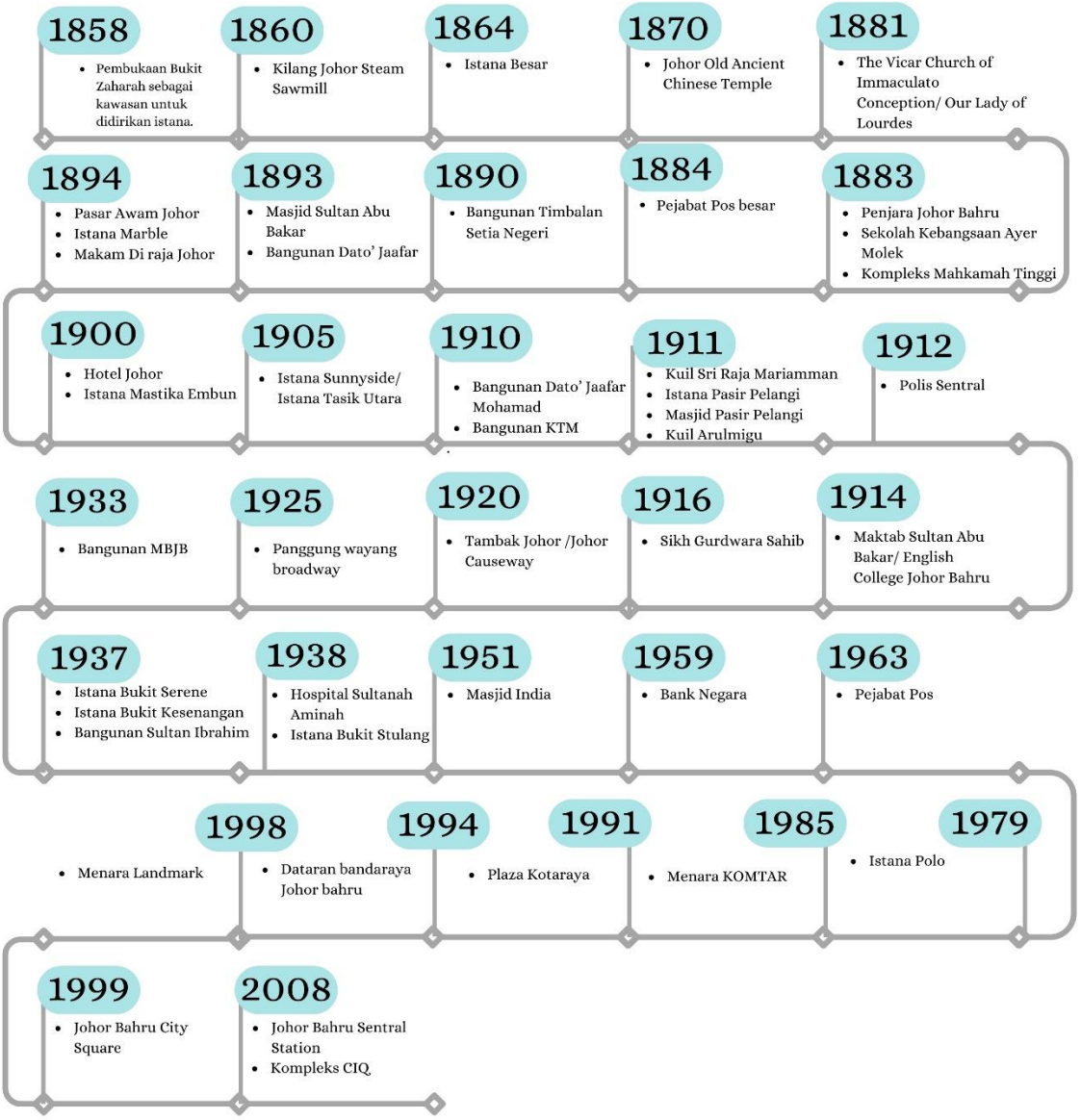
Perkembangan Seni Bina Johor Bahru

Pengaruh senibina tradisi petempatan selat amat kuat dalam memberi insipirasi rekabentuk pada pembinaan pejabat, institusi dan rumah kerajaan malah turut menyumbang pada rekabentuk istana raja-raja melayu dan juga masjid. Pengaruh tradisi petempatan selat adalah terhasil dari satu evolusi khusus iaitu 'tradisi hibrid dunia imigran' (Abel, 2012) di mana kedudukan geografi Semenanjung Tanah Melayu sebagai laluan Timur-Barat mengundang kehadiran pedagangan daripada saudagar Arab, India, China dan Eropah. Gabungan budaya hibrid ini memperlihatkan sikap keterbukaan masyarakat setempat dalam mengadaptasi keperluan bagi memenuhi kehidupan lingkungan baru. Di Johor, antara bangunan yang menerima pengaruh kolonial dan digabung dengan konsep seni bina tempatan dan masih kekal hingga ke hari ini ialah Bangunan Sultan Ibrahim, Balai Polis Sentral dan Stesen Keretapi. Dalam ciri-ciri rekabentuk bangunan tradisional Melayu Islam terdahulu, lebih banyak ukiran akan dipamerkan melalui elemen bangunan seperti tingkap, cucur atap, kerawang, sisip angin dan pintu. Tetapi dengan gaya reka bentuk pengaruh kolonial, ia lebih ringkas dengan menonjolkan ukiran dan motif di dinding bangunan terutamanya di bahagian gerbang mula diterapkan.

Merujuk pada Samsudin (2022) yang membuat penyelidikan terhadap urutan masa pembinaan bangunan yang diklasifikasikan sebagai warisan sejarah, di awal pentadbiran Temengung Ibrahim, tiada binaan bangunan yang menunjukkan pengaruh seni bina tempatan kecuali rumah kediaman penduduk asal yang telah bermastautin di Tanjung Puteri. Ditambah lagi, pusat pemerintahan masih berpusat di Teluk Belanga, Singapura dan kerja-kerja meneroka Tanjung Puteri untuk dijadikan pusat pentadbiran sedang dijalankan. Walau bagaimanapun, binaan bangunan seperti istana, bangunan pentadbiran dan masjid melambangkan pengaruh seni bina kolonial atau tempatan giat dibuat di zaman pemerintahan Sultan Abu Bakar.

Seterusnya sewaktu negeri lain di Semenanjung Tanah Melayu sedang bergelut dengan menghalang perebakan kuasa British, Sultan Abu Bakar berjaya melentur perluasan kuasa British tersebut dengan menjalinkan satu interaksi yang harmoni susulan Perjanjian

Persahabatan Kerajaan Johor dengan British pada 1885. Perjanjian ini turut memberi kesan terhadap seni reka bentuk bangunan utama di Johor seperti Bangunan Sultan Ibrahim. Pada waktu itu Sultan Ibrahim menitahkan istilah 'Johor mesti jadi Johor' yang membawa maksud baginda inginkan Johor yang maju, tetapi mesti mempunyai citra tersendiri dan kukuh dengan jati diri Johor. Sehubungan dengan itu, walaupun rupa perbandaran di Johor Bahru menerima arus kemodenan, tetapi konsep yang menggabungkan senibina Melayu dan Inggeris perlu diterapkan (M.N, 2023). Apabila di zaman pemerintahan Sultan Ibrahim, baginda memberi tumpuan pada pembinaan infstruktur seperti pembinaan tambak Johor, dan menyelaraskan sistem pentadbiran di bawah campurtangan British dengan juga menubuhkan Lembaga Bandaran (*Townhall*) serta mewujudkan Enakmen Tanah 1910 dan Enakmen Lombong 1911. Berdasarkan kedua-dua enakmen ini, para pemohon tanah pertanian atau lombong akan dikenakan cukai tahunan (premium dan sewa) yang juga disebut geran hidup (N. Abdullah & Jambi, 2017). Rajah seterusnya menunjukan garis masa pembinaan bangunan yang menjadi sejarah di Johor Bahru sejak dari pembukaannya oleh Temenggung Daeng Ibrahim sejak tahun 1858 hingga tahun 1994.



Rajah 1.3 : Garis Masa Pembinaan Bangunan Yang Menjadi Sejarah Di Johor Bahru Sejak Dari Pembukaan Oleh Temenggung Daeng Ibrahim

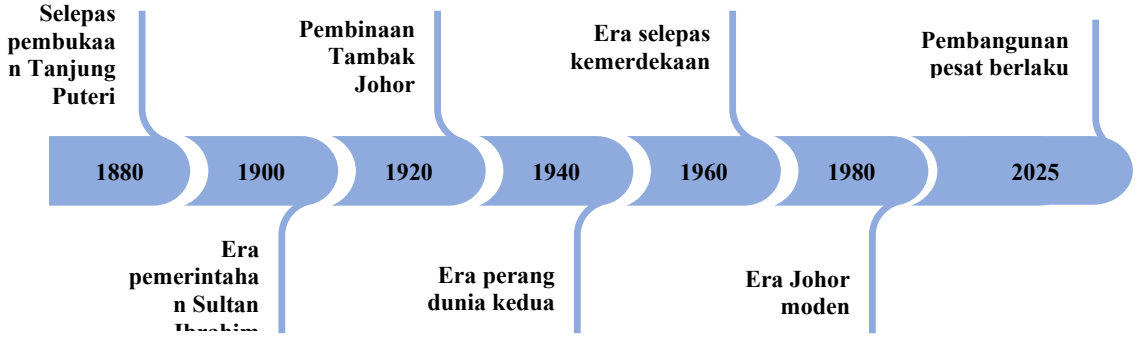
Sumber (diadaptasi Samsudin (2022).

Penemuan

Sebagai memenuhi pencapaian objektif pertama iaitu memahami perkembangan Johor Bahru melalui pendekatan morfologi bagi bandar Johor Bahru, pendekatan yang dikemukakan oleh Arbi and Talib (1986) mengenai kota kesultanan lama akan dijadikan rujukan. Antara atribut penting akan sentiasa dirujuk ialah sungai, istana, pasar, masjid dan keadaan topografi dan juga perkembangan jalanraya. Seterusnya dalam menghasilkan pemetaan morfologi dari sudut sejarah, pembahagian zaman akan dilakukan untuk mengenalpasti dengan lebih tepat setiap perubahan atribut fizikal yang berlaku. Analisis ini memberi fokus pada lokasi petempatan lama, keadaan geografi sedia ada seperti nama bukit dan sungai. Pengumpulan data yang diperolehi ini boleh diklasifikasikan kepada empat jenis bahan utama iaitu :

1. Gambar lama : Pengumpulan bahan ini menjadi sumber rujukan utama dengan mengenalpasti kedudukan serta kawasan persekitarannya
2. Peta lama dari arkib : Peta lama amat membantu dalam mengenalpasti kedudukan dan menjadi penanda aras dalam menghasilkan peta asas kajian
3. Sesi temuramah dengan golongan sejarawan: Satu sesi temuramah telah dibuat bersama dengan Ar. Tpr. Abdul Latif Muzammil, seorang arkitek dan perancang bandar bandar profesional, merupakan anak jati Johor Bahru yang lahir pada tahun 1952. Beliau seorang pakar dalam rekabentuk seni bina warisan dan juga telah menjadi perunding perancang bandar dan arkitek di Johor Bahru sejak tahun 1989.
4. Sesi temuramah degan penduduk tempatan : sesi temuramah ini dijalankan secara rawak ketika mengadakan kajian lapangan dengan cara berbual secara santai dengan penduduk sekitar bagi mengetahui kedudukan petempatan lama.

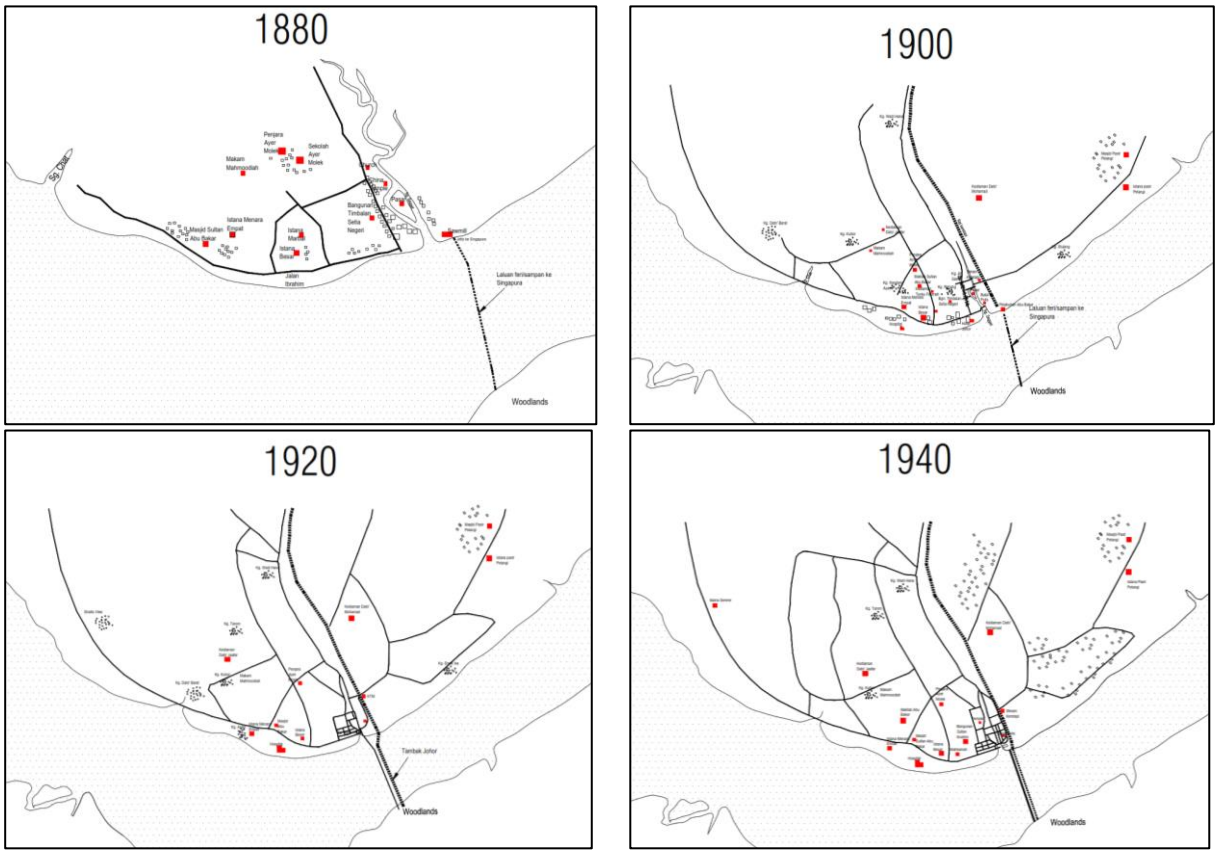
Seterusnya, pembahagian mengikut tahun peredaran zaman dilakukan berdasarkan peristiwa besar. Antara penemuan utama yang diperolehi semasa proses penyusunan data dibuat, peristiwa besar yang boleh diambilkira seperti era pemerintahan sultan, campurtangan penjajahan Inggeris, pembinaan tambak Johor dan juga era penjajahan Jepun. Mengambilkira peristiwa ini, pengkaji telah menetapkan perbezaan peristiwa selang 20 tahun dalam tempoh 100 tahun pembukaan Johor Bahru. Pengklasifikasian ini mengambilkira tempoh 100 tahun memandangkan ianya sudah mencukupi untuk melihat perkembangan signifikan sesebuah bandar. Berikut merupakan jarak masa pembahagian zaman yang telah ditetapkan.

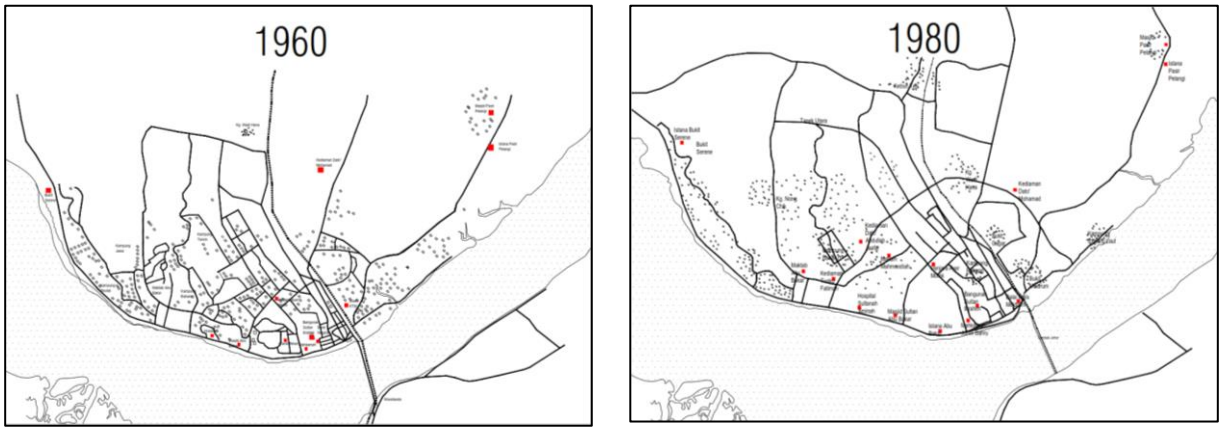


Rajah 1.4 : Jarak pembahagian masa bagi kajian morfologi.

Sumber : (Olahan Pengkaji, 2025)

Berdasarkan rajah jarak pembahagian zaman di atas, analisis morfologi ini terhenti di tahun 1980 dengan bertujuan memberi fokus utama pada kesan sejarah awal pembukaan Johor Bahru tanpa mengambilkira pembangunan arus kemodenan pusat bandar yang terlalu pesat.





Rajah 1.5 : Peta Perkembangan Johor Bahru Dari Tahun 1880 Hingga 1980 Selama 100 Tahun.

Sumber (Kajian Lapangan Pengkaji, 2025)

Rajah di atas menunjukkan hasil pemetaan bandar Johor Bahru selama 100 tahun. Setelah analisis ini dijalankan, beberapa penemuan diperolehi. Antaranya ialah:

1. Ketika awal pembukaan Tanjung Puteri di tahun 1880-an, kawasan ini menempatkan kampung nelayan, dan petempatan sistem kangchu. Selain itu juga, di sekitar kawasan istana juga menempatkan kampung kecil pekerja dan dayang istana berulang-alik.
2. Sungai Segget memainkan peranan penting sebagai nadi awal perdagangan dan pengangkutan.
3. Pembinaan tambak Johor memainkan peranan besar dalam menggalakkan pertumbuhan pesar di sekitar Sungai Segget.
4. Petempatan lama yang wujud di sekitar pusat bandar telah digantikan pembinaan bangunan moden. Namun, beberapa unit bangunan sesebuah milik pentadbian kerajaan Johor dan Istana Johor masih lagi kekal.
5. Antara petempatan lama yang masih kekal hingga sekarang ialah Kampung Kubor atau Kg. Mahmoodiah, Kampung Tarom dan Kampung Wadi Hana.
6. Beberapa buah istana yang dibina di waktu pemerintahan Sultan Abu Bakar dan Sultan Ibrahim telah tiada.
7. Bangunan sesebuah yang masih kekal adalah bangunan kemudahan awam, rumah ibadat, kediaman istana dan bangunan pentadbiran.
8. Deretan rumah kedai yang masih wujud pada masa kini di pusat bandar adalah lokasi petempatan sistem kangchu.

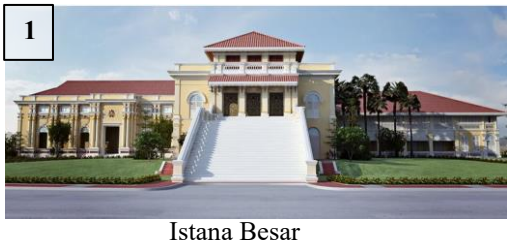
Seterusnya, bagi mencapai objektif kedua iaitu mengenalpasti bangunan yang dikategorikan bersejarah masih kekal serta mampu dijadikan tarikan pelancongan atau tidak, pendekatan kajian rintis digunakan. Satu lawatan (kajian rintis) telah dijalankan mengikut zon kawasan kajian yang telah ditetapkan dengan menggunakan borang inventori bangunan. Hasil dari kajian rintis tersebut, didapati terdapat lebih dari 48 unit bangunan sesebuah dan 6 unit rumah kedai yang dikenalpasti masih berkeadaan baik dan berpotensi atau telah dijadikan produk pelancongan. Selain itu, melalui lawatan juga mendapati beberapa buah bangunan baru yang bercirikan warisan namun tidak disenaraikan sebagai bahan sejarah juga ditemui. Justeru, beberapa kriteria telah ditetapkan dalam membuat pemilihan bangunan yang akan dijadikan panduan bagi memilih bangunan yang akan digunakan pada peringkat kaji selidik. Kategori yang ditetapkan adalah merujuk pada jadual dibawah:-

Jadual 1.2 : Kategori Bangunan Yang Mengikut Kriteria Yang Bersesuaian.

Bil	Kategori	Hasil penemuan
1	Bangunan yang masih kekal utuh (sesebuah dan rumah kedai)	48 unit -bangunan sesebuah 6 unit- rumah kedai
2	Bangunan yang tidak boleh diakses oleh orang awam (termasuk istana/ pentadbiran/ sekolah/ hakmilik persendirian)	21 unit
3	Bangunan yang boleh dilawati oleh orang awam sebagai objek pelancongan	14 unit
4	Bangunan yang telah dijadikan produk pelancongan	12 unit
5	Bangunan yang belum dijadikan produk pelancongan, namun berpotensi jika dibuat penyesuaian guna semula bangunan.	9 unit

Sumber (Kajian Lapangan Pengkaji, 2025)

Di samping itu juga, terdapat lebih 178 unit bangunan rumah kedai yang terdapat di sekitar Jalan Dhoby, Jalan Trus, Jalan Tan Hiok Nee, Jalan Ibrahim, Jalan Segget yang telah dikenalpasti terletak di dalam zon warisan dan 9 unit daripadanya telah dikenali sebagai produk pelancongan. Melalui kajian lapangan ini juga, pengkaji turut mendapati adanya bangunan lama yang telah menjalani penyesuaian fungsi bangunan dan dijadikan sebagai produk pelancongan. Rajah seterusnya menunjukkan pemetaan lokasi setelah dianalisis bagi kajian rintis yang dijalankan.



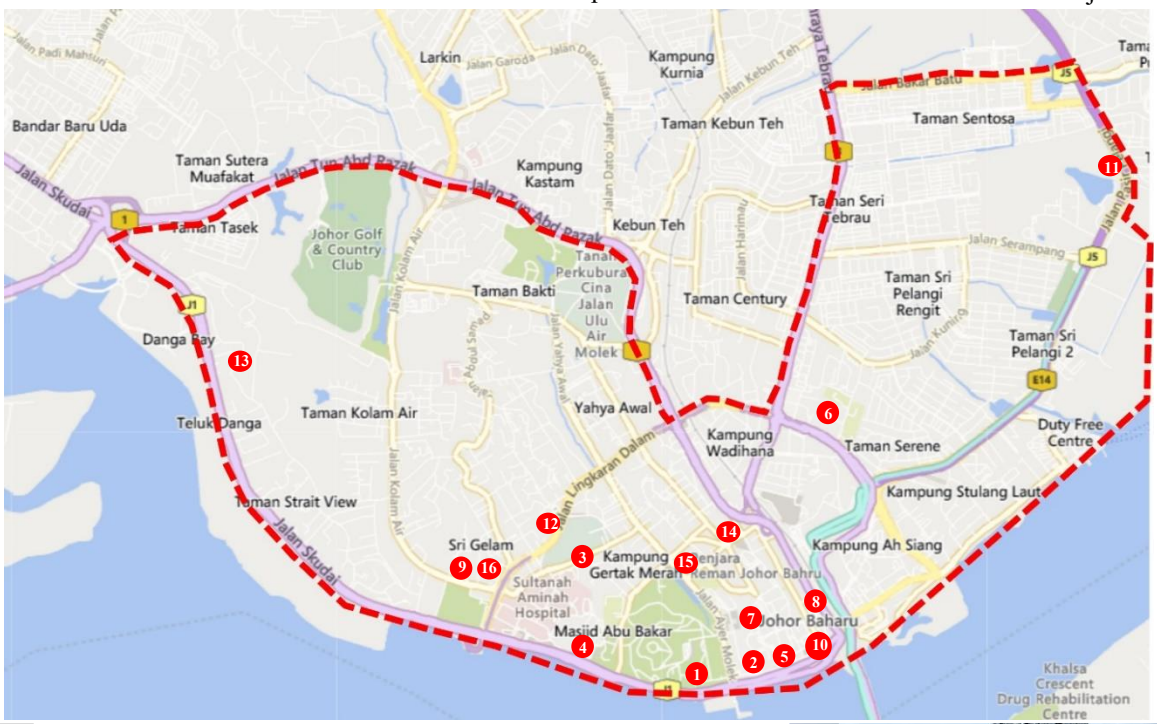
Istana Besar



Kompleks Mahkamah



Makam Diraja Mahmoodiah





Masjid Sultan Abu Bakar



Bangunan pejabat pos



Bangunan Dato' Jaafar Mohamad



Bangunan Bukit Timbalan



Stesen keretapi



Maktab Sultan Abu Bakar

Lain-lain

10 - Balai Polis Sentral
- Deretan rumah kedai Jalan Tan Hiok Nee, Jalan Trus, Jalan Dhoby, Jalan Segget
- Masjid India Dato' Ahmad Awang

11 – Masjid Pasir Pelangi

12 - Kediaman Dato' Abdullah Jaafar (Galeri Seni)
13 - Istana Bukit Serene
14 - The Vicar Church of Immaculato Conception
15 - Penjara Ayer Molek
16 – Kediaman Tunku Aminah (Galeri Tenun)

Rajah 1.6 : Gambar dan kedudukan bangunan warisan di Johor Bahru yang masih kekal. Sumber (Kajian LapanganPengkaji,2025)

Penutup

Hasil penemuan yang diperolehi menunjukkan objektif pertama telah tercapai dengan penghasilan peta perkembangan morfologi di mana beberapa penemuan terhasil dengan melihat petempatan dan bangunan lama yang masih tinggal. Manakala objektif kedua juga telah dicapai dengan menjalankan kajian rintis dan seterusnya membuat kategori penilaian bangunan yang tersedia menerima pelancongan atau tidak dan telah dikenalpasti lokasi kedudukannya pada masa kini. Secara keseluruhannya penyelidikan ini dapat menterjemahkan pendekatan morfologi bandar dapat membantu memahami sejarah lapisan fizikal Johor Bahru seterusnya menyediakan asas maklumat dalam pelancongan warisan.

Penghargaan

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IMPLIKASI DOMINASI KOMUNITI ETNIK ROHINGYA DALAM PERNIAGAAN TERHADAP KESELAMATAN EKONOMI MALAYSIA

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Abstrak: *Dominasi komuniti etnik Rohingya dalam sektor ekonomi tertentu, terutamanya melalui aktiviti perniagaan tidak formal, menimbulkan pelbagai implikasi terhadap keselamatan ekonomi Malaysia. Golongan pelarian ini bukan setakat memperoleh pendapatan sebagai pemotong rumput, buruh kontrak dan pencari besi buruk. Peningkatan penglibatan mereka dalam pasaran tempatan bukan sahaja mencetuskan persaingan dengan peniaga tempatan tetapi juga menimbulkan kebimbangan berkaitan kestabilan ekonomi serta kawal selia perniagaan. Kajian ini menggunakan kaedah kualitatif dengan data diperoleh daripada sumber primer dan sekunder. Data primer dikumpul daripada temubual dan pemerhatian di kawasan terlibat. Data sekunder daripada sumber empirikal seperti disertasi, jurnal dan data dalam talian. Kajian ini mempunyai tiga objektif, iaitu 1) mengkaji kesan keselamatan ekonomi akibat kebanjiran komuniti etnik Rohingya; 2) menganalisis langkah-langkah pengurusan dan keselamatan akibat dominasi pelarian Rohingya dalam ekonomi Malaysia; dan 3) menganalisis keberhasilan polisi yang dilaksanakan oleh kerajaan dalam mengurus keselamatan ekonomi akibat kebanjiran komuniti etnik Rohingya. Hasil kajian ini mendapati 1) dominasi komuniti etnik Rohingya dalam perniagaan menjejaskan ekonomi penduduk tempatan dan menggugat kestabilan ekonomi negara; 2) langkah pengurusan dan keselamatan akibat dominasi sektor ekonomi oleh komuniti etnik Rohingya tidak dilaksanakan secara efektif; dan 3) dasar kerajaan sedia ada dalam menguruskan keselamatan ekonomi tidak mencukupi serta tidak selaras antara kerajaan Persekutuan dan negeri. Kajian ini menyarankan supaya kerajaan memperkukuh dasar dan perundangn. Kerajaan juga perlu menguruskan data dan pendaftaran pelarian bagi memastikan keselamatan ekonomi Malaysia tidak terjejas dan kekal terjamin.*

Kata Kunci: *(Ekonomi, Keselamatan, Malaysia, Perniagaan, Rohingya)*

Pengenalan

Selama bertahun-tahun, pelarian Rohingya telah membentuk komuniti di beberapa lokasi utama di Malaysia, terutamanya di Lembah Klang, Pulau Pinang, Kedah, dan Pahang. Dalam Lembah Klang, kebanyakan mereka menetap di negeri Selangor, dengan kawasan tumpuan seperti Ampang, Gombak, dan Hulu Langat yang sehingga hari ini masih menjadi pusat penempatan utama bagi etnik ini. Keadaan ini mencerminkan bagaimana komuniti Rohingya telah berakar umbi di Malaysia, membina kehidupan dan menyesuaikan diri dengan persekitaran baharu meskipun berdepan dengan pelbagai cabaran sebagai pelarian (Intan Suria et al., 2016:12, Nur Syazwani & Ishtiaq, 2019:437 & Teo, 2020:104).

Kehadiran komuniti Rohingya menjadi isu besar dalam kalangan masyarakat tempatan terutamanya daripada aspek sosial dan keselamatan ekonomi negara (Mohamad Azri et al.,

2022:120). Golongan pelarian ini bukan setakat memperoleh pendapatan sebagai pemotong rumput, buruh kontrak dan pencari besi buruk. Penguasaan mereka yang semakin meningkat dalam industri tertentu, terutamanya melalui aktiviti perniagaan tidak formal telah mencetuskan perdebatan mengenai pengaruh ekonomi dan implikasi kawal selia komuniti etnik Rohingya.

Golongan pelarian yang sinonim dengan kehadiran mereka di sekitar Pasar Harian Selayang didapati menjejaskan ekonomi penduduk tempatan (Hamzah, 2023). Selepas pelaksanaan perintah kawalan pergerakan (PKP) tamat pada 2021 jumlah warga asing membabitkan etnik Rohingya yang berniaga di Pasar Harian Selayang dan Pasar Borong Kuala Lumpur meningkat lebih dua kali ganda, walaupun diperangi pihak berkuasa sejak lebih dua dekad lalu (Noor Hidayah, 2022). Menurut Mohd Jamilul & Noor Hidayah (2022), selain menawarkan harga yang lebih murah berbanding peniaga tempatan, mereka juga menimbulkan kekacauan dan kesesakan jalan raya di kawasan berkenaan.

Dominasi komuniti etnik Rohingya dalam sektor ekonomi tertentu, terutamanya melalui aktiviti perniagaan tidak formal, telah menimbulkan pelbagai implikasi terhadap keselamatan ekonomi Malaysia. Peningkatan penglibatan mereka dalam pasaran tempatan bukan sahaja mencetuskan persaingan dengan peniaga tempatan tetapi juga menimbulkan kebimbangan berkaitan kestabilan ekonomi serta kawal selia perniagaan. Keadaan ini memerlukan perhatian serius daripada pihak berkuasa bagi memastikan keseimbangan antara aspek kemanusiaan dan kepentingan ekonomi negara terus terpelihara. Tanpa kawalan yang efektif, isu ini berpotensi memberi kesan jangka panjang terhadap struktur ekonomi Malaysia.

Sorotan Literatur

Kebanjiran komuniti Rohingya di Malaysia telah menjadi subjek kajian yang meluas, dengan penekanan terhadap pelbagai implikasi dalam aspek keselamatan politik, ekonomi, dan sosial. Kajian oleh Azizah (2015) menekankan bahawa ketiadaan pendidikan formal dalam kalangan kanak-kanak Rohingya boleh membawa kepada penglibatan mereka dalam aktiviti antisosial dan jenayah apabila dewasa kelak. Selain itu, Azlinariah et al. (2018) mendapati bahawa kekurangan akses pendidikan bagi kanak-kanak Rohingya meningkatkan risiko mereka terlibat dalam aktiviti buruk seperti pengemisan. Aida & Napisah (2022) juga membuktikan bahawa tanpa pendidikan, kanak-kanak pelarian mudah terdedah kepada eksploitasi dan kegiatan jenayah.

Dalam aspek keselamatan, kajian oleh Intan Suria & Sity (2016) menunjukkan bahawa kehadiran pendatang asing, termasuk Rohingya, telah menggugat keamanan di kawasan bandar seperti Selangor dan Kuala Lumpur, dengan peningkatan jenayah kekerasan dan harta benda. Kajian oleh Intan Suria et al. (2020) turut menegaskan bahawa kedatangan pelarian Rohingya menimbulkan masalah kepada negara, dengan peningkatan kes jenayah harta benda dan risiko penyebaran penyakit berjangkit. Mohammad Adhwa' (2018) pula menyatakan bahawa tingkah laku negatif sesetengah komuniti Rohingya telah menjejaskan sikap prihatin rakyat Malaysia, menimbulkan kebimbangan mengenai kedaulatan negara.

Dalam aspek sosial dan politik, kajian oleh Fuad (2019) menyoroti bahawa kehadiran pendatang asing tanpa izin, termasuk Rohingya, membawa implikasi dalam aspek sosial,

politik, dan keselamatan, termasuk penyebaran penyakit dan peningkatan jenayah. Kajian oleh

Shamim (2022) menunjukkan bahawa kehadiran pelarian Rohingya dalam jangka masa panjang di Bangladesh menyebabkan isu keselamatan seperti pengedaran dadah dan pergaduhan berkumpulan. Selain itu, kajian oleh Zulfaqar dan Rodziana (2020) mendapati bahawa ketiadaan pengurusan perkahwinan yang teratur dalam kalangan komuniti Rohingya membawa kepada isu seperti sijil nikah palsu dan pelanggaran hak pasangan serta anak-anak.

Daripada sudut ekonomi, kajian oleh Mohd Ramlan dan Mohammad Fajil (2023) menjelaskan bahawa aliran masuk pelarian boleh memberi kesan negatif terhadap ekonomi jika mereka didiskriminasi oleh majikan, memandangkan mereka bekerja secara tidak sah dan memasuki sektor berkemahiran rendah. Andika (2019) pula meneliti penglibatan individu Rohingya dalam aktiviti penyeludupan manusia, yang dianggap sebagai perniagaan atau perkhidmatan berdasarkan semangat persaudaraan.

Manakala, kajian oleh Azizah & Mohd Yahya (2021) menekankan bahawa kehadiran pelarian Rohingya menjadi beban kepada masyarakat global dan mencetuskan polemik di Malaysia sejak 2016. Kajian oleh Nadhirah & Mohd Irwan (2023) mendapati bahawa pengalaman negatif rakyat Malaysia dengan pelarian Rohingya meningkatkan rungutan di media sosial dan kebimbangan mengenai keselamatan. Secara keseluruhan, literatur sedia ada menunjukkan bahawa kebanjiran komuniti Rohingya di Malaysia membawa pelbagai implikasi yang memerlukan perhatian serius daripada semua pihak.

Konsep Keselamatan Ekonomi

Keselamatan ekonomi pula memberi kesan terhadap kemampuan negara mengekalkan sumber kewangan untuk menjana kekuatan ekonomi. Kegiatan jenayah yang berlaku memberi kesan kepada keselamatan ekonomi negara. Buzan (1983:79-82) mentakrifkan keselamatan ekonomi sebagai kerajaan yang mampu mengekalkan sumber ekonomi secara berpanjangan dan tidak mengharapkan pihak lain dengan menjana ekonomi negara sendiri melalui penghasilan produk untuk dieskport ke luar negara. Buzan (1991:19) turut berpendapat, keselamatan ekonomi melibatkan akses kepada sumber kewangan dan pasaran yang diperlukan untuk memelihara tahap kebajikan rakyat dan kuasa negara.

Menurut Kamarulnizam (1999:156-157), kebanyakan negara di seluruh dunia mula mengutamakan keselamatan ekonomi sebagai kebimbangan utama negara selapas temat Perang Dingin. Sebelum ini, ahli ekonomi menganggap keselamatan ekonomi sebagai kurang penting kerana isu utama dunia adalah mempertahankan kepentingan nasional. Walau bagaimanapun, mentakrifkan dan mentafsir keselamatan ekonomi masih mencabar kerana hubungan yang kompleks antara faktor keselamatan dan ekonomi. Hubungan yang rumit ini mempunyai implikasi yang meluas, bukan sahaja untuk interaksi antara individu dan kerajaan tetapi juga untuk hubungan antara negara.

Manakala, Ronis (2011) menjelaskan keselamatan ekonomi sebagai tonggak asas keselamatan negara. Daya maju ekonomi sesebuah negara adalah penting, kerana tanpa modal, perniagaan, keuntungan dan pekerjaan akhirnya akan mengakibatkan kekurangan hasil cukai serta menjejaskan keupayaan ketenteraan. Menerusi infrastruktur perindustrian

yang kukuh akan mewujudkan pekerjaan, menjana kekayaan dan mengekalkan pertumbuhan ekonomi. Tanpa
peluang pekerjaan yang mencukupi, kesejahteraan masyarakat akan merosot, meningkatkan risiko perpecahan dan konflik.

Kesan Kebanjiran Etnik Rohingya Terhadap Ekonomi
Dominasi Dalam Perniagaan

Dianggar seramai 16,000 warga asing termasuk golongan pelarian Rohingya yang memegang kad Pesuruhjaya Bangsa-Bangsa Bersatu Bagi Pelarian (UNHCR) berada di sekitar Pasar Borong Selayang, Selangor berbanding 6,000 rakyat tempatan (Bernama, 2020). Menurut Intan Suria et al., (2020:150), pelarian etnik Rohingya ini mahir dalam urusan jual beli dan menjadi orang Tengah atau customer service kepada pelanggan. Mereka juga memahami budaya tawar-menawar masyarakat tempatan. Pemilik gerai menjual sayur dan ikan di pasar adalah milik orang Cina. Namun, pelarian Rohingya menjadi penjaga gerai dan menjalankan operasi harian. Sebilangan golongan ini yang telah lama berada di Malaysia berjaya mengusahakan kedai runcit dan gerai makan milik sendiri di sekitar pasar.

Jadual 1: Kronologi Pelarian Rohingya di Pasar Borong Selayang

Tahun	Peristiwa
Awal 2000an	Pelarian Rohingya mula bekerja di Pasar Borong Selayang, menyewa lot kedai dan menjual barangan.
Februari 2016	Pergaduhan berlaku antara penduduk tempatan dan pekerja Rohingya, menyebabkan seorang maut dan dua cedera.
April 2020	Pasar ditutup akibat wabak COVID-19, dengan 28 jangkitan dan satu kematian.
Jun 2020	Dewan Bandaraya Kuala Lumpur (DBKL) melarang pelarian, termasuk pemegang kad UNHCR, daripada memasuki pasar. Warga asing hanya dibenarkan masuk jika ditemani oleh warga Malaysia dan memegang permit yang sah.
April 2022	Pegawai Imigresen menahan 248 warga asing, termasuk peniaga Rohingya.
Februari 2023	Peniaga Rohingya kembali, menjual barangan di tempat letak kereta dan berhampiran persimpangan.

Sumber: (Diolah oleh penyelidik)

Jadual 1 menunjukkan kronologi kehadiran pelarian etnik Rohingya di Pasar Borong Selayang secara beransur-ansur di kawasan itu, bermula dari awal 2000-an apabila mereka mula bekerja di gerai milik rakyat tempatan. Pada 2020, pasaran ditutup buat sementara waktu kerana wabak COVID-19, yang membawa kepada penguatkuasaan yang lebih ketat oleh pihak berkuasa. Pada 2022, imigresen menahan 248 pendatang asing tanpa izin termasuk pelarian Rohingya (Nizam, 2022). Namun, pada 2023 menunjukkan peniaga etnik Rohingya telah kembali beroperasi. Kehadiran berterusan pelarian Rohingya di pasar harian ini menimbul kebimbangan rakyat tempatan. Aktiviti perniagaan oleh etnik Rohingya dilihat semakin tidak terkawal, termasuk di kawasan terlarang seperti tempat letak kereta dan tepi jalan. Keadaan ini berterusan tanpa pemantauan yang efektif oleh pihak berkuasa (Muhammad, 2023).

Pada mulanya, ramai pelarian ini bekerja sebagai buruh di pasar dan sektor tidak formal lain, melakukan pekerjaan yang selalunya kurang diminati oleh penduduk tempatan seperti kerja-kerja berat, kotor dan bersedia kerja lebih masa. Pemilik gerai jualan memberi kepercayaan kepada mereka untuk mengendali dan menguruskan perniagaan sepenuhnya bermula daripada penerimaan bahan mentah sehingga menjual kepada masyakat tempatan. Pemilik gerai tidak memantau dan hanya menerima laporan dan hasil jualan sahaja. Keadaan ini menyebabkan mereka lebih berani dan terus berpengaruh di kawasan tersebut. Dari semasa ke semasa, mereka secara beransur-ansur mendapatkan ruang kedai dan premis perniagaan daripada peniaga tempatan yang menyewakan lesen perniagaan (Halim, 2024).

Akibatnya, ramai peniaga tempatan, terutamanya vendor berskala kecil tidak dapat terus bertahan kerana kehadiran yang agresif usahawan etnik Rohingya. Golongan pendatang asing ini beroperasi tanpa membayar cukai, permit perniagaan atau mematuhi peraturan perniagaan tempatan. Ini mewujudkan medan permainan yang tidak sekata di mana usahawan tempatan, yang mesti mematuhi kewajipan undang-undang dan kewangan. Situasi ini juga membuatkan mereka berupaya menawarkan barangan dan perkhidmatan pada harga yang lebih rendah (Intan Suria, 2024). Menurut Roslim (2025), bank-bank yang pernah beroperasi di sekitar Pasar Selayang turut memberhentikan operasi di situ. Bangunan bank itu kini turut dijadikan lokasi oleh etnik Rohingya untuk menjual bahan-bahan basah.

Selain menguasai perniagaan di Pasar Borong Selayang, etnik Rohingya juga mempelopori sektor pertanian tempatan. Tanah pertanian yang dahulunya diusahakan warga tempatan kini dikuasai pendatang asing etnik Rohingya. Mereka menukar sawah padi seluas 12 hektar menjadi ladang sayur di Sekinchan dan Tanjong Karang, Selangor. Pelarian Rohingya yang sebelum ini mengambil upah bekerja dan menyewa sawah milik rakyat tempatan, kini berubah menjadi tauke ladang (Nor Azam et al., 2023). Golongan ini aktif mengusahakan tanaman kontan seperti jagung dan ubi kayu yang hidup subur di kawasan sawah padi selain menanam sayuran seperti labu dan kacang bendi. Mereka mengusahakan tanaman berkenaan di atas tanah rizab kerajaan selain ada pemilik tanah sanggup memajak tanah kepada golongan ini semata-mata mahu meraih keuntungan besar. Etnik Rohingya sanggup membayar kadar sewa atau pajakan tinggi kepada pemilik tanah (Halim, 2024 & Sophian, 2024).

Komuniti etnik Rohingya mengusahakan kebun sayur-sayuran pada skala besar dan mula menjualnya kepada pemborong tempatan. Tindakan mereka ini memberi kesan terhadap hasil jualan sayur-sayuran pekebun tempatan. Mereka menawarkan harga yang jauh lebih murah berbanding harga pasaran. Ini menyebabkan ramai pemborong tempatan membeli daripada mereka. Hal ini menyebabkan sayur-sayuran dari kebun penduduk tempatan tidak laku dan seringkali berlaku lambakan (Roslim, 2025).

Selain sayur-sayuran, komuniti etnik Rohingya juga menceburi tanaman padi di Selangor dengan menawarkan pelbagai perkhidmatan kepada pesawah tempatan. Mereka menawarkan kerja-kerja meracun dan membaja serendah RM 6 hingga RM 8 sahaja setiap tong atau kampit baja kepada pesawah tempatan. Ini sekali gus memberikan persaingan kepada warga tempatan yang sebelum ini meletakkan harga antara RM 10 hingga RM 12 bagi setiap tong atau kampit baja.Malah, ada juga pesawah yang mengupah mereka sepenuhnya bagi menjaga petak sawah yang diusahakan berikutan harga upah yang rendah. Golongan etnik ini juga telah mahir membuat semaian padi sebelum dijual pada pesawah tempatan pada harga sekitar RM700 bagi satu ekar. Kegiatan ini memberi kesan besar pada

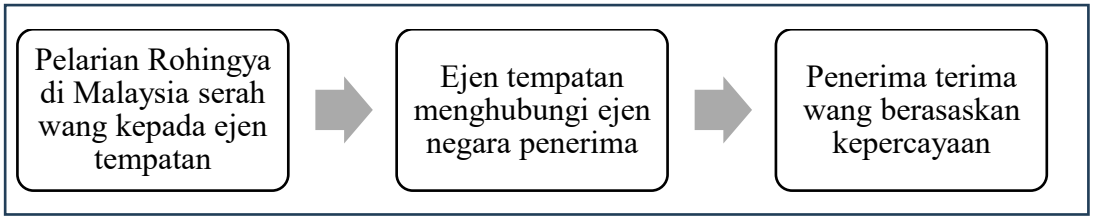
penduduk tempatan yang mencari rezeki melalui kerja rencam dan mengambil upah di sawah (Mustafa, 2025).

Sementara itu, kajian lapangan di sekitar Klang, Selangor, mendapati pelarian etnik Rohingya turut menceburi sektor perkhidmatan mencuci kereta. Malah merupakan pemilik perniagaan tersebut, mengupah pekerja asing dari negara lain, seperti Indonesia, Myanmar dan Nepal. Perkembangan ini menunjukkan peralihan peranan ekonomi mereka daripada buruh kepada usahawan yang menggaji migran lain. Perniagaan yang diusahakan bukan sahaja memberi sumber pendapatan kepada komuniti etnik Rohingya malah membuka peluang pekerjaan kepada pekerja asing yang lain. Tidak seperti pengendali cuci kereta tempatan yang mengenakan bayaran lebih tinggi, pendatang asing tanpa izin ini mengekalkan harga yang lebih rendah untuk menarik lebih ramai pelanggan, memanfaatkan harga yang kompetitif sebagai strategi utama untuk mengekalkan operasinya (Roslim, 2025).

Manakala, kajian lapangan di Negeri Sembilan, Johor, dan Pulau Pinang mendapati komuniti etnik Rohingya secara beransur-ansur terlibat dalam sektor pembinaan dan kontraktor negara ini. Pada mulanya bekerja sebagai buruh biasa, etnik Rohingya yang telah berada lebih 20 tahun di Malaysia mengembangkan peranan mereka, memanfaatkan kemahiran dan rangkaian mereka untuk mendapatkan projek yang lebih besar. Lama kelamaan, komuniti ini menjalinkan hubungan yang meluas, membolehkan mereka beroperasi sebagai kontraktor bebas dan bukan hanya pekerja (Abdul Razak & Din, 2024). Di Pulau Pinang, mereka sering mendapatkan kontrak untuk kerja-kerja penyelenggaraan masjid dan surau (Mazlan, 2025).

Perbankan Haram

Kumpulan etnik Rohingya, terutamanya mereka yang tinggal sebagai pelarian atau pendatang tanpa izin, sering bergantung kepada rangkaian kewangan tidak rasmi, kadangkala dirujuk sebagai bank haram atau sistem perbankan bawah tanah, untuk menguruskan wang mereka. Salah satu kaedah paling biasa digunakan ialah sistem hawala, rangkaian kiriman wang berasaskan amanah yang beroperasi di luar peraturan perbankan rasmi (UNODC, 2023:29). Di Malaysia, sindiket menggunakan modus operandi beroperasi di restoran, kedai runcit, kedai kosmetik dan kios menjual peralatan elektronik bagi menutup jejak aktiviti mengurup wang tanpa lesen (Samadi, 2023).



Rajah 1: Proses Sistem Perbankan Bawah Tanah

Sumber: (Diolah oleh Penyelidik)

Rajah 1 memunjukkan proses sistem kewangan tidak rasmi etnik Rohingya. Dalam sistem ini, seorang etnik Rohingya yang memperoleh pendapatan di Malaysia, menyerahkan wang tunai kepada ejen hawala tempatan. Ejen ini kemudian menghubungi rakan sejawat di

negara asal atau penempatan pelarian seperti kem Balukhali dan Kutupalong, Bangladesh. Ejen di negara penerima akan menghantar jumlah yang setara kepada penerima. Tiada wang fizikal dipindahkan merentasi sempadan sebaliknya, urus niaga bergantung pada kepercayaan peribadi dan sistem lejar tidak rasmi (Harun, 2024).

Kaedah ini membolehkan individu etnik Rohingya memindahkan wang secara berhati-hati, mengelak sekatan perbankan dan penelitian undang-undang, terutamanya kerana tidak mempunyai akses kepada institusi kewangan rasmi. Hal ini kerana status mereka yang tidak berdokumen. Selain itu, dalam komuniti mereka, sesetengah etnik Rohingya mengendalikan sistem simpanan dan pinjaman rahsia, mengumpulkan wang untuk kegunaan kecemasan, pelaburan perniagaan, atau pembayaran penyeludupan manusia. Rangkaian bawah tanah ini, walaupun penting untuk kelangsungan hidup mereka, tetapi turut mendedahkan mereka kepada risiko seperti penipuan, pemerasan dan eksploitasi oleh orang tengah yang tidak bertanggungjawab (Sophian, 2024)

Kehilangan Hasil Cukai Kerajaan

Memandangkan kebanyakan perniagaan komuniti etnik Rohingya beroperasi secara tidak formal, mereka tidak menyumbang kepada sistem cukai negara. Ini mengakibatkan ketirisan ekonomi yang ketara, di mana wang beredar dalam ekonomi tanpa dokumen dan bukannya menyumbang kepada hasil negara Malaysia (Halim, 2024). Peluasan perniagaan yang dikendalikan Rohingya tanpa dokumentasi yang betul juga memberikan cabaran kepada pihak berkuasa tempatan dalam menguatkuasakan peraturan perniagaan dan mengekalkan persaingan yang adil dalam pasaran. Keupayaan usahawan Rohingya mengupah pekerja asing merumitkan lagi dinamik pasaran buruh, terutamanya apabila mereka beroperasi di luar rangka kerja perundangan rasmi (Mustafa, 2025).

Sementara itu, sistem bank haram yang digunakan secara meluas oleh pelarian etnik Rohingya di Malaysia untuk menghantar wang kepada keluarga mereka di Bangladesh dan Myanmar memberikan beberapa cabaran kawal selia, ekonomi dan keselamatan kepada kerajaan Malaysia. Memandangkan sistem perbankan bawah tanah ini beroperasi di luar sistem kewangan formal, Bank Negara Malaysia (BNM) menghadapi kesukaran untuk memantau pengiriman wang rentas sempadan sekali gus mengehadkan keupayaan pihak berkuasa untuk mengesan transaksi mencurigakan yang mungkin dikaitkan dengan aktiviti haram seperti pembiayaan keganasan atau pemerdagangan manusia (Zulkarnain, 2024).

Tambahan pula, sifat tidak formal transaksi ini mengakibatkan kerugian ekonomi dan hasil, kerana aliran kewangan yang tidak dilaporkan membawa kepada pengurangan hasil cukai dan menyumbang kepada aliran keluar modal yang melemahkan rizab pertukaran asing Malaysia. Ketiadaan pengawasan juga meningkatkan potensi jenayah kewangan, kerana sesetengah ejen di negara penerima mungkin mengintegrasikan pengiriman wang yang sah dengan dana haram yang diperoleh daripada aktiviti seperti pengedaran dadah, penyeludupan atau perdagangan haram (Andinor, 2024).

Selain itu, pengecualian undang-undang dan kewangan pelarian Rohingya memburukkan lagi isu ini, kerana mereka tidak diiktiraf secara rasmi sebagai pekerja sah di Malaysia dan dengan itu kekurangan akses kepada perkhidmatan perbankan formal. Akibatnya, fenomena ini memerlukan penelitian yang lebih teliti oleh penggubal dasar untuk memastikan penyertaan ekonomi dalam kalangan komuniti pelarian sejajar dengan undang-undang

buruh negara dan rangka kerja pengawalseliaan, dengan itu melindungi kepentingan perniagaan tempatan dan pertimbangan keselamatan ekonomi negara (Mohd Zulhairi, 2025).

Saranan Pengurusan Komuniti Etnik Rohingya

Kebanjiran komuniti Rohingya di Malaysia mencetuskan keperluan bagi kerajaan Malaysia untuk mengambil langkah-langkah pengurusan, keselamatan, dan polisi yang berkesan bagi menjamin kestabilan ekonomi dan keselamatan negara.

Pengukuhan Dasar dan Perundangan

Di Malaysia, tidak ada kerangka perundangan dan pentadbiran khusus mengenai pelarian (Mohd Zulhairi, 2024). Akta Imigresen 1959/63 dan Akta Pasport 1966 merupakan set perundangan sedia ada yang sering diguna pakai dalam menangani kehadiran pelarian di Malaysia. Oleh itu, pelarian dan pencari suaka adalah sama tertakluk kepada Akta Imigresen seperti pendatang asing tanpa izin (PATI) yang lain. Contohnya, jika mereka memasuki atau tinggal di Malaysia secara tidak sah, mereka boleh dipenjarakan, disebat, ditahan atau dibuang negeri (Andinor, 2024).

Terdapat beberapa agensi kerajaan yang mempunyai mandat khusus menangani isu berkaitan orang pelarian di Malaysia. Antaranya ialah Majlis Keselamatan Negara (MKN), Kementerian Dalam Negeri (KDN), Kementerian Luar Negeri (KLN) dan Kementerian Kesihatan Malaysia (KKM). Agensi-agensi ini memainkan peranan penting dalam mengawal kemasukan, memantau pergerakan dan memberi bantuan kesihatan asas dan memastikan kehadiran pelarian ke Malaysia tidak membawa ancaman keselamatan. MKN merupakan agensi utama kerajaan yang mempunyai mandat khusus berkenaan pelarian di Malaysia (Andika, 2019:48).

Pihak Berkuasa Tempatan (PBT) turut terlibat dalam menangani isu peniaga warga asing tanpa lesen. Sebagai contoh, Dewan Bandaraya Kuala Lumpur (DBKL) mengambil tindakan sitaan terhadap barangan jualan warga asing yang dibuat mengikut peruntukan Undang-Undang Kecil Perlesenan Penjaja dan Gerai (Wilayah Persekutuan Kuala Lumpur) 2016 serta Undang-Undang Kecil Pasar (Wilayah Persekutuan Kuala Lumpur) 2016. Bagi penjaja warga asing yang didapati menjalankan aktiviti menjaja tanpa lesen, tindakan serta-merta dilakukan. Semua barangan yang disita tidak boleh dituntut semula (DBKL, 2020). Manakala, beberapa PBT telah memperkenalkan syarat pelesenan yang lebih ketat untuk mengelakkan penguasaan asing dalam perniagaan tempatan. PBT Negeri Sembilan, memerlukan pemegang lesen mendaftar dengan Lembaga Hasil Dalam Negeri (LHDN) dan memastikan hanya warganegara Malaysia yang menjalankan perniagaan (Bernama, 2023).

Dasar sedia ada dalam menangani isu pelarian di Malaysia mempunyai beberapa kelemahan yang ketara. Antaranya, terdapat kelemahan seperti undang-undang yang tidak selaras antara kerajaan Persekutuan dan negeri. Sehubungan itu, kerajaan perlu menggubal dasar yang lebih jelas mengenai pelarian, termasuk menetapkan status undang-undang mereka, hak dan tanggungjawab, serta mekanisme kawalan dan pengurusan yang sistematik (Halim, 2024). Kelemahan dalam undang-undang negara akan dimanfaatkan oleh penjenayah untuk melakukan jenayah (Muhammad Khairul Haffizi, 2025).

Pengurusan Data Dan Pendaftaran Pelarian

Kerajaan perlu memperkenalkan sistem pendaftaran pelarian yang lebih sistematik bagi memastikan pemantauan yang berkesan terhadap keberadaan mereka serta mengurangkan risiko eksploitasi oleh sindiket pemerdagangan manusia dan aktiviti ekonomi tidak sah. Sistem pendaftaran ini boleh dijadikan asas dalam menilai jumlah pelarian yang berada di negara ini, memastikan mereka direkodkan dalam pangkalan data rasmi, serta membolehkan pihak berkuasa mengenal pasti pergerakan dan aktiviti mereka dalam negara (Muhammad Khairul Haffizi, 2025 & Roslim, 2025).

Sistem pendaftaran pelarian juga perlu diselaraskan dengan agensi keselamatan seperti Majlis Keselamatan Negara (MKN), Jabatan Imigresen, Polis Diraja Malaysia (PDRM), dan pihak berkuasa tempatan dan boleh dibantu oleh Pertubuhan Bukan Kerajaan (NGO) bagi memastikan kawalan menyeluruh. Menerusi integrasi data antara agensi, kerajaan boleh mengenal pasti individu yang berisiko, mencegah pelarian daripada menyalahgunakan kemudahan yang disediakan, serta mengelakkan kehadiran mereka daripada mengancam keselamatan ekonomi negara (Halim, 2024).

Menurut Zulkarnain (2024) kewujudan aktiviti perbankan bawah tanah dan pengiriman wang haram dalam kalangan komuniti Rohingya menimbulkan cabaran besar kepada kestabilan ekonomi negara. Pergerakan wang secara tidak terkawal bukan sahaja menyebabkan ketirisan hasil cukai negara, tetapi juga membuka ruang kepada kegiatan jenayah seperti pengubahan wang haram dan pembiayaan jenayah terancang. Oleh itu, pengurusan data dan sistem pendaftaran pelarian yang lebih sistematik menjadi langkah penting dalam menangani isu ini. Sistem pendaftaran pelarian yang teratur akan membolehkan kerajaan mengenal pasti jumlah sebenar pelarian yang berada di Malaysia serta memantau aktiviti ekonomi mereka. Menerusi pangkalan data yang dikemas kini secara berkala, pihak berkuasa seperti Bank Negara Malaysia (BNM) dan agensi penguatkuasaan kewangan boleh mengawal selia akses pelarian kepada perkhidmatan kewangan yang sah, mengesan dan mengenal pasti individu yang terlibat dalam pengiriman wang mencurigakan serta mengurangkan kebergantungan pelarian kepada sistem perbankan tidak rasmi seperti hawala, yang sering disalahgunakan untuk aktiviti jenayah rentas sempadan (Sophian, 2024).

Kesimpulan

Kebanjiran komuniti etnik Rohingya di Malaysia membawa implikasi besar terhadap keselamatan ekonomi negara, terutamanya dalam aspek dominasi sektor perniagaan tidak formal, ketidakseimbangan pasaran buruh, dan kehilangan hasil cukai. Kajian ini mendapati bahawa ketiadaan dasar dan perundangan khusus bagi pelarian serta kelemahan dalam kawal selia membolehkan komuniti ini menguasai sektor ekonomi tertentu tanpa pemantauan yang efektif. Selain itu, kegiatan perbankan bawah tanah dan pengiriman wang haram yang tidak dikawal dengan baik turut menyumbang kepada ketirisan ekonomi dan potensi penyalahgunaan sistem kewangan negara.

Bagi memastikan kestabilan ekonomi Malaysia tidak terjejas, langkah proaktif perlu diambil oleh kerajaan. Ini termasuk memperkukuh dasar dan perundangan berkaitan pelarian,

menyelaraskan polisi antara kerajaan Persekutuan dan negeri, serta memperkenalkan sistem pendaftaran pelarian. Menerusi pemantauan yang lebih ketat dan penyelarasan antara agensi berkaitan, kerajaan dapat mengawal keberadaan pelarian, mengurus akses mereka kepada sektor ekonomi, dan membanteras kegiatan kewangan tidak sah.

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PENDOKUMENTASIAN BAHASA BERSAMA KOMUNITI: CABARAN DAN PELUANG DALAM MEMBANGUNKAN E-GAYAD MABALUT GLOSARI

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Abstrak: Pendokumentasian bahasa memainkan peranan penting dalam memastikan warisan linguistik terus hidup, terutama bagi bahasa etnik yang berhadapan dengan cabaran dalam mengekalkan penggunaannya. Bahasa bukan sekadar alat komunikasi, tetapi juga jiwa sesuatu budaya. Masyarakat Bisaya di Beaufort, Sabah, masih menuturkan bahasa mereka dalam kehidupan seharian, namun perubahan sosial dan perkembangan teknologi memberi cabaran baharu dalam melestarikannya. Jika tiada langkah proaktif diambil maka penguasaan bahasa di kalangan generasi muda menjadi semakin rentan dan berisiko terjejas pada masa hadapan. *E-Gayad Mabalut Glosari* diperkenalkan sebagai satu inisiatif pendigitalan bahasa yang melibatkan komuniti Bisaya secara langsung. Kajian ini bukan sekadar mengumpul dan menyusun kosa kata, tetapi juga memastikan keaslian serta kegunaannya dalam kehidupan seharian. Masyarakat Bisaya sendiri berperanan sebagai penyumbang utama dalam mengenal pasti, mengesahkan, dan memperkayakan glosari ini agar tetap relevan untuk generasi akan datang. Artikel ini ditulis sebagai kertas konsep berdasarkan sorotan literatur mengenai dokumentasi bahasa, penglibatan komuniti, dan peranan teknologi dalam pemuliharaan linguistik. Antara cabaran utama yang dibincangkan ialah kekurangan sumber bertulis, kesukaran mengekalkan ketepatan makna, serta keterbatasan akses teknologi dalam kalangan komuniti. Walaupun begitu, peluang untuk merealisasikan projek ini terbuka luas dengan adanya teknologi digital, sokongan institusi akademik, serta kesedaran masyarakat yang semakin meningkat terhadap kepentingan memelihara bahasa ibunda. Kajian ini bukan sahaja membantu mendokumentasi bahasa Bisaya, tetapi juga berfungsi sebagai model pendigitalan pendokumentasian bahasa lain yang berasaskan komuniti. Dengan pendekatan yang lebih inklusif dan kolaboratif, *E-Gayad Mabalut Glosari* bukan sahaja mampu menjadi rujukan primer komuniti pencinta bahasa dan linguistik malah ianya menjadi simbol pemerkasaan identiti dan warisan budaya masyarakat Bisaya.

Kata Kunci: *Pendokumentasian Bahasa, E-Gayad Mabalut, Penglibatan Komuniti, Glosari Digital, Etnik Bisaya, Beaufort*

Abstract: *Language documentation plays a crucial role in ensuring the survival of linguistic heritage, especially for ethnic languages facing challenges in maintaining their usage. Language is not merely a tool for communication but also the soul of a culture. The Bisaya community in Beaufort, Sabah, continues to speak their language in daily life, yet social changes and technological developments present new challenges in preserving it. Without proactive measures, the mastery of the language among the younger generation is becoming*

increasingly vulnerable and at risk of being lost in the future. The E-Gayad Mabalut Glossary is introduced as a digital language initiative that involves the Bisaya community directly. This study not only collects and organizes vocabulary but also ensures the authenticity and daily use of the language. The Bisaya community itself plays a pivotal role in identifying, verifying, and enriching this glossary to keep it relevant for future generations. This article is written as a conceptual paper based on a literature review on language documentation, community involvement, and the role of technology in linguistic preservation. Major challenges discussed include the lack of written resources, difficulties in maintaining the accuracy of meanings, and limited access to technology within the community. Despite these challenges, the opportunity to realize this project is widely open with the support of digital technology, academic institutions, and the growing awareness of the community regarding the importance of preserving their native language. This study not only aids in documenting the Bisaya language but also serves as a model for community-based digital language documentation initiatives for other languages. With a more inclusive and collaborative approach, the E-Gayad Mabalut Glossary can serve as a primary reference for language enthusiasts and linguists, as well as a symbol of empowerment for the identity and cultural heritage of the Bisaya community.

Keywords: *Language Documentation, E-Gayad Mabalut, Community Involvement, Digital Glossary, Bisaya Ethnic Group, Beaufort*

Pengenalan

Dalam arus globalisasi, banyak bahasa etnik semakin kurang digunakan, khususnya dalam kalangan generasi muda, disebabkan dominasi bahasa utama dan ketiadaan usaha dokumentasi yang sistematik (Grenoble & Whaley, 2006; UNESCO, 2022). Bahasa Bisaya di Sabah turut mengalami penurunan penggunaan, seperti dibuktikan oleh Suhailin et al. (2020) yang mendapati golongan muda semakin jarang menggunakan bahasa ini dalam kehidupan seharian. Sehubungan itu, E-Gayad Mabalut Glosari diperkenalkan sebagai usaha rintis untuk memelihara bahasa dengan mengetengahkan perkataan dan ungkapan yang baik serta sesuai digunakan dalam rutin harian masyarakat. Pendokumentasian bahasa bukan sahaja membantu melestarikan kosa kata dan struktur linguistik yang semakin dilupakan, tetapi juga memperkukuh identiti etnik dan menyemai rasa bangga terhadap warisan budaya (Skutnabb-Kangas & McCarty, 2008; Romaine, 2007).

E-Gayad Mabalut yang diterjemahkan sebagai *'percakapan atau perkataan yang baik'* dalam bahasa Bisaya, dibangunkan melalui pendekatan kolaboratif bersama komuniti. Glosari ini bukan sahaja berfungsi sebagai repositori istilah, tetapi juga menyediakan makna dan penggunaannya dalam konteks budaya, tradisi, dan nilai-nilai yang diamalkan oleh komuniti Bisaya. Penglibatan langsung komuniti dalam pembangunan kandungan glosari dapat membantu memastikan kesahihan dan kesesuaian yang lebih relevan dengan realiti tempatan (Bowern, 2015). Dengan memanfaatkan teknologi digital yang interaktif dan mudah diakses, projek ini menyediakan peluang untuk pemuliharaan bahasa yang lebih inklusif dan lestari. Kajian ini penting kerana ianya bukan sahaja menunjukkan potensi teknologi dalam usaha revitalisasi bahasa minoriti, tetapi juga memperkenalkan model dokumentasi berasaskan komuniti yang boleh dijadikan rujukan dalam konteks Malaysia, yang kaya dengan kepelbagaian linguistik (Austin & Sallabank, 2011).

Isu dan Permasalahan Kajian

Penggunaan bahasa Bisaya sebagai bahasa minoriti semakin berkurangan akibat pengaruh kuat bahasa Inggeris dan bahasa Melayu sebagai bahasa pengantar rasmi di Malaysia, yang mengancam kelangsungan dan kepelbagaian bahasa ini dalam komuniti. Pendokumentasian bahasa etnik adalah langkah penting untuk menjaga warisan ini kerana bahasa bukan sahaja alat komunikasi, tetapi juga simbol budaya dan identiti masyarakat (Waemasna & Yusniza, 2023). Bagi bahasa yang dituturkan oleh komuniti kecil, pendokumentasian berfungsi sebagai simpanan yang boleh digunakan untuk pendidikan, pemulihan, dan kajian bahasa. Pendokumentasian menjadi lebih penting apabila bilangan penutur asli semakin sedikit atau bahasa tersebut tidak diajar dalam sekolah atau digunakan dalam urusan rasmi. Tambahan lagi, menurut Nasrun & James (2017), kebanyakan bahasa-bahasa tempatan seperti bahasa-bahasa daerah agak kurang diberi perhatian kerana penulisan lebih tertumpu kepada kajian fonetik dan fonologi.

Peralihan Bahasa dan Keterancaman Bahasa Etnik

Menurut Sa'adiah et al., (2023), kebanyakan bahasa di dunia pada hari ini telah mengalami beberapa bentuk peralihan bahasa dan sebahagian besar berdepan dengan situasi keterancaman bahasa. Hal ini disokong oleh kajian Hayati et al., (2020) bahawa peralihan bahasa berlaku apabila suatu masyarakat mengabaikan kewujudan bahasa etnik mereka sendiri dari segi penggunaan dengan menggunakan bahasa yang lebih dominan seperti bahasa Melayu dan Bahasa Inggeris dalam aspek sosial dan ekonomi. Dalam sistem pendidikan di Malaysia, setiap pelajar didedahkan dengan kepelbagaian bahasa sejak di alam persekolahan, sejajar dengan latar belakang bahasa ibunda mereka yang berbeza mengikut kaum dan etnik (Tamilarasi & Khairul, 2022). Namun begitu, Bahasa Melayu dan Bahasa Inggeris telah menjadi bahasa pertama dan kedua dalam sistem pendidikan, media, dan pekerjaan di Malaysia. Kewujudan bahasa yang lebih dominan dalam masyarakat multibahasa *(multilingual)* turut menyumbang kepada pilihan bahasa, khususnya dalam kalangan penutur bahasa minoriti yang akhirnya menyumbang kepada penurunan penggunaan bahasa ibunda dalam kalangan generasi muda (Dilah et al., 2020). Tambahan pula, tekanan sosial untuk berasimilasi dengan bahasa majoriti menjadikan bahasa minoriti semakin kurang relevan dituturkan dalam kehidupan seharian.

Peranan Bahasa Sebagai Identiti dan Jiwa Budaya

Bahasa mencerminkan budaya kerana masyarakat menzahirkan nilai, kepercayaan dan norma mereka melalui bahasa. Oleh itu, apabila sesuatu bahasa pupus, masyarakat turut kehilangan satu cara pandang dunia yang unik (Fishman, 1991). Bahasa juga berperanan penting dalam membentuk identiti etnik, sekaligus memupuk rasa kekitaan dalam kalangan komuniti. Dalam konteks masyarakat majmuk di Malaysia, kepelbagaian etnik mendorong komuniti minoriti untuk memelihara dan memulihara bahasa masing-masing sebagai usaha mempertahankan identiti budaya (Rozmalina et al., 2018). Tambahan pula, arus globalisasi dan tekanan daripada kepadatan komuniti lain semakin menggesa etnik minoriti untuk terus memperjuangkan warisan budaya serta jati diri mereka. Amalan budaya dalam sesebuah masyarakat lazimnya berubah mengikut peredaran masa. Perubahan ini membuka ruang kepada pengaruh luar yang seterusnya bertembung dengan budaya tempatan, lalu mencetuskan proses asimilasi atau akulturasi dalam komuniti (Ayu et al., 2024).

Komuniti Bisaya di Beaufort dan Inisiatif *E-Gayad Mabalut Glosari*

Suku kaum Bisaya di Sabah merupakan sebahagian daripada kelompok Austronesia yang berhijrah ke Borneo, dan seterusnya membentuk identiti etnik tersendiri, meskipun berkongsi akar sejarah dan budaya dengan masyarakat Visaya di Filipina (Lokin, 2004). Komuniti Bisaya di Beaufort masih aktif menuturkan bahasa ibunda mereka, terutama dalam kehidupan harian, namun penggunaan bahasa Bisaya kini menunjukkan penurunan, terutamanya dalam kalangan generasi muda yang lebih cenderung menggunakan Bahasa Melayu dan Inggeris. Kajian Suhailin et al., (2020) membuktikan bahawa bilangan penutur bahasa Bisaya semakin berkurang dan transmisi bahasa antara generasi terancam akibat dominasi Bahasa Melayu dalam domain keluarga. Oleh itu, usaha untuk memelihara warisan linguistik komuniti ini perlu dilakukan secara sistematik dan inklusif. Inisiatif *E-Gayad Mabalut Glosari*, sebagai platform dokumentasi digital, berfungsi bukan sahaja untuk merakam kosa kata bahasa Bisaya, malah menggalakkan penglibatan aktif komuniti dalam proses dokumentasi. Pendekatan ini selari dengan model *community-based language documentation* yang menekankan kerjasama erat antara pengkaji dan penutur asli dalam usaha pemeliharaan bahasa (Czaykowska-Higgins, 2009). Melalui pendekatan tersebut, *E-Gayad Mabalut Glosari* berpotensi untuk menjadi sumber rujukan digital yang lestari bagi generasi akan datang.

Sorotan Literatur

Dalam konteks pembangunan E-Gayad Mabalut Glosari, sorotan literatur membantu menelusuri isu-isu berkaitan penurunan penggunaan bahasa minoriti, kepentingan pendokumentasian bahasa, peranan teknologi dalam revitalisasi bahasa, serta pendekatan berasaskan komuniti dalam usaha pemeliharaan warisan budaya tidak ketara. Analisis tematik digunakan untuk mengenal pasti dan mengorganisasikan tema-tema utama yang relevan dengan kajian, sekaligus memudahkan pemahaman terhadap cabaran dan peluang pemulihan bahasa Bisaya. Justeru, bahagian ini akan membincangkan literatur utama yang berkaitan secara langsung dengan objektif dan fokus kajian ini.

Pendokumentasian Bahasa

Pendokumentasian bahasa adalah proses sistematik melibatkan aktiviti mengumpul, merakam, dan menyusun data linguistik, khususnya bagi bahasa yang kurang digunakan, untuk rujukan masa depan (Himmelmann, 1998). Ia melibatkan rakaman pertuturan penutur asli, transkripsi, terjemahan, dan analisis konteks sosial, amat penting bagi bahasa minoriti tanpa sistem tulisan atau penggunaan dalam pendidikan rasmi. Selain mengatasi penurunan penggunaan, proses ini membantu memahami struktur bahasa dan budaya komuniti (Grenoble & Whaley, 2006). Dengan kemajuan teknologi seperti ELAN, FLEx, dan platform dalam talian, dokumentasi kini lebih cepat dan mudah diakses, terutama oleh generasi muda (Skilton et al., 2024; Carpenter et al., 2016). Di Malaysia, pendokumentasian melibatkan komuniti etnik seperti Mah Meri, Orang Asli, serta etnik di Sabah dan Sarawak. Asmah Haji Omar (2012) menegaskan bahasa bukan sahaja mencerminkan identiti etnik, tetapi juga nilai budaya. Projek global seperti DOBES dan ELAR menunjukkan bahawa teknologi digital mempercepat dan memperkukuh usaha pemuliharaan bahasa, menjadikan pendigitalan bahasa strategi utama untuk kelestarian warisan linguistik di seluruh dunia (Himmelmann, 2006).

Penglibatan Komuniti

Penglibatan komuniti dalam usaha memelihara dan memulihara bahasa etnik atau bahasa ibunda kaum minoriti dianggap sebagai elemen kritikal dalam memastikan kejayaan dokumentasi dan kelestarian bahasa tersebut. Model *community-based language documentation* menekankan keperluan kerjasama erat antara penyelidik luar dan komuniti penutur asli, di mana komuniti bukan sekadar menjadi subjek kajian, tetapi turut terlibat aktif sebagai penyumbang, penyunting, dan pengguna sumber linguistik yang dihasilkan (Czaykowska-Higgins, 2009). Pendekatan ini bukan sahaja memperkasa komuniti dalam mengurus warisan bahasa mereka, malah meningkatkan kesedaran terhadap nilai identiti dan budaya sendiri. Kajian oleh Rice (2011) juga menekankan bahawa pendokumentasian yang berasaskan komuniti membina hubungan saling menghormati dan memberi peluang kepada komuniti untuk menentukan arah serta keutamaan dalam projek pemuliharaan bahasa. Sementara itu, Grenoble & Furbee (2010) menunjukkan bahawa penglibatan aktif komuniti mempercepatkan proses revitalisasi bahasa melalui pendidikan bahasa ibunda, bengkel bahasa, dan pembangunan bahan pengajaran yang relevan. Keberkesanan pendekatan ini dapat dilihat dalam inisiatif revitalisasi bahasa Māori di New Zealand yang melibatkan kerjasama antara guru, pelajar, dan keluarga dalam pembangunan kurikulum dan bahan pengajaran (King, 2001), serta dalam projek *Kadazandusun Language Foundation* (KLF) di Malaysia yang melibatkan guru dan komuniti dalam penghasilan kamus dan bahan pembelajaran berasaskan bahasa tempatan (Lasimbang & Tangit, 2000).

Peranan Teknologi dalam Pemuliharaan Bahasa

Kemajuan teknologi telah membawa kepada pembangunan pelbagai perisian khusus untuk mendokumentasikan bahasa. Perisian seperti ELAN digunakan untuk anotasi pertuturan, FLEx untuk penyusunan kamus, dan *SayMore* untuk rakaman temu bual. Perisian-perisian ini membolehkan penyelidik dan komuniti menyusun bahan linguistik secara sistematik dan interaktif (Bird & Simons, 2003). Selain itu, aplikasi mudah alih seperti Aikuma turut menyediakan platform bagi komuniti mendokumentasikan bahasa mereka sendiri menggunakan telefon pintar, sekaligus memperluas penglibatan masyarakat dalam usaha pemeliharaan bahasa (Bird et al., 2014). Beberapa inisiatif glosari dan kamus digital di peringkat antarabangsa telah membuktikan keberkesanan pendekatan ini, antaranya *Kamusi Project* untuk bahasa Swahili (Benjamin & Biersteker, 2001) dan *Te Whanake* bagi bahasa Māori (Moorfield, 2008). Di Malaysia pula, kewujudan Kamus Kadazan-Dusun Online memperlihatkan potensi besar teknologi dalam memperluas akses masyarakat terhadap bahasa-bahasa minoriti (Miller et al., 2015).

Tahap Penggunaan Bahasa dalam Kehidupan Seharian

Bahasa Bisaya Sabah, yang merupakan salah satu cabang daripada keluarga bahasa Austronesia, masih digunakan secara aktif oleh penutur asli, terutama dalam kalangan warga emas di kawasan Beaufort dan Kuala Penyu, Sabah (Suhailin et al., 2020). Namun, pemerhatian lapangan dan data tidak formal menunjukkan penurunan ketara dalam penggunaan bahasa ini, terutamanya di kalangan generasi muda. Generasi lebih tua masih menggunakan bahasa Bisaya dalam kehidupan seharian, tetapi proses pemindahan bahasa kepada generasi berikutnya semakin terancam. Faktor utama yang menyumbang kepada penurunan ini adalah dominasi bahasa Melayu sebagai bahasa pengantar di sekolah dan urusan rasmi, serta pengaruh bahasa Inggeris dalam media massa. Justeru, penggunaan

bahasa Bisaya kini lebih tertumpu kepada komunikasi dalam keluarga dan majlis adat, sementara dalam situasi rasmi seperti di sekolah, tempat kerja, dan media sosial, ia semakin jarang digunakan. Keadaan ini mencerminkan bahawa bahasa Bisaya berada dalam kedudukan yang semakin terancam, dan tanpa langkah-langkah pemuliharaan yang proaktif, ia berpotensi hilang dalam beberapa generasi akan datang. Kehilangan bahasa, seperti yang diperingatkan oleh Asmah (2015) dan Moseley (2010), bukan hanya melibatkan kehilangan alat komunikasi tetapi juga warisan budaya dan identiti etnik yang penting. Oleh itu, usaha mendokumentasi dan memulihara bahasa Bisaya adalah amat penting bagi memastikan warisan linguistik ini terus hidup dan dipertahankan untuk generasi akan datang, dengan pendekatan seperti pendokumentasian digital, penglibatan komuniti, dan pendidikan berasaskan bahasa ibunda yang dapat memastikan kelestarian bahasa ini.

Rasional Pembangunan E-Gayad Mabalut Glosari

Sebagai tindak balas terhadap penurunan penggunaan bahasa Bisaya dalam kalangan generasi muda, *E-Gayad Mabalut Glosari* diperkenalkan sebagai satu inisiatif strategik ke arah pendigitalan dan pemuliharaan bahasa serta warisan budaya etnik Bisaya. Glosari ini mendokumentasikan kosa kata asas yang digunakan dalam kehidupan seharian, termasuk nilai murni dan budaya tempatan, serta berfungsi sebagai sumber pembelajaran untuk generasi muda dan bukan penutur asli. Inisiatif ini selari dengan seruan global untuk melindungi bahasa ibunda yang semakin terpinggir, seiring pandangan Crystal (2000) bahawa kehilangan bahasa bermakna kehilangan budaya, identiti dan cara pandang dunia sesebuah komuniti. Justeru, *E-Gayad Mabalut Glosari* bukan sekadar platform linguistik, tetapi turut menjadi instrumen penting dalam memperkasakan komuniti Bisaya dan memastikan kelangsungan warisan budaya mereka dalam era digital.

Ciri-Ciri Asas E-Gayad Mabalut Glosari

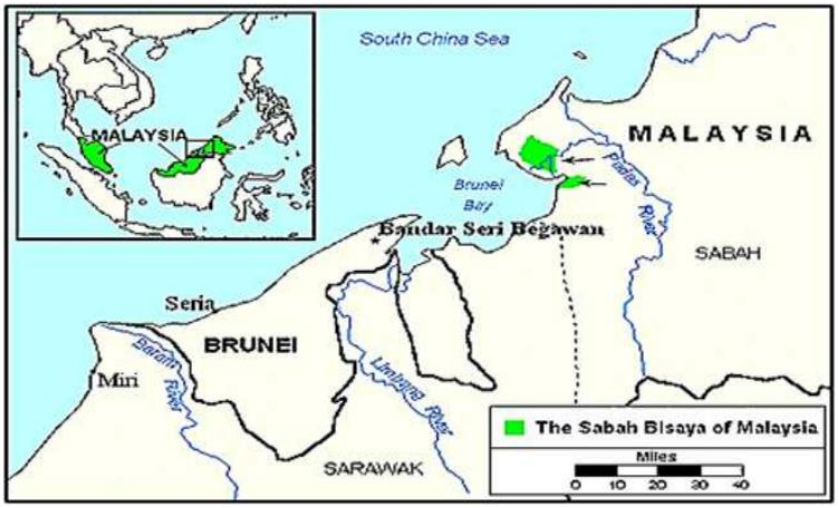
E-Gayad Mabalut Glosari direka dengan pendekatan mesra pengguna dan inklusif untuk menyokong pembelajaran bahasa secara efektif. Glosari ini memaparkan struktur dwibahasa (Bisaya–Melayu) bersama transkripsi fonetik dan audio sebutan bagi setiap entri, serta contoh ayat harian dalam bahasa Bisaya dengan terjemahan Melayu. Sebagai contoh, perkataan “masaga” yang bermaksud *"rajin"* digunakan dalam ayat *"Ahmad seorang anak yang rajin".* Terjemahan oleh Informan 1 (66 tahun) ialah *“masaga kokolot anak maka ngaran da Yamat tih,”* yang mencerminkan gaya bahasa lebih formal dan tradisional. Sementara itu, terjemahan yang diberikan oleh Informan 2 (21 tahun) berbunyi *“elelele masaga kokolot yamat noh awat taw,”* yang menunjukkan gaya bahasa lebih santai dan kontemporari. Perbezaan dalam sebutan dan gaya ini mencerminkan variasi antara generasi tua yang lebih formal dan generasi muda yang cenderung menggunakan bahasa yang lebih kasual. Glosari ini turut menyertakan elemen visual seperti gambar dan ilustrasi yang menggambarkan motif budaya Bisaya, menjadikannya bukan hanya sebagai repositori linguistik tetapi juga sebagai bahan bantu mengajar yang sesuai untuk sekolah rendah dan menengah. Pendekatan multimodal ini menyokong pelbagai gaya pembelajaran dan diyakini dapat memperkukuh pemerolehan bahasa, selaras dengan prinsip pembelajaran multimodal (Hinton, Huss, & Roche, 2018; Fishman, 1991).

Metodologi Kajian

Pembangunan *E-Gayad Mabalut Glosari* menggunakan kaedah kualitatif bagi memahami secara mendalam penggunaan bahasa Bisaya dalam kehidupan seharian serta nilai budaya yang terkandung di dalamnya. Kajian ini mengaplikasikan dua pendekatan utama, iaitu etnografi kolaboratif dan partisipatif, bagi membolehkan pengkaji berinteraksi secara langsung dengan komuniti dan bekerjasama dengan informan dalam proses pengumpulan data. Persampelan purposif digunakan untuk memilih informan yang sesuai, melibatkan penutur aktif berusia 50 tahun ke atas sebagai sumber utama kerana mereka memiliki pengetahuan mendalam tentang kosa kata dan ungkapan tradisional, serta 5 hingga 7 orang belia berusia 15 hingga 40 tahun bagi mencerminkan variasi penggunaan bahasa mengikut generasi. Data dikumpul melalui interaksi lapangan, temu bual tidak formal, rakaman perbualan, catatan lapangan, dan penyertaan dalam aktiviti komuniti. Pendekatan ini penting untuk memastikan glosari yang dibangunkan bukan sahaja mencerminkan aspek linguistik, tetapi turut menggambarkan nilai budaya dan realiti penggunaan bahasa Bisaya dalam konteks komuniti di Beaufort.

Komuniti Bisaya dan Inisiatif E-Gayad Mabalut Glosari

Komuniti Bisaya, yang juga dikenali dengan nama Bisayah atau Besaya, telah menetap di beberapa kawasan di Borneo, termasuk Sabah, Sarawak, dan Brunei. Di Sabah, majoriti masyarakat Bisaya dapat ditemui di daerah Beaufort dan Kuala Penyu. Kehadiran mereka yang paling ketara terletak di kawasan barat Beaufort, terutamanya sepanjang Sungai Padas Damit, Gramma, dan Sungai Padas Selatan. Di samping itu, banyak kampung Bisaya dapat ditemui sepanjang Sungai Klias, di mana mereka bergaul dengan masyarakat etnik Kadazan. Pekan Kota Klias yang terletak di kawasan juga turut dihuni oleh penduduk yang menggunakan bahasa Brunei (Dunn, 1984). Di Borneo dan Filipina, terdapat sebuah kumpulan etnik yang dikenali sebagai Visaya (atau Visayans). Persoalan sama ada masyarakat Visaya di Filipina berasal dari Bisaya di Borneo telah menjadi subjek perbincangan dalam kalangan sejarawan dan ahli antropologi selama bertahun-tahun, namun sehingga kini tiada jawapan yang muktamad (Sonza, 1974). Dalam kalangan masyarakat Bisaya di Borneo, terdapat juga satu teori menarik mengenai asal-usul nama mereka. Berdasarkan sebuah lagenda yang dicatatkan oleh Derek Headly pada tahun 1950, Sultan Brunei pernah melawat kawasan penempatan Bisaya dan terpesona dengan keindahan tanah tersebut, lalu berseru, *"Bisai-yah!"*, yang diterjemahkan sebagai *"Betapa cantiknya!"*.



Rajah 1: Kawasan Bahasa Bisaya Beaufort, Sabah

Sumber : Joshua Project (2019) dalam Suhailin et al., (2020)

Etnik Bisaya merupakan antara komuniti terawal di Borneo Utara yang memeluk agama Islam sejak abad ke-13. Pada masa kini, kira-kira 90 peratus masyarakat Bisaya di Sabah menganut agama Islam, sementara kebanyakan masyarakat Bisaya di Sarawak beragama Kristian. Walau bagaimanapun, masih terdapat segelintir masyarakat Bisaya, seperti di Manunggang, Sabah, yang terus mengamalkan kepercayaan tradisional (Suhailin et al., 2020). Dari segi ekonomi, masyarakat Bisaya terkenal dengan kepakaran dalam bidang pertanian, mengusahakan pelbagai tanaman seperti padi, halia, rumbia, kunyit, ubi, pisang, keladi, lada, kelapa, dan buah-buahan tempatan. Dalam aspek kebudayaan, mereka masih mengamalkan beberapa tradisi seperti Tarian Liliput, Tarian Sayau Bagarus (yang melibatkan penggarusan batang rumbia), dan Tarian Mengalawat (tarian memijak hampas batang rumbia). Antara hidangan tradisional yang paling dikenali ialah ambuyat, yang diperbuat daripada tepung sagu rumbia dan dimakan bersama pelbagai lauk-pauk (Blandoi, 2002). Namun demikian, pengaruh pemodenan dan proses asimilasi dengan budaya dominan memberi cabaran kepada kelestarian budaya dan bahasa Bisaya, menjadikan usaha pemeliharaan warisan ini semakin penting untuk memastikan kesinambungannya di masa hadapan.

Pendekatan Etnografi Kolaboratif

Pendekatan etnografi kolaboratif menekankan penglibatan aktif komuniti tempatan sepanjang proses dokumentasi bahasa dengan menjadikan informan sebagai rakan strategik dalam kajian. Data kosa kata dikumpulkan melalui temu bual bersama penutur asli, terutamanya warga emas dan pemimpin adat yang fasih menggunakan bahasa Bisaya. Pendekatan ini tidak melihat komuniti sebagai sekadar subjek kajian, tetapi melibatkan mereka secara langsung dalam semua peringkat penghasilan glosari, mulai dari pengumpulan data, analisis, hingga penyebaran hasil kajian (Lassiter, 2005). Pendekatan ini sangat relevan dalam usaha memelihara bahasa etnik seperti bahasa Bisaya kerana ia menghormati dan mengangkat suara, pengalaman, serta perspektif komuniti asal secara langsung, sekaligus memastikan hasil kajian menjadi lebih tepat, bermakna, dan berdaya guna.

Pemerhatian Partisipatif

Selain temu bual, kaedah pemerhatian partisipatif digunakan sebagai teknik utama dalam pendekatan etnografi bagi membolehkan penyelidik terlibat secara langsung dalam kehidupan seharian komuniti yang dikaji. Melalui kaedah ini, penyelidik menyertai pelbagai aktiviti sosial dan budaya masyarakat Bisaya seperti majlis kenduri, upacara adat, dan interaksi harian, sekali gus menyaksikan sendiri penggunaan bahasa Bisaya dalam konteks sebenar. Pendekatan ini membolehkan pemahaman yang lebih mendalam terhadap struktur dan variasi bahasa, serta makna budaya, nilai simbolik dan norma sosial yang tersirat dalam setiap pertuturan (Bernard, 2011). Pengalaman ini juga membantu penyelidik memahami bahasa dan budaya daripada sudut pandang komuniti sendiri, sekali gus meningkatkan keautentikan dan kerelevanan dapatan. Selain itu, pendekatan ini sejajar dengan prinsip penyelidikan dekolonial yang menekankan penghargaan terhadap pengetahuan komuniti setempat sebagai sumber ilmu yang sah dalam wacana akademik.

Cabaran dalam Pendokumentasian Bahasa

Pendokumentasian bahasa adalah usaha yang sangat penting dalam memastikan kelangsungan sesuatu bahasa, terutamanya bahasa-bahasa peribumi yang semakin terancam. Bagi bahasa Bisaya di Beaufort, Sabah, pendokumentasian ini menghadapi pelbagai cabaran yang boleh menjejaskan usaha pemeliharaan bahasa tersebut. Dalam konteks masyarakat Bisaya, cabaran utama yang dihadapi termasuk kekurangan sumber yang mencukupi, keterbatasan teknologi, variasi linguistik yang meluas, serta sikap generasi muda terhadap penggunaan bahasa ibunda mereka. Isu-isu ini memerlukan pendekatan yang holistik dan bersepadu untuk memastikan bahasa Bisaya bukan sahaja didokumentasikan dengan tepat, tetapi juga terus berkembang dan dilestarikan sebagai sebahagian daripada warisan budaya yang bernilai.

Kekurangan Sumber Bertulis Terdahulu

Bahasa Bisaya di Sabah masih kekal sebagai bahasa lisan tanpa sistem penulisan formal yang meluas, menjadikan usaha untuk mendokumentasikannya lebih sukar. Kekurangan bahan dokumentasi seperti kamus, buku teks, atau sumber linguistik akademik menjadikan proses untuk memahami struktur bahasa secara sistematik sangat terbatas. Oleh itu, pendokumentasian bahasa Bisaya perlu bermula dari asas, bergantung kepada ingatan dan pengalaman penutur asli untuk menyampaikan maklumat linguistik dengan konsisten. **Grenoble & Whaley (2006)** menyatakan bahawa kekurangan dokumentasi awal menjadikan usaha pemuliharaan bahasa ini memerlukan masa dan kesabaran. **Hinton (2001)** pula menekankan bahawa penglibatan komuniti sangat penting dalam memastikan makna asli bahasa dipelihara. Selain itu, **Himmelmann (2006)** menjelaskan bahawa masalah kekurangan dana, pakar linguistik, dan peralatan rakaman yang mencukupi menghalang usaha mendokumentasikan bahasa secara menyeluruh. Di samping itu, kekurangan pengetahuan teknikal dalam kalangan komuniti untuk menggunakan teknologi terkini menambah kesukaran dalam usaha pendokumentasian ini, dan jika tidak ditangani, bahasa Bisaya berisiko semakin terpinggir dan mungkin hilang.

Teknologi Pendokumentasian Bahasa

Cabaran kedua yang dihadapi dalam pendokumentasian bahasa Bisaya adalah kekurangan akses kepada teknologi yang diperlukan untuk mendigitalkan bahan bahasa secara berkesan. **Bird & Simons (2003)** menyatakan bahawa kebanyakan komuniti peribumi tidak mempunyai kemudahan teknologi yang mencukupi, dan di Sabah, khususnya di kawasan luar bandar seperti Beaufort, masalah infrastruktur teknologi menghalang komuniti daripada mengakses perisian atau platform yang sesuai untuk menyimpan dan menganalisis data linguistik. Untuk mengatasi hal ini, platform digital seperti ***OpenSpeaks Multimedia Toolkit*** dan ***SayMore*** boleh digunakan dalam pembangunan ***E-Gayad Mabalut Glosari.*** Kedua-dua platform ini menawarkan kemudahan untuk mengumpul dan menyimpan pelbagai jenis data linguistik, termasuk teks, audio, dan visual, dengan cara yang mudah diakses, mesra pengguna, dan sesuai dengan keperluan komuniti luar bandar. ***OpenSpeaks*** membolehkan rakaman audio-visual dan pengurusan hak cipta, manakala ***SayMore*** membantu dalam pengorganisasian data serta penjejakan kemajuan dokumentasi (The Open Language Documentation Project, 2019; SayMore, 2025). Penggunaan platform-platform ini dapat mempercepatkan proses pendokumentasian bahasa Bisaya, memudahkan akses di kawasan luar bandar, serta memastikan bahan yang dihasilkan dapat dipelihara dan disebarkan secara meluas tanpa memerlukan infrastruktur teknologi yang kompleks.

Variasi Dialek dan Linguistik dalam Kalangan Penutur Sendiri

Bahasa Bisaya yang dituturkan di kawasan Beaufort, Kuala Penyu, dan Sipitang memperlihatkan variasi dialek yang ketara dari segi sebutan, kosa kata dan struktur ayat, bergantung kepada lokaliti dan komuniti penutur. Cabaran ini menimbulkan persoalan penting dalam proses pendokumentasian, khususnya dalam menentukan bentuk standard yang mewakili keseluruhan komuniti Bisaya. Menurut Trudgill (2002), variasi dialek merupakan fenomena semula jadi dalam mana-mana bahasa, namun pendekatan terhadapnya harus bersifat inklusif agar tidak meminggirkan mana-mana subkumpulan. Dorian (1994) turut menekankan keperluan semangat kompromi dalam revitalisasi bahasa supaya setiap komuniti merasa diwakili. Dalam konteks Bisaya, perbezaan ini bukan sahaja bersifat geografi tetapi turut dipengaruhi oleh faktor generasi dan asimilasi budaya luar. Generasi muda, misalnya, lebih cenderung menggunakan gaya pertuturan santai yang terpengaruh dengan bahasa Melayu dan Inggeris, manakala generasi lebih tua kekal dengan bentuk pertuturan tradisional yang kaya nilai budaya. Fenomena ini menggambarkan proses pertembungan budaya akibat pengaruh pendidikan, media dan mobiliti sosial. Kajian oleh Mahali et al. (2021) mengenai masyarakat Murut di Keningau menunjukkan pola yang sama apabila generasi muda lebih banyak menggunakan dialek Melayu Sabah dalam komunikasi harian. Justeru, usaha pendokumentasian bahasa Bisaya perlu mengambil kira variasi ini secara menyeluruh, bagi mengelakkan kehilangan elemen unik setiap dialek serta memastikan kelangsungan warisan budaya komuniti yang lebih inklusif dan autentik.

Sikap Generasi Muda terhadap Bahasa Ibunda

Sikap generasi muda terhadap bahasa ibunda merupakan faktor penting yang menentukan kejayaan usaha pendokumentasian dan pemeliharaan bahasa, termasuk dalam kalangan masyarakat Bisaya di Sabah. Pengaruh bahasa Melayu dan Inggeris, terutamanya melalui sistem pendidikan, media sosial, dan persekitaran kerja, telah menyebabkan ruang penggunaan bahasa Bisaya semakin terhad dalam kehidupan seharian. Kajian oleh Suhailin

et al., (2020) juga mendapati bahawa penutur muda Bisaya menunjukkan tahap penggunaan bahasa ibunda yang rendah, khususnya dalam konteks komunikasi formal dan pendidikan, walaupun mereka masih mengekalkan kefahaman asas terhadap bahasa tersebut. Fishman (1991) menjelaskan bahawa perubahan sikap generasi muda merupakan petunjuk utama berlakunya peralihan bahasa *(language shift)*. Dalam hal ini, Hornberger & Coronel-Molina (2004) menekankan kepentingan pendekatan holistik dalam perancangan bahasa, termasuk peranan pendidikan, budaya dan identiti dalam memperkukuh kedudukan bahasa ibunda. Di Sabah, bahasa Bisaya jarang digunakan dalam domain rasmi, menjadikannya kurang kelihatan dan kurang digunakan secara aktif. Tanpa sokongan daripada generasi muda, usaha pemeliharaan bahasa akan menjadi lebih mencabar. Oleh itu, inisiatif pendokumentasian perlu disertai dengan strategi jangka panjang yang memberi penekanan kepada pengukuhan nilai dan peranan bahasa Bisaya sebagai warisan budaya yang signifikan. Pemeliharaan bahasa ini bukan sahaja memastikan kesinambungan komunikasi antara generasi, tetapi juga mempertahankan identiti serta khazanah budaya yang unik dan bernilai tinggi.

Peluang Pendokumentasian Bahasa Etnik Melalui *E-Gayad Mabalut Glosari*

Dalam menghadapi cabaran dokumentasi bahasa etnik seperti bahasa Bisaya di Sabah, terdapat juga pelbagai peluang dan potensi yang boleh dimanfaatkan untuk menjamin kelangsungan dan pemerkasaan warisan linguistik tersebut. Inisiatif seperti *E-Gayad Mabalut Glosari* bukan sahaja membuka ruang kepada dokumentasi yang lebih sistematik, tetapi juga berpotensi menjadi pemangkin kepada kebangkitan semula bahasa ibunda dalam kalangan komuniti khususnya generasi muda.

Peningkatan Kesedaran terhadap Kepentingan Pemuliharaan Bahasa

Dalam beberapa tahun kebelakangan ini, semakin ramai yang menyedari betapa pentingnya untuk memelihara bahasa ibunda, dan perhatian terhadapnya semakin meningkat di seluruh dunia, termasuk di Malaysia. Pelancaran *Indigenous Languages Decade 2022–2032* oleh UNESCO telah memberi dorongan penting untuk usaha kolektif bagi memelihara dan menghidupkan semula bahasa-bahasa yang terancam, termasuk bahasa peribumi di Malaysia (UNESCO, 2021). Menurut Ghafar (2023), bahasa bukan hanya sekadar alat komunikasi, tetapi juga elemen penting dalam budaya yang menyokong pembangunan sosial. Beliau juga menyatakan bahawa bahasa memainkan peranan besar dalam interaksi manusia dan memberi pengaruh mendalam terhadap budaya secara keseluruhan. Dalam konteks bahasa Bisaya, kajian oleh Suhailin et al. (2020) menekankan bahawa ada keperluan mendesak untuk memelihara dan mendokumentasikan bahasa tersebut, terutamanya kerana semakin kurang penggunaannya di kalangan generasi muda. Peningkatan kesedaran ini memberi asas yang kuat, baik dari segi moral, ilmiah, mahupun sosial, untuk menyokong projek pemuliharaan seperti *E-Gayad Mabalut Glosari,* yang boleh menjadi platform penting untuk mengekalkan warisan bahasa dan budaya masyarakat Bisaya di Sabah.

Penggunaan Teknologi Digital Dalam Pendokumentasian Bahasa

Perkembangan teknologi digital memberi peluang besar dalam pendokumentasian bahasa, termasuk bahasa Bisaya. Penggunaan aplikasi mudah alih, laman sesawang interaktif, serta rakaman audio dan video menjadikan proses pendokumentasian lebih dinamik dan inklusif, (Austin & Sallabank, 2011). Selain itu, pangkalan data awan *(cloud database)*

membolehkan penyimpanan dan perkongsian bahan bahasa secara dalam talian, yang memudahkan akses tanpa bergantung pada storan fizikal. Dalam konteks *E-Gayad Mabalut Glosari*, platform digital ini membolehkan glosari dibina secara interaktif dan mesra pengguna, serta dikemas kini mengikut keperluan semasa. Ini penting bagi memastikan bahasa Bisaya dapat dipelihara dengan berkesan, terutamanya dalam kalangan generasi muda dan komuniti yang lebih luas, yang semakin memerlukan kemudahan akses digital untuk menghubungkan mereka dengan warisan linguistik mereka.

Peranan Institusi Akademik Dan NGO Dalam Menyokong Projek Bahasa

Institusi pengajian tinggi memainkan peranan utama dalam memastikan pemeliharaan dan dokumentasi bahasa etnik dilakukan secara sistematik, beretika, dan mampan. Melalui jaringan akademik, kepakaran penyelidikan, dan akses kepada sumber pembiayaan, institusi seperti Pusat Penataran Ilmu dan Bahasa (PPIB) serta Institut Kajian Orang Asal Borneo (BoRIIS) di Universiti Malaysia Sabah telah menjadi platform utama dalam menyokong pengajaran, penyelidikan, dan pemerkasaan bahasa etnik di Sabah, termasuk bahasa Bisaya. Kajian oleh Austin dan Sallabank (2011) menegaskan bahawa sokongan daripada institusi akademik sangat penting dalam membina sumber linguistik yang menjadi asas kepada pengajaran dan revitalisasi bahasa minoriti. Selain itu, organisasi bukan kerajaan (NGO) turut memainkan peranan penting dalam memperkukuh jaringan komuniti, memperkasa kapasiti tempatan, dan menggerakkan advokasi berkaitan hak serta nilai bahasa ibunda. NGO seperti *Kadazandusun Language Foundation* (KLF) dan *PACOS Trust* telah menunjukkan keupayaan mereka dalam menyokong pemuliharaan bahasa melalui latihan komuniti, penghasilan bahan pengajaran, dan inisiatif literasi bahasa tempatan. Seperti yang dinyatakan oleh Bowern (2015), penglibatan komuniti dan sokongan institusi adalah kunci kejayaan revitalisasi bahasa. Oleh itu, sinergi antara akademia dan masyarakat sivil sangat penting dalam menjayakan inisiatif akar umbi seperti E-Gayad Mabalut, yang memerlukan kerjasama interdisiplin dan berasaskan komuniti bagi memastikan usaha pendokumentasian bahasa dapat memberi manfaat yang lestari kepada generasi kini dan akan datang.

Pemerkasaan Identiti Etnik Melalui Glosari Interaktif

Glosari interaktif seperti *E-Gayad Mabalut* berperanan lebih daripada sekadar alat dokumentasi, ia juga menjadi wahana pemerkasaan identiti etnik serta pemulihan rasa bangga terhadap warisan budaya. Dengan mengintegrasikan elemen visual, audio, dan konteks penggunaan sebenar dalam kehidupan seharian, glosari ini tidak hanya mendekatkan komuniti dengan bahasa mereka, tetapi juga memudahkan akses dan pemahaman terhadap makna, sebutan, dan aplikasi istilah dalam situasi kontemporari. Sebagai contoh, penggunaan klip video yang memaparkan dialog harian dalam bahasa Bisaya atau rakaman sebutan asli oleh penutur tempatan memberikan pengalaman pembelajaran yang lebih autentik. Pendekatan glosari digital ini terbukti berkesan dalam menarik minat generasi muda yang lebih cenderung kepada pembelajaran berasaskan teknologi dan media interaktif. Kajian Romaine (2006) menekankan bahawa penglibatan belia dalam pembelajaran bahasa ibunda melalui kaedah moden dapat menggalakkan kesinambungan linguistik dan meningkatkan rasa tanggungjawab terhadap pemeliharaan bahasa di kalangan generasi pewaris. Oleh itu, *E-Gayad Mabalut Glosari* bukan hanya bersifat informatif, tetapi juga menjadi jambatan penting dalam menghubungkan generasi lama dan baru melalui bahasa yang dikongsi sebagai asas identiti komuniti Bisaya.

Kesimpulan

Keberhasilan projek *E-Gayad Mabalut Glosari* tidak hanya bergantung pada kecanggihan teknologi atau reka bentuk platform, tetapi bergantung sepenuhnya kepada penglibatan aktif komuniti sebagai pemegang amanah bahasa dan budaya. Komuniti Bisaya dilibatkan sebagai rakan kongsi yang menyumbang secara langsung dalam proses dokumentasi, menjadikan mereka bukan sekadar penerima manfaat, tetapi juga pemilik dan pengguna utama glosari ini. Pendekatan berasaskan komuniti ini memastikan setiap istilah dan makna yang dirakam mencerminkan nilai, amalan harian dan konteks budaya sebenar masyarakat Bisaya. Justeru, glosari ini bukan sekadar repositori linguistik, tetapi juga satu bentuk pernyataan identiti dan ekspresi suara kolektif komuniti.

Bukan itu sahaja, *E-Gayad Mabalut Glosari* diharapkan dapat menjadi pemangkin kepada inisiatif serupa dalam kalangan komuniti etnik lain di Malaysia yang kaya dengan kepelbagaian bahasa dan budaya. Dalam jangka masa panjang, projek ini berpotensi untuk dijadikan model nasional bagi dokumentasi bahasa yang berasaskan komuniti, bersifat inklusif dan mampan. Inisiatif seperti *E-Gayad Mabalut Glosari* sejajar dengan Agenda 2 dalam Rancangan Malaysia Ke-12 (RMK-12) bagi tempoh 2021–2025, menekankan pemerkasaan warisan budaya sebagai asas pembinaan negara bangsa. Agenda ini bertujuan untuk memelihara dan memulihara warisan budaya negara, termasuk warisan budaya tidak ketara seperti bahasa, adat resam, dan amalan tradisional. Usaha ini penting dalam memastikan kelangsungan identiti budaya masyarakat Malaysia yang berbilang kaum serta dalam memperkukuh perpaduan nasional. Oleh itu, usaha pendokumentasian bahasa seperti ini memainkan peranan penting dalam memastikan kelangsungan identiti budaya komuniti minoriti, serta menjamin kesinambungan warisan budaya Malaysia yang berbilang kaum untuk generasi masa hadapan.

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PERANAN DAN PENGARUH AHLI MAJLIS DALAM PEMBANGUNAN DASAR TEMPATAN DI NEGERI SELANGOR

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Abstrak : *Cabang ketiga dalam struktur pentadbiran negara selepas kerajaan persekutuan dan kerajaan negeri adalah Pihak Berkuasa Tempatan (PBT). Dasar dan polisi yang baik dan bermanfaat untuk komuniti adalah matlamat utama yang ingin dicapai dalam system Kerajaan Tempatan. Pihak Berkuasa Tempatan (PBT) mempunyai kuasa untuk melaksanakan sebarang aktiviti yang memberi faedah am kepada penduduk kawasan. Antara isu utama yang kerap dibangkitkan oleh orang awam namun agak kurang dikaji adalah fungsi dan peranan ahli majlis sebagai pembuat dasar di bawah PBT. Mengenalpasti mekanisme untuk menyalurkan aduan dan maklumat daripada peringkat komuniti dan badan eksekutif di PBT di Selangor adalah antara aspek yang perlu diteliti. Peranan ahli majlis di negeri Selangor, berfokuskan beberapa daerah dan zon dalam membangun dasar dan polisi untuk komuniti ini diselidiki melalui penyelidikan kuantitatif temubual secara terfokus terhadap kumpulan sasaran. Pendekatan penyelidikan kuantitatif akan digunakan, menggunakan tinjauan berstruktur untuk mengumpulkan data daripada ahli majlis perbandaran dan pihak berkepentingan yang berkaitan. Analisis statistik lanjutan, seperti Exploratory Factor Analysis (EFA), Structural Equation Modelling (SEM) dan Analisis Regresi, akan digunakan untuk menilai keberkesanan dasar dan mengenal pasti faktor utama membuat keputusan. Dapatan utama daripada kajian ini adalah untuk mengetahui laras kefahaman masyarakat berkenaan peranan ahli majlis dalam negeri Selangor untuk menambaik dasar dan polisi yang lebih holistik untuk membangun komuniti setempat.*

Kata Kunci: *Pihak Berkuasa Tempatan (PBT), Ahli Majlis, Polisi di Selangor, Pembangunan Komuniti*

Pengenalan

1.1 Pendahuluan

Ahli majlis berperanan sebagai perantara penting antara Kerajaan Tempatan, Kerajaan Negeri dan masyarakat, bertindak sebagai saluran utama untuk mengumpul maklum balas awam, menilai keperluan komuniti dan menterjemahkan kebimbangan ini kepada dasar yang boleh diambil tindakan. Peranan mereka adalah penting dalam merapatkan jurang antara pihak berkuasa kerajaan dan orang ramai, memastikan tadbir urus di peringkat perbandaran kekal inklusif, partisipatif dan responsif kepada isu tempatan. Dengan memupuk komunikasi dua hala, ahli majlis membantu memudahkan sistem penyampaian perkhidmatan yang lebih telus dan cekap, akhirnya menyumbang kepada merealisasikan visi, misi dan aspirasi Kerajaan Negeri Selangor. Melalui penglibatan mereka, mereka

memainkan peranan penting dalam mengukuhkan tadbir urus tempatan, meningkatkan pelaksanaan dasar, dan menggalakkan inisiatif pembangunan yang dipacu komuniti.

Laporan Suruhanjaya Athi Nahappan (1968) meletakkan asas bagi struktur dan pentadbiran kerajaan tempatan di Malaysia. Suruhanjaya itu menekankan keperluan ahli majlis yang dilantik oleh kerajaan negeri untuk menyelia dan mengurus hal ehwal kerajaan tempatan, memastikan tadbir urus perbandaran sejajar dengan keutamaan pembangunan negeri dan negara. Laporan itu menggariskan bahawa kerajaan tempatan adalah peringkat penting dalam sistem tadbir urus yang lebih luas, berfungsi sebagai unit pentadbiran yang paling dekat dengan rakyat. Rangka kerja ini membolehkan ahli majlis menangani cabaran setempat, melaksanakan dasar yang disesuaikan dengan keperluan unik kawasan pilihan raya mereka, dan mengawasi pembangunan perkhidmatan perbandaran penting.

Di negeri Selangor, pelantikan, peranan, dan tanggungjawab ahli majlis perbandaran sebahagian besarnya dikawal oleh Garis Panduan Tatacara Ahli Majlis Pihak Berkuasa Tempatan Negeri Selangor. Dokumen undang-undang ini menggariskan skop kuasa, prosedur membuat keputusan, piawaian etika, dan tugas pentadbiran yang diharapkan daripada ahli majlis. Garis panduan ini memastikan ahli majlis mematuhi prinsip tadbir urus yang baik, ketelusan dan akauntabiliti semasa melaksanakan tanggungjawab mereka. Fungsi mereka meluas merentasi pelbagai bidang (Rajah 1). Garis Panduan Tatacara Ahli Majlis Pihak Berkuasa Tempatan Negeri Selangor berfungsi sebagai rangka kerja tadbir urus asas yang bertujuan memastikan semua Pihak Berkuasa Tempatan (PBT) dalam negeri beroperasi secara terkoordinasi, tersusun dan cekap. Garis panduan ini menyediakan proses pengurusan yang seragam untuk ahli majlis, menggariskan peranan, tanggungjawab, dan prosedur pentadbiran mereka untuk mengukuhkan kerja berpasukan, meningkatkan kecekapan tadbir urus, dan meningkatkan standard penyampaian perkhidmatan

Kawalan pentadbiran dan perancangan bandar MDKS dijalankan dengan mematuhi beberapa perundangan utama, termasuk Akta Kerajaan Tempatan 1976 (Akta 171), Akta Perancangan Bandar dan Desa 1976 (Akta 172), Akta Jalan, Parit dan Bangunan 1974 (Akta 133), Akta Bangunan dan Harta Bersama (MA70), Pengurusan Bangunan dan Harta Bersama (Ma707). undang-undang kecil (20 UUK) (Mohsin et al., 2022). Selain itu, MDKS juga mematuhi arahan daripada Majlis Mesyuarat Kerajaan Negeri Selangor, memastikan dasar dan projek pembangunan selari dengan rangka kerja tadbir urus negeri dan inisiatif perancangan bandar yang strategik (Nor Zaini, 2018).

1.2 Latar Belakang Kajian

Peranan, tanggungjawab dan pengaruh ahli majlis perbandaran di Malaysia adalah pelbagai dan meluas merentasi pelbagai dimensi tadbir urus, penglibatan komuniti dan hubungan antara kerajaan. Sebagai pemegang taruh utama dalam kerajaan tempatan, ahli majlis perbandaran memainkan peranan penting dalam membentuk dasar, memudahkan penyertaan awam dan mempengaruhi proses membuat keputusan. Keberkesanan mereka, bagaimanapun, sering ditentukan oleh pelbagai faktor politik, ekonomi, dan pentadbiran yang boleh memperkasakan atau mengekang kuasa mereka. Memahami sifat pelbagai bentuk tanggungjawab mereka memberikan gambaran tentang cabaran dan peluang tadbir urus yang terdapat dalam sistem perbandaran Malaysia.

1.2.1 Peranan dan Tanggungjawab Ahli Majlis Perbandaran

Ahli majlis perbandaran terlibat secara mendalam dalam proses perbincangan, perundingan dan membuat keputusan yang berlaku dalam dewan majlis dan dalam aktiviti tadbir urus luar (Getimis & Hlepas, 2013). Mereka terlibat dalam perancangan strategik dan operasi, memastikan dasar perbandaran sejajar dengan matlamat pembangunan tempatan dan objektif negara yang lebih luas (Zanudin et al., 2019). Penglibatan mereka melangkaui hanya penggubalan dasar, kerana mereka juga menyumbang kepada pelaksanaan dan penilaian dasar, memainkan peranan dalam membentuk keberkesanan program dan perkhidmatan perbandaran. Memandangkan kedudukan mereka sebagai perantara antara kerajaan dan orang ramai, mereka mesti mengemudi landskap politik yang kompleks sambil berusaha untuk memenuhi tanggungjawab tadbir urus mereka.

Aspek penting peranan mereka ialah penglibatan komuniti, yang signifikan untuk memastikan tadbir urus yang inklusif dan demokratik. Ahli majlis perbandaran bertindak sebagai jambatan antara pihak berkuasa tempatan dan penduduk, memperjuangkan kebimbangan awam dan memasukkan kepentingan masyarakat ke dalam perancangan dasar (Zanudin et al., 2019). Penglibatan komuniti yang berkesan memupuk ketelusan yang lebih tinggi, meningkatkan kepercayaan kepada kerajaan tempatan, dan mengukuhkan demokrasi penyertaan (Zanudin et al., 2024; Zanudin et al., 2019; Zanudin et al., 2022). Dengan menggalakkan penglibatan aktif komuniti, ahli majlis membantu mewujudkan dasar yang mencerminkan keperluan dan aspirasi sebenar penduduk setempat. Walau bagaimanapun, untuk mencapai penyertaan yang bermakna memerlukan mekanisme yang membolehkan rakyat menyuarakan kebimbangan mereka dan menyumbang kepada pembuatan keputusan secara tersusun dan termaklum.

Satu lagi tanggungjawab utama ahli majlis perbandaran adalah untuk memudahkan penyertaan orang ramai dalam inisiatif tadbir urus tempatan dan program perbandaran. Penglibatan awam adalah komponen penting dalam tadbir urus yang baik, kerana ia menggalakkan akauntabiliti dan memastikan dasar sejajar dengan keperluan rakyat (Nurudin et al., 2017). Ahli majlis mesti menggalakkan penglibatan rakyat secara aktif dalam pelbagai program perbandaran, daripada perancangan bandar dan pengurusan alam sekitar kepada projek pembangunan ekonomi. Di Malaysia, memupuk kerjasama antara kerajaan tempatan dan orang ramai adalah strategi asas untuk mencapai agenda pembangunan negara yang lebih luas (Nurudin et al., 2017). Dengan mengukuhkan mekanisme penyertaan, pihak berkuasa perbandaran boleh memastikan proses tadbir urus kekal telus, inklusif dan berkesan.

1.2.2 Pengaruh dalam Membuat Keputusan

Pengaruh ahli majlis perbandaran dalam membuat keputusan sebahagian besarnya dibentuk oleh hubungan antara kerajaan mereka, terutamanya interaksi mereka dengan kerajaan negeri. Di Malaysia, operasi kerajaan tempatan banyak dipengaruhi oleh pihak berkuasa peringkat negeri, yang melaksanakan kawalan ketara ke atas sumber perbandaran, rangka kerja dasar dan fungsi pentadbiran (Ik-Tien & Pey-Wen, 2024). Struktur hierarki ini boleh menjadi sumber kuasa dan juga batasan. Di satu pihak, ia membolehkan ahli majlis perbandaran menyelaraskan dasar mereka dengan agenda negeri dan persekutuan, memastikan pendekatan tadbir urus yang koheren. Sebaliknya, ia boleh menyekat autonomi mereka, kerana keputusan utama selalunya memerlukan kelulusan daripada badan pentadbir

yang lebih tinggi. Dinamik ini menyerlahkan sifat terpusat sistem kerajaan tempatan Malaysia, yang kadangkala mengehadkan keupayaan ahli majlis perbandaran membuat keputusan.

Selain daripada hubungan kerajaan, pengaruh ahli majlis perbandaran juga dibentuk oleh rangkaian politik dan ekonomi dalam bidang kuasa mereka. Tadbir urus tempatan di Malaysia selalunya melibatkan hubungan yang rumit antara aktor politik, entiti perniagaan dan pihak berkepentingan yang berpengaruh.

Tambahan pula, keberkesanan ahli majlis perbandaran dipengaruhi oleh ketersediaan garis panduan berstruktur dan rangka kerja membuat keputusan. Rangka kerja tadbir urus yang ditakrifkan dengan baik boleh memberikan kejelasan dalam penggubalan dan pelaksanaan dasar, mengurangkan kekaburan dalam membuat keputusan perbandaran. Walau bagaimanapun, dalam banyak kes, ketiadaan garis panduan piawai membawa kepada ketidakkonsistenan dalam amalan tadbir urus, mengakibatkan ketidakcekapan dan salah urus (Ngah et al., 2012). Untuk meningkatkan keberkesanan membuat keputusan, majlis perbandaran perlu membangunkan rangka kerja berstruktur yang menggalakkan penggubalan dasar berasaskan bukti, kerjasama pihak berkepentingan dan proses tadbir urus yang telus. Selain itu, mewujudkan perkongsian strategik dengan kumpulan sivik, institusi penyelidikan dan pihak berkepentingan swasta boleh meningkatkan lagi tadbir urus perbandaran dengan memasukkan pelbagai perspektif ke dalam keputusan dasar.

1.2.3 Cabaran Dalam Pembuatan Keputusan Perbandaran

Walaupun peranan dan pengaruh penting mereka, ahli majlis perbandaran menghadapi pelbagai cabaran yang menghalang keupayaan mereka untuk mentadbir dengan berkesan. Salah satu cabaran utama ialah penyertaan masyarakat, walaupun penting untuk tadbir urus inklusif, sering dikekang oleh pelbagai faktor. Banyak komuniti kekurangan pengetahuan, sumber dan modal sosial yang diperlukan untuk mengambil bahagian secara berkesan dalam tadbir urus perbandaran (Yahman et al., 2023). Selain itu, rakyat mungkin menghadapi kekangan masa yang menghalang mereka daripada terlibat dalam proses membuat keputusan tempatan. Keterbatasan ini mengakibatkan jurang penyertaan, di mana hanya sebahagian kecil daripada populasi—biasanya mereka yang mempunyai status sosio-ekonomi yang lebih tinggi—bergiat aktif dalam aktiviti tadbir urus, manakala kumpulan terpinggir kekal kurang diwakili (Zanudin et al., 2024; Zanudin et al., 2019). Untuk menangani isu ini, pihak berkuasa tempatan mesti melaksanakan inisiatif pendidikan awam, program jangkauan dan platform penglibatan digital untuk memperkasakan komuniti dengan alatan yang diperlukan untuk mengambil bahagian secara bermakna dalam tadbir urusan.

Tambahan pula, cabaran struktur dan operasi dalam sistem tadbir urus perbandaran juga mempengaruhi keberkesanan membuat keputusan. Profesionalisme dan kapasiti perancang awam memainkan peranan penting dalam membentuk hasil tadbir urus. Kekurangan kakitangan mahir, latihan yang tidak mencukupi, dan akses terhad kepada data yang tepat boleh menjejaskan kualiti dasar dan perkhidmatan perbandaran (Zanudin et al, 2019, Zanudin et al., 2022). Selain itu, jurang maklumat dan ketidakcekapan birokrasi boleh menyebabkan kelewatan dalam pelaksanaan dasar, mengurangkan keberkesanan inisiatif tadbir urus. Untuk mengatasi cabaran ini, majlis perbandaran mesti melabur dalam program

pembinaan kapasiti, penyelesaian tadbir urus berasaskan teknologi, dan pembaharuan institusi yang meningkatkan kecekapan operasi perbandaran.

1.2.4 Faktor Utama Yang Mempengaruhi Ahli Majlis Perbandaran Membuat Keputusan Dalam Pembangunan Dasar

1.2.4.1 Perbandaran Yang Pesat

Masalah ini telah memberi tekanan yang ketara kepada majlis perbandaran di Selangor, khususnya dalam mengurus pembangunan infrastruktur, penyampaian perkhidmatan awam, dan perancangan bandar. Memandangkan kepadatan penduduk terus meningkat di kawasan bandar, majlis perbandaran mesti menyesuaikan dasar dan garis panduan untuk menampung permintaan yang semakin meningkat untuk perumahan, pengangkutan, pengurusan sisa dan kemudahan awam. Peningkatan penumpuan penduduk di Lembah Klang. dengan satu daripada empat rakyat Malaysia menetap di rantau ini, meningkatkan lagi keperluan untuk tadbir urus yang berkesan dan inisiatif pembangunan bandar yang strategik.

Majlis perbandaran di Selangor memainkan peranan penting dalam menangani cabaran yang berkaitan dengan pengembangan bandar. Mereka bertanggungjawab untuk memastikan perkhidmatan penting seperti bekalan air, sanitasi, pengangkutan awam dan pelupusan sisa sejajar dengan permintaan penduduk bandar yang berkembang pesat. Tambahan pula, peralihan daripada 28% penduduk bandar pada tahun 1970 kepada 75% pada tahun 2020 mencerminkan keperluan mendesak untuk dasar yang menggalakkan pertumbuhan bandar yang mampan, pemuliharaan alam sekitar dan daya tahan ekonomi. Tekanan terhadap infrastruktur awam dan kerumitan pengurusan bandar yang semakin meningkat memerlukan majlis perbandaran untuk menerima pakai model tadbir urus yang inovatif, termasuk penyepaduan teknologi bandar pintar, penyertaan awam yang dipertingkatkan dan pembuatan keputusan berasaskan data (Tey & Lai, 2022).

1.2.4.2 Hubungan Antara Kerajaan Negeri Dan Pusat

Pengaruh ahli majlis perbandaran selalunya dibentuk oleh hubungan mereka dengan kerajaan negeri. Di Malaysia, kerajaan negeri mempunyai kawalan yang ketara ke atas pihak berkuasa tempatan, terutamanya dalam peruntukan sumber dan pelaksanaan dasar. Struktur hierarki ini boleh memperkasa dan mengekang keupayaan membuat keputusan ahli majlis. Persekutuan Malaysia memberikan kerajaan negeri peranan yang dominan dalam pengurusan dan pentadbiran pihak berkuasa tempatan, mengukuhkan tadbir urus atas ke bawah.

1.2.4.3 Rangkaian Politik dan Ekonomi

Pengaruh ahli majlis juga dibentuk oleh rangkaian politik dan ekonomi tempatan, yang boleh menentukan keupayaan mereka untuk melaksanakan dasar dengan berkesan. Hubungan penaung-pelanggan antara orang kuat negeri dan kumpulan perniagaan tempatan, khususnya di Sarawak, menggambarkan bagaimana ahli majlis mesti mengemudi dinamik politik yang kompleks. Hubungan sedemikian boleh membawa kepada layanan keutamaan dalam keputusan dasar, mempengaruhi pembangunan bandar dan struktur tadbir urus tempatan.

1.2.4.4 Garis Panduan Dan Rangka Kerja Untuk Membuat Keputusan

Salah satu cabaran terbesar yang dihadapi oleh ahli majlis perbandaran ialah kekurangan garis panduan yang jelas untuk membuat keputusan. Ketiadaan rangka kerja berstruktur ini sering menghalang keupayaan mereka untuk membuat keputusan dasar yang termaklum dan konsisten. Untuk menangani isu ini, kajian itu mencadangkan rangka kerja membuat keputusan baharu berdasarkan 13 faktor utama. Pendekatan berstruktur ini bertujuan untuk meningkatkan ketepatan dan fokus keputusan ahli majlis, memastikan tadbir urus di peringkat tempatan lebih inklusif dan berkesan. Selain itu, kajian itu menekankan kepentingan perkongsian strategik antara ahli majlis dan pihak berkepentingan lain, termasuk ahli politik, perancang dan ahli akademik, untuk meningkatkan kualiti membuat keputusan dan hasil tadbir urus.

1.3 Permasalahan kajian

Peranan ahli majlis perbandaran dalam membangunkan dasar dan garis panduan untuk masyarakat adalah penting dalam memastikan pembangunan bandar yang mampan, kebajikan sosial dan keselamatan awam. Walaubagaimanapun, pelbagai cabaran tadbir urus, ketidakcekapan dan kekangan membuat keputusan menghalang keberkesanannya. Cabaran-cabaran ini boleh dikategorikan kepada faktor politik, pentadbiran, kewangan dan penglibatan komuniti. Walaupun majlis perbandaran bertanggungjawab untuk pembangunan dasar, terdapat bukti empirikal yang terhad tentang cara aktif ahli majlis perbandaran mengambil bahagian dalam menggubal, melaksana dan menilai dasar. Kajian lepas di negara lain mengesahkan bahawa ahli majlis perbandaran mengambil bahagian secara aktif dalam proses berkaitan dasar, termasuk perbincangan, tawar-menawar dan membuat keputusan. Ahli majlis turut melibatkan diri dengan urusan dalam dan di luar dewan majlis, menunjukkan penglibatan berterusan mereka dalam tadbir urus (Cooper & Rimes, 2024). Kajian lepas turut mengiktiraf ahli majlis sebagai pemegang taruh politik utama dalam tadbir urus tempatan. Sebutan ahli majlis 'eksekutif' yang memegang peranan kepimpinan formal dan tidak formal menunjukkan bahawa sesetengah pihak mempunyai kuasa membuat keputusan, mengukuhkan penyertaan aktif mereka dalam penggubalan dasar (Swianiewicz, 2017). Namun, dari konteks Malaysia, sejauh mana peranan, tanggungjawab dan pengaruh mereka dalam membuat keputusan masih tidak jelas, yang membawa kepada potensi jurang tadbir urus dalam menangani keperluan komuniti. Walaupun ahli majlis dijangka memudahkan tadbir urus tempatan dan membuat keputusan, kekurangan garis panduan dan rangka kerja berstruktur yang jelas telah mengakibatkan kesamaran mengenai kuasa dan keberkesanan sebenar mereka (Nurudin et al., 2017).

Pembuatan dasar perbandaran dipengaruhi oleh pelbagai faktor politik, ekonomi dan pentadbiran, tetapi kesan khusus faktor ini terhadap keputusan ahli majlis perbandaran kurang didokumentasikan. Kekurangan penyelidikan tentang bagaimana kekangan kewangan, tekanan politik, dan ketidakcekapan birokrasi membentuk dasar tempatan mengehadkan usaha untuk menambah baik tadbir urus dan akauntabiliti. Interaksi pengaruh kewangan, tekanan politik, dan ketidakcekapan birokrasi dengan ketara membentuk penggubalan dasar perbandaran. Memahami dinamik ini adalah penting untuk meningkatkan tadbir urus dan akauntabiliti di peringkat tempatan.

Banyak dasar yang dilaksanakan di peringkat perbandaran gagal mencapai hasil yang diharapkan, selalunya disebabkan oleh reka bentuk dasar yang lemah, penguatkuasaan yang

lemah, atau penglibatan masyarakat yang tidak mencukupi.Tidak ada penilaian menyeluruh tentang sejauh mana dasar perbandaran di Selangor menangani isu utama seperti pembangunan bandar, kemampanan alam sekitar, kebajikan sosial dan keselamatan awam, yang membawa kepada hasil dasar yang tidak konsisten (Somasundram et al., 2018). Penilaian ahli majlis tentang dasar perbandaran di Selangor perlu melibatkan pemahaman peranan penyertaan awam, mekanisme membuat keputusan, cabaran dalam pelaksanaan dasar, struktur tadbir urus, ketelusan dan pembinaan kapasiti. Faktor-faktor ini secara kolektif dapat mempengaruhi keberkesanan dasar perbandaran menangani isu-isu utama di rantau ini (Yahman et al., 2023).

Majlis perbandaran menghadapi pelbagai cabaran dalam membangunkan dan melaksanakan dasar, termasuk kelewatan birokrasi, ketidakcekapan pentadbiran dan kekangan kewangan. Majlis tempatan di Malaysia sering dikritik kerana ketidakcekapan dan kekurangan akauntabiliti mereka. Ketidakcekapan ini sebahagiannya disebabkan oleh kelewatan birokrasi yang menghalang proses membuat keputusan dan pelaksanaan dasar yang tepat pada masanya (Khalid, 2010). Negeri Pulau Pinang, sebagai contoh, telah menghadapi cabaran berkaitan autonomi yang terhad dan sumber yang terhad, yang biasa berlaku di seluruh persekutuan berpusat di Malaysia (Chan et al., 2024). Walau bagaimanapun, cabaran ini tidak didokumentasikan dengan baik, menjadikannya sukar untuk mengenal pasti penyelesaian untuk menambah baik tadbir urus dan pelaksanaan dasar di peringkat tempatan.

1.4 Persoalan kajian

Apakah faktor utama yang mempengaruhi ahli majlis perbandaran di Selangor dalam proses membuat keputusan dasar tempatan?
Bagaimanakah peranan ahli majlis perbandaran diterjemahkan dalam pembentukan dasar dan garis panduan pembangunan masyarakat?
Sejauh manakah keberkesanan dasar dan garis panduan yang dibangunkan oleh ahli majlis perbandaran dalam menangani isu perancangan bandar, kemampanan, kebajikan sosial dan keselamatan awam?
Apakah cabaran utama yang dihadapi oleh ahli majlis perbandaran dalam pembangunan dan pelaksanaan dasar tempatan?

1.5 Objektif Kajian

Untuk mengenal pasti dan menganalisis faktor politik, ekonomi dan pentadbiran yang mempengaruhi proses membuat keputusan ahli majlis perbandaran di Selangor.
Untuk mengkaji peranan dan sumbangan ahli majlis perbandaran dalam pembentukan dasar dan garis panduan pembangunan masyarakat.

Untuk menilai keberkesanan dasar dan garis panduan yang dibangunkan oleh ahli majlis perbandaran dalam aspek perancangan bandar, kelestarian alam sekitar, kebajikan sosial dan keselamatan awam.

Untuk mengenal pasti cabaran birokrasi, pentadbiran, kewangan dan komuniti yang menghalang keberkesanan pelaksanaan dasar di peringkat perbandaran.

1.6 Skop Kajian

Kajian ini memfokuskan kepada peranan ahli majlis perbandaran di Negeri Selangor dalam membangunkan dasar dan garis panduan untuk masyarakat. Ia akan dijalankan di majlis perbandaran terpilih di seluruh Selangor, meliputi kawasan bandar dan separa bandar, seperti Petaling Jaya, Subang Jaya, Shah Alam, Klang, dan Ampang Jaya. Lokasi-lokasi ini telah dipilih untuk memastikan perwakilan yang pelbagai bagi struktur tadbir urus perbandaran.

Responden utama untuk kajian ini ialah ahli majlis perbandaran yang bertanggungjawab untuk penggubalan dasar, pelaksanaan dan penilaian. Selain itu, pegawai kerajaan tempatan dan wakil masyarakat terpilih yang berinteraksi dengan dasar perbandaran akan disertakan untuk memberikan pandangan yang lebih luas. Kajian itu akan memberi tumpuan kepada pembangunan dasar dan garis panduan dalam bidang utama, termasuk perancangan bandar dan pembangunan infrastruktur, kelestarian alam sekitar dan pengurusan sisa, kebajikan sosial dan kesejahteraan masyarakat, dan dasar keselamatan dan kesihatan awam.

Pendekatan penyelidikan kuantitatif akan digunakan, menggunakan tinjauan berstruktur untuk mengumpulkan data daripada ahli majlis perbandaran dan pihak berkepentingan yang berkaitan. Analisis statistik lanjutan, seperti Exploratory Factor Analysis (EFA), Structural Equation Modelling (SEM) dan Analisis Regresi, akan digunakan untuk menilai keberkesanan dasar dan mengenal pasti faktor utama membuat keputusan. Penyelidikan akan dijalankan dalam tempoh enam bulan, meliputi pengedaran tinjauan, pengumpulan data, dan analisis statistik untuk memastikan penemuan yang komprehensif dan boleh dipercayai.

Kajian Literatur

2.1 Pengenalan

Tadbir urus tempatan memainkan peranan penting dalam membentuk pembangunan sosio-ekonomi dan organisasi spatial kawasan bandar. Di Malaysia, majlis perbandaran ditubuhkan di bawah pelbagai rangka kerja perundangan yang berfungsi sebagai agensi barisan hadapan untuk menyampaikan perkhidmatan awam, mengawal selia pembangunan dan melibatkan diri dengan rakyat (Ik-Tien & Pey-Wen, 2024). Ahli Majlis, sebagai wakil yang dilantik atau dipilih dalam majlis ini, memikul tanggungjawab membentuk dan melaksanakan dasar yang secara langsung mempengaruhi kehidupan harian penduduk (Khalid, 2010).

Dari konteks kajian ini, institusi dan perundangan di mana ahli majlis perbandaran di Selangor beroperasi, peranan mereka merangkumi penggubalan dasar, pengurusan bandar dan pembangunan komuniti. Ahli majlis perbandaran bukan sahaja berfungsi untuk mentadbir dasar tetapi juga untuk memperjuangkan pembangunan mampan, ekuiti sosial, dan akauntabiliti awam (Grant, 2024). Peranan mereka merangkumi pelbagai domain, termasuk perancangan bandar, pengurusan sisa, perlindungan alam sekitar, kebajikan sosial dan keselamatan awam. Walau bagaimanapun, pengaruh sebenar mereka sering dimediasi oleh struktur politik, rangka kerja undang-undang, hierarki institusi, dan had pentadbiran (Zanudin et al., 2021).

Negeri Selangor adalah antara yang mengalami pembangunan pesat dan mempunyai jumlah populasi yang tinggi antaranya bandaraya utama seperti Petaling Jaya, Shah Alam, Klang dan Subang Jaya. Oleh itu, ahli majlis memainkan peranan penting dalam pengantaraan antara agenda pembangunan negeri dan keperluan masyarakat tempatan (Marzukhi et al., 2016).

Memahami fungsi dan batasan ahli majlis dalam konteks ini memerlukan penerokaan menyeluruh terhadap instrumen perundangan yang mengawal pihak berkuasa tempatan di Malaysia, seperti Akta Kerajaan Tempatan 1976 (Akta 171), Akta Perancangan Bandar dan Desa 1976 (Akta 172), dan Akta Jalan, Saliran dan Bangunan 1974 (Akta 133).

2.2 Pengurusan Bandar di Malaysia

Pengurusan bandar di Malaysia ialah domain pelbagai rupa dan berkembang yang melibatkan penyelarasan dasar, infrastruktur, struktur tadbir urus dan perkhidmatan awam untuk memenuhi keperluan populasi bandar yang semakin meningkat. Memandangkan negara terus mengalami pembandaran yang pesat, terutamanya di negeri-negeri seperti Selangor, Kuala Lumpur, Johor, dan Pulau Pinang. pengurusan bandar menjadi semakin kompleks, memerlukan strategi yang komprehensif dan bersepadu merentas pelbagai peringkat kerajaan.

Kadar pembandaran Malaysia telah mencapai kira-kira 78% pada 2020, dan trend ini dijangka berterusan. Pertumbuhan ini telah meningkatkan permintaan terhadap infrastruktur bandar, perumahan, pengangkutan awam, pengurusan sisa, pemuliharaan alam sekitar dan keselamatan awam. Pengurusan bandar bukan semata-mata mengenai perancangan fizikal atau penyediaan perkhidmatan, ia adalah mengenai menjajarkan pembangunan ekonomi, kemampanan alam sekitar dan keterangkuman sosial secara seimbang. Dalam hal ini, ahli majlis perbandaran dan pegawai kerajaan tempatan memainkan peranan penting dalam menterjemahkan dasar kepada tindakan di peringkat akar umbi (Yasin et al., 2021).

Kementerian Perumahan dan Kerajaan Tempatan (KPKT) memainkan peranan penting dalam membimbing dasar pembangunan bandar di Malaysia. Walau bagaimanapun, pelaksanaan sebenar strategi pengurusan bandar dilaksanakan oleh pihak berkuasa tempatan, termasuk majlis bandaraya (majlis bandaraya), majlis perbandaran (majlis perbandaran), dan majlis daerah (majlis daerah) (Karim et al., 2021). Walaupun ahli majlis dijangka mewakili kepentingan masyarakat dan mengambil bahagian dalam proses membuat keputusan, mereka sering menghadapi batasan kerana gabungan politik dan proses perancangan atas ke bawah

Dalam beberapa tahun kebelakangan ini, usaha telah dibuat untuk mengguna pakai inisiatif bandar pintar dalam pengurusan bandar, khususnya di pusat bandar seperti Kuala Lumpur, Shah Alam dan Cyberjaya. Inisiatif ini bertujuan untuk memanfaatkan teknologi untuk pengurusan trafik yang lebih baik, keselamatan awam, pengumpulan sisa dan penglibatan rakyat. Tambahan pula, pengurusan bandar juga mesti bertindak balas terhadap isu-isu silang seperti perubahan iklim, kesihatan awam dan pengurangan risiko bencana.

2.3 Latar Belakang Pentadbiran Di Selangor

Selangor adalah negeri yang paling ramai penduduknya dan ekonominya cergas, terletak secara strategik di kawasan tengah Semenanjung Malaysia. Ia mengelilingi Wilayah Persekutuan Kuala Lumpur dan Putrajaya, berfungsi sebagai hab utama untuk perdagangan, industri, pengangkutan dan tadbir urus (Yasin et al., 2022). Memandangkan sifat urbannya dan trajektori pembangunan pesat, Selangor memainkan peranan penting dalam membentuk landskap sosio-politik dan ekonomi negara. Pentadbiran Selangor adalah sangat kompleks, melibatkan pelbagai lapisan tadbir urus, daripada peringkat persekutuan dan negeri sehinggalah kepada unit kerajaan tempatan termasuk majlis perbandaran dan daerah (Ma et al., 2024). Memahami struktur pentadbiran ini adalah penting untuk memahami cara dasar digubal dan dilaksanakan di peringkat tempatan, terutamanya oleh ahli majlis perbandaran (Azari et al., 2022).

2.3.1 Struktur Tadbir Urus Negeri

Selangor beroperasi di bawah sistem raja berperlembagaan dengan sistem kerajaan berparlimen, sama seperti negeri-negeri Malaysia yang lain. Kerajaan negeri menyelia pelbagai sektor seperti pengurusan tanah, tadbir urus tempatan, kerja awam, dan pendidikan peringkat negeri dan hal ehwal agama, seperti yang diperuntukkan di bawah Perlembagaan Persekutuan Malaysia (Aziz et al., 2024). Dewan Undangan Negeri Selangor (Dewan Negeri Selangor) berperanan sebagai badan penggubal undang-undang dan memainkan peranan penting dalam meluluskan undang-undang negeri dan membahaskan perkara dasar (Yang & Khalid, 2024).

2.3.2Peranan Kerajaan Negeri Dalam Tadbir Urus Tempatan

Kerajaan negeri memegang kuasa besar ke atas majlis tempatan dalam wilayahnya. Menurut Akta Kerajaan Tempatan 1976 (Akta 171), pihak berkuasa tempatan berada di bawah bidang kuasa kerajaan negeri masing-masing, yang memegang kuasa untuk menubuhkan, membubarkan, atau meminda sempadan majlis tempatan (Matthews, 2024). Di Selangor, terdapat 12 pihak berkuasa tempatan, termasuk majlis bandaraya (Majlis Bandaraya), majlis perbandaran (Majlis Perbandaran), dan majlis daerah (Majlis Daerah) (Azari et al., 2022).

2.3.3Ahli Majlis Perbandaran di Selangor

Ahli majlis perbandaran berfungsi sebagai perantara antara pihak berkuasa tempatan dan masyarakat. Kerajaan Negeri Selangor, terutamanya sejak peralihan politik 2008, telah mengambil beberapa inisiatif untuk meningkatkan ketelusan, penyertaan awam, dan prestasi dalam tadbir urus tempatan. Sebagai contoh, Selangor adalah antara negeri pertama yang melaksanakan mesyuarat majlis terbuka dan program penglibatan masyarakat seperti "Mesyuarat Majlis Terbuka" untuk menggalakkan penyertaan rakyat dalam perbincangan dasar (Kamaruddin et al., 2023). Pembaharuan ini bertujuan untuk meningkatkan legitimasi ahli majlis dan memupuk kepercayaan antara kerajaan tempatan dan orang ramai.

2.3.4 Keupayaan Pentadbiran Dan Rangka Kerja Institusi

Selangor mempunyai tahap kapasiti pentadbiran yang agak tinggi di kalangan negeri-negeri Malaysia, disokong oleh perkhidmatan awam yang cekap, alat perancangan bersepadu dan

infrastruktur digital. Negeri itu juga menggalakkan penggubalan dasar berasaskan bukti melalui institusi seperti Institut Darul Ehsan (IDE), yang menjalankan penyelidikan mengenai tadbir urus, persepsi awam dan hasil pembangunan di Selangor (Widiarto et al., 2025). Kerjasama antara badan pemikir, organisasi masyarakat sivil dan agensi kerajaan telah membantu meluaskan asas pengetahuan dan memupuk inovasi dalam tadbir urus tempatan (Yasin et al., 2022).

2.3.5. Hubungan Antara Kerajaan Dan Penjajaran Dasar

Aspek penting latar belakang pentadbiran di Selangor ialah penyelarasan antara kerajaan persekutuan, negeri dan tempatan. Banyak dasar yang mempengaruhi perancangan bandar, peraturan alam sekitar dan pembangunan infrastruktur didorong oleh persekutuan tetapi memerlukan pelaksanaan tempatan. Susunan tadbir urus pelbagai peringkat ini memerlukan penjajaran keutamaan, penyelarasan aktiviti, dan persempadanan peranan yang jelas (Singaravelloo et al., 2023).

2.3.6 Fokus Dasar Dan Tadbir Urus Bandar Di Selangor

Agenda pembangunan Selangor menekankan kemampanan, keterangkuman, dan inovasi. Inisiatif yang diterajui kerajaan negeri seperti program *"Smart Selangor"* bertujuan untuk mendigitalkan perkhidmatan awam, meningkatkan mobiliti melalui sistem pengangkutan awam bersepadu, dan meningkatkan daya tahan bandar. Strategi tadbir urus bandar negeri juga termasuk perumahan sosial, pembangunan ruang hijau, program pemerkasaan komuniti, dan perancangan siap sedia bencana.

2.4 Evolusi Pihak Berkuasa Tempatan di Selangor

Perkembangan tadbir urus tempatan di Selangor mencerminkan trajektori desentralisasi dan pemodenan yang lebih luas dalam pentadbiran awam Malaysia. Sebagai salah satu negeri yang paling bandar dan maju dari segi ekonomi di Malaysia, Selangor telah mengalami transformasi yang ketara dalam fungsi, tanggungjawab dan kuasa pihak berkuasa tempatannya. Perubahan ini telah dibentuk oleh satu siri rangka kerja perundangan yang bertujuan untuk mengawal selia pentadbiran, perancangan, dan mekanisme penyampaian perkhidmatan majlis tempatan.

2.4.1 Peranan Pihak Berkuasa Tempatan di bawah Akta 171

Akta Kerajaan Tempatan 1976 (Akta 171) berfungsi sebagai instrumen perundangan utama yang mengawal pihak berkuasa tempatan di Semenanjung Malaysia. Di bawah Akta ini, pihak berkuasa tempatan ditubuhkan oleh Pihak Berkuasa Negeri masing-masing dan diberi kuasa untuk mengurus perkhidmatan perbandaran dan menguatkuasakan peraturan tempatan. Akta ini menggariskan aspek struktur, pentadbiran dan kewangan tadbir urus tempatan, dengan itu menyediakan rangka kerja yang komprehensif untuk operasi perbandaran (Sukri et al., 2022).



Rajah 2.1: Kuasa pihak berkuasa tempatan berdasarkan Akta 171

2.4.2 Peranan Pihak Berkuasa Tempatan di Bawah Akta 172

Akta Perancangan Bandar dan Desa 1976 (Akta 172) menyediakan asas perundangan untuk perancangan spatial dan pengurusan guna tanah di Malaysia. Di bawah Akta ini, pihak berkuasa tempatan di Selangor diberi peranan berkanun sebagai Pihak Berkuasa Perancang Tempatan (LPA) yang bertanggungjawab untuk menyediakan dan melaksanakan rancangan pembangunan dalam bidang kuasa mereka.

Tanggungjawab utama di bawah Akta 172 termasuk:

- Penyediaan rancangan tempatan yang sejajar dengan strategi pembangunan negeri dan negara.
- Penilaian dan kelulusan aplikasi pembangunan, termasuk susun atur dan pelan bangunan.
- Penguatkuasaan kawalan perancangan untuk mencegah pembangunan haram.

2.4.3 Peranan dan Fungsi Pihak Berkuasa Tempatan di bawah Akta 133 (Akta Jalan, Saliran dan Bangunan 1974)

Akta Jalan, Saliran dan Bangunan 1974 (Akta 133) mengawal standard teknikal dan keselamatan yang berkaitan dengan infrastruktur bandar, khususnya dalam pembinaan dan penyelenggaraan kemudahan awam. Akta ini mewakilkan tanggungjawab khusus kepada pihak berkuasa tempatan mengenai perancangan, kelulusan, dan pemeriksaan bangunan, jalan dan sistem perparitan.

Di bawah Akta 133, pihak berkuasa tempatan di Selangor ditugaskan untuk:

- Kelulusan pelan bangunan dan pengeluaran sijil siap dan pematuhan (CCC).
- Penyeliaan pembinaan dan penyelenggaraan jalan, memastikan rangkaian jalan yang selamat dan mudah diakses.
- Pengurusan sistem saliran air ribut untuk mengelakkan banjir bandar.

2.5 Kuasa Ahli Majlis

2.5.1 Peranan Dan Kuasa Di Dalam Dasar

Ahli Majlis di Selangor terlibat secara aktif dalam penggubalan, pelaksanaan, dan penilaian dasar di peringkat tempatan. Peranan dan kuasa mereka dalam penggubalan dasar termasuk: Musyawarah dan Pembuatan Keputusan: Ahli majlis adalah pusat kepada proses membuat keputusan demokratik dalam majlis perbandaran. Proses perbincangan memastikan bahawa pelbagai perspektif dipertimbangkan dan keputusan mencerminkan keperluan komuniti.

Pengawasan dan Akauntabiliti: Ahli majlis berfungsi sebagai pemerhati terhadap pelaksanaan dasar dan prestasi jabatan kerajaan tempatan. Mereka meneliti laporan, hasil audit dan maklum balas jabatan untuk memastikan objektif dasar dipenuhi dengan berkesan. Apabila percanggahan atau ketidakcekapan timbul, ahli majlis boleh menyoal pegawai majlis, memulakan siasatan, atau mengesyorkan tindakan pembaikan.

Keahlian Jawatankuasa: Majlis perbandaran sering menubuhkan pelbagai jawatankuasa tetap dan ad hoc untuk memberi tumpuan kepada bidang tadbir urus tertentu. Sebagai ahli jawatankuasa, mereka meneliti isu secara mendalam, berunding dengan pakar atau pihak berkepentingan, dan merumuskan cadangan terperinci untuk dibentangkan kepada majlis penuh.

Advokasi Dasar: Ahli majlis berfungsi sebagai penghubung penting antara orang awam dan kerajaan tempatan. Sama ada memperjuangkan perumahan mampu milik, jalan yang lebih selamat, pengangkutan awam yang dipertingkatkan atau kemampanan alam sekitar, ahli majlis menggunakan platform mereka untuk membawa isu akar umbi ke dalam perbincangan dasar rasmi.

Kelulusan Belanjawan: Salah satu alat dasar paling berkuasa yang tersedia untuk ahli majlis ialah kuasa mereka untuk meluluskan belanjawan tahunan majlis perbandaran. Belanjawan ini menggariskan unjuran hasil, perbelanjaan yang dirancang, dan peruntukan pembiayaan untuk infrastruktur awam, program sosial, penyelenggaraan dan fungsi pentadbiran.

2.5.2 Peranan Dan Kuasa Di Dalam Pembangunan Komuniti

Di luar penggubalan dasar, ahli majlis di Selangor memainkan peranan penting dalam memacu inisiatif pembangunan komuniti yang meningkatkan kualiti hidup penduduk. Peranan dan kuasa mereka dalam domain ini termasuk:

Penglibatan Komuniti: Ahli majlis mengekalkan hubungan rapat dengan komuniti mereka melalui penglibatan secara langsung dalam pelbagai bentuk, seperti mesyuarat dewan bandaran, walkabout dan acara komuniti. Penglibatan ini membolehkan ahli majlis mengumpul maklum balas masa nyata, memahami cabaran sosio-ekonomi yang dihadapi oleh penduduk, dan membangunkan bersama penyelesaian yang relevan.

Pemudahcaraan Projek Tempatan: Ahli majlis selalunya menjadi pemula dan fasilitator projek pembangunan komuniti. Ini mungkin termasuk menaik taraf jalan tempatan, meningkatkan pencahayaan jalan, mengindahkan taman, menubuhkan pusat komuniti, atau menganjurkan kempen kebersihan dan kitar semula.

Sokongan untuk Kumpulan Terdedah: Ahli majlis adalah penyokong utama untuk rangkuman sosial dan ekuiti. Mereka mengenal pasti keperluan penduduk yang terdedah—seperti golongan miskin bandar, warga emas, orang kurang upaya, ibu tunggal, dan belia yang berisiko—dan mendesak inisiatif untuk menyokong kesejahteraan mereka. Ahli majlis sering bekerjasama dengan NGO dan jabatan kebajikan untuk memaksimumkan jangkauan dan impak.

Pengantaraan dan Penyelesaian Konflik: Dalam persekitaran bandar yang pelbagai, konflik di kalangan penduduk atau antara rakyat dan kerajaan bukanlah perkara luar biasa. Ahli majlis bertindak sebagai orang tengah neutral yang membantu menyelesaikan pertikaian dengan cara yang aman dan membina.

Penggalakan Penyertaan Sivik: Ahli Majlis memupuk rasa pemilikan dalam kalangan penduduk dengan menggalakkan penyertaan sivik dalam tadbir urus tempatan. Mereka menggalakkan pembentukan persatuan penduduk, menganjurkan inisiatif berasaskan sukarelawan, dan melibatkan rakyat dalam proses membuat keputusan seperti belanjawan penyertaan dan pendengaran awam.

Memantau Pembangunan Tempatan: Ahli Majlis sentiasa memantau projek pembangunan yang sedang berjalan dan kesan sosio-alam sekitar mereka. Mereka menjalankan lawatan tapak, mendapatkan maklum balas komuniti, dan melaporkan penemuan kepada majlis perbandaran. Isu seperti kesesakan lalu lintas, kehilangan ruang hijau atau pembuangan sisa yang tidak betul dibenderakan untuk langkah pembetulan.

2.6 Faktor-Faktor Yang Mempengaruhi Keputusan Dasar Di Peringkat Tempatan

2.6.1 Pengaruh Politik Dan Penjajaran Parti Dalam Pembuatan Keputusan Tempatan

Pengaruh politik dan penjajaran parti mempunyai kesan yang mendalam terhadap proses membuat keputusan dalam kerajaan tempatan. Di Selangor, seperti kebanyakan bahagian lain di Malaysia, ahli majlis tempatan sering dilantik berdasarkan gabungan politik, mencerminkan struktur dan penguasaan politik parti yang lebih luas. Walau bagaimanapun, penjajaran ini juga boleh menyebabkan ketegangan, terutamanya dalam majlis yang mempunyai komposisi politik yang pelbagai.

Selain itu, naungan politik boleh menjejaskan objektiviti membuat keputusan. Ahli majlis mungkin berasa tertekan untuk menyokong inisiatif yang memihak kepada penyokong setia

parti atau individu atau syarikat yang berkaitan dengan politik, walaupun inisiatif tersebut tidak sesuai dengan kepentingan masyarakat yang lebih luas. Ini menjejaskan tadbir urus yang baik dan ketelusan (Muhamad et al., 2023). Sebaliknya, ahli majlis yang bersekutu dengan pembangkang mungkin bergelut untuk mendapatkan cadangan mereka dengan serius atau dibiayai, yang boleh mewujudkan jurang perbezaan dalam penyampaian perkhidmatan merentas kawasan pilihan raya yang berbeza (Faruqi et al., 2021).

2.6.2 Pembuatan Dasar Dan Penetapan Agenda Politik

Cabaran utama dalam tadbir urus tempatan ialah ketegangan antara penggubalan dasar berasaskan bukti dan penetapan agenda politik. Pembuatan dasar berasaskan bukti melibatkan penggunaan data, penemuan penyelidikan, maklum balas komuniti dan perundingan pakar untuk membimbing keputusan. Sesetengah ahli majlis memperjuangkan pendekatan berasaskan bukti dengan menyokong penilaian keperluan, projek perintis dasar dan penunjuk prestasi. Mereka berunding dengan institusi akademik, masyarakat sivil dan penduduk untuk mengumpul pandangan menyeluruh sebelum mencadangkan dasar baharu.

Namun begitu, sokongan institusi untuk penggubalan dasar berasaskan bukti tidak selalu kukuh. Majlis mungkin kekurangan unit penyelidikan, keupayaan analisis data atau pembiayaan untuk kajian dasar. Mewujudkan budaya pembelajaran, menginstitusikan amalan penyelidikan dan menggalakkan ketelusan dalam membuat keputusan boleh membantu merapatkan jurang ini. Membina perkongsian dengan institusi akademik dan badan pemikir, membangunkan repositori data tempatan, dan menginstitusikan rangka kerja pemantauan dan penilaian adalah langkah praktikal ke arah meningkatkan peranan bukti dalam tadbir urus tempatan (Lim & Yigitcanlar, 2022).

2.6.3 Pertimbangan Ekonomi Dan Kekangan Belanjawan Dalam Tadbir Urus Perbandaran

Keadaan ekonomi memainkan peranan asas dalam membentuk keputusan dasar majlis perbandaran. Kerajaan tempatan di Selangor beroperasi dalam lingkungan bajet tahunan yang diluluskan oleh ahli majlis, dan ketersediaan sumber kewangan menentukan kebolehlaksanaan dan keutamaan inisiatif awam. Hasil perbandaran terutamanya datang daripada cukai tempatan, yuran, permit dan geran negeri atau persekutuan. Ahli majlis juga mesti mengemudi politik pengagihan belanjawan. Kajian oleh Penang Institute telah menyerlahkan bagaimana gabungan politik dalam majlis boleh mempengaruhi kawasan mana yang menerima lebih banyak pembiayaan, selalunya mencerminkan kepentingan strategik pakatan pemerintah (Hughes et al., 2023).

2.6.4 Kapasiti Pentadbiran Dan Gaya Kepimpinan Ahli Majlis

Keberkesanan pelaksanaan dasar di peringkat kerajaan tempatan amat dipengaruhi oleh kedua-dua kekuatan pentadbiran majlis perbandaran dan gaya kepimpinan ahli majlis individu. Keupayaan mereka untuk mengemudi proses birokrasi, menggerakkan sumber, dan melibatkan pihak berkepentingan sering menentukan kejayaan atau kegagalan inisiatif tempatan. Mereka yang mempamerkan ciri kepimpinan yang proaktif seperti berpandangan jauh strategik, membuat keputusan secara partisipatif, dan penglibatan kolaboratif dengan jabatan majlis secara amnya lebih berkesan dalam menterjemahkan objektif dasar kepada hasil yang boleh diukur (Rami et al, 2021). Inisiatif Kerajaan Negeri Selangor untuk

menginstitusikan latihan melalui Akademi Kerajaan Tempatan adalah intervensi tepat pada masanya untuk profesionalisasi tadbir urus tempatan dan membina kapasiti kepimpinan di semua majlis (Jamaiudin, 2021). Selain itu, keterangkuman kepimpinan terutamanya penglibatan ahli majlis wanita dan belia telah menunjukkan pengaruh positif terhadap tindak balas dasar (Zain et al., 2024). Akhirnya, hubungan simbiotik antara kapasiti pentadbiran dan kepimpinan ahli majlis mentakrifkan realiti operasi pelaksanaan dasar, menjadikannya penting bagi kerajaan tempatan untuk mengukuhkan kedua-dua tonggak untuk mencapai tadbir urus yang mampan dan berkesan (Yasin et al., 2022).

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APLIKASI KAEDAH INTERPRETIVE STRUCTRAL MODELLING UNTUK PEMBANGUNAN MODEL KEMAHIRAN VISUALISASI MATA PELAJARAN GRAFIK KOMUNIKASI TEKNIKAL

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Abstract: *Kemahiran visualisasi memainkan peranan penting dalam pembelajaran mata pelajaran Grafik Komunikasi Teknikal (GKT), terutamanya dalam konteks Pendidikan dan Latihan Teknikal dan Vokasional (TVET). Kajian ini bertujuan membangunkan model kemahiran visualisasi bagi mata pelajaran GKT dengan menggunakan kaedah Nominal Group Technique (NGT) dan Interpretive Structural Modelling (ISM). NGT digunakan untuk mengenal pasti elemen utama yang menyumbang kepada peningkatan kemahiran visualisasi, manakala ISM berperanan dalam menghasilkan model dengan mengintegrasikan pendapat pakar yang terlibat dalam bidang pendidikan teknikal dan grafik komunikasi teknikal. Melalui kaedah ini, tujuh (7) elemen utama telah dikenal pasti dan dimasukkan ke dalam model dengan bantuan perisian ISM. Hasil analisis menunjukkan bahawa elemen-elemen ini mempunyai hubungan hierarki yang berbeza dan diagihkan kepada dua kuadran utama berdasarkan tahap kebergantungan dan pemacuannya dalam pembangunan kemahiran visualisasi. Model ini memberikan gambaran yang lebih jelas mengenai kepentingan setiap elemen dan boleh dijadikan sebagai rujukan dalam merancang strategi pengajaran yang lebih berkesan. Dapatan kajian ini berpotensi membantu pendidik dalam meningkatkan keupayaan pelajar memahami konsep visualisasi teknikal serta menyumbang kepada inovasi dalam kurikulum GKT dan TVET secara keseluruhannya.*

Keywords: *Nominal Group Technique, Interpretive Structural Modelling, Kemahiran Visualisasi, Grafik Komunikasi Teknikal, TVET,*

Pengenalan

Secara umumnya, GKT (Grafik Komunikasi Teknikal) ialah mata pelajaran elektif dalam kurikulum STEM (Sains, Teknologi, Kejuruteraan, dan Matematik). Walau bagaimanapun, ia terletak di bawah Pendidikan dan Latihan Teknikal dan Vokasional (TVET), yang merupakan komponen pendidikan STEM. Klasifikasi ini sama dengan mata pelajaran STEM elektif lain seperti Lukisan Kejuruteraan, Pengajian Kejuruteraan Awam, Pengajian Kejuruteraan

Mekanikal, dan sebagainya. Ini boleh dibuktikan melalui Dokumen Penyelarasan Kurikulum KSSM versi 2.0, di mana mata pelajaran berkaitan dibangunkan oleh Bahagian TVET (KPM, 2021). Manakala Dokumen Penyelarasan Kurikulum bagi mata pelajaran lain disediakan oleh Bahagian Pembangunan Kurikulum.

Kemahiran visualisasi merupakan aspek penting dalam pembelajaran mata pelajaran Grafik Komunikasi Teknikal (GKT), terutama dalam konteks Pendidikan dan Latihan Teknikal dan Vokasional (TVET). Kemahiran ini membantu pelajar memahami dan mentafsir maklumat grafik dengan lebih berkesan, seterusnya meningkatkan keupayaan mereka dalam penghasilan lukisan teknikal yang tepat. Di Malaysia, pendidikan berasaskan bidang teknikal kejuruteraan semakin menekankan pentingnya kemahiran ini, yang bertujuan untuk mempersiapkan pelajar menghadapi keperluan dan cabaran yang kompleks dalam industri yang sentiasa berubah. Namun, kajian menunjukkan bahawa tahap kemahiran visualisasi di kalangan pelajar kejuruteraan di Malaysia masih perlu ditingkatkan, terutamanya dalam konteks mengendalikan model 3D, lukisan teknikal, serta pemahaman konsep kejuruteraan yang kompleks (Ali et al., 2024).

Satu kajian yang menemubual pelajar kejuruteraan mendapati bahawa mereka menghadapi kesulitan dalam penggambaran visual dan pemanipulasian objek dalam ruang tiga dimensi, yang sangat penting dalam bidang seperti kejuruteraan dan teknikal (Yaacob et al., 2021).Keterbatasan dalam kemahiran ini bukan sahaja menjejaskan prestasi akademik tetapi juga menghalang kemampuan mereka untuk bekerja secara efektif dalam pasukan multidisiplin di industri yang memerlukan penyelesaian inovatif dan kritikal terhadap masalah lebih lanjut (Lin et al., 2022). Di luar Malaysia, masalah ini juga dikesan di negara lain di mana pendidikan teknikal dan kejuruteraan berusaha untuk menyelaraskan kemahiran yang diperlukan dengan keperluan industri (Ji et al., 2024).

Masalah kemahiran visualisasi ini semakin ketara apabila melihat kepada prestasi pelajar yang tidak memenuhi standard yang diharapkan dalam bidang pendidikan, khususnya dalam subjek matematik yang berkaitan dengan asas untuk menguasai mata pelajaran Grafik Komunikasi Teknikal. Contohnya, kajian menunjukkan bahawa kemahiran visualisasi yang rendah dapat menjejaskan kemampuan pelajar untuk menyelesaikan masalah matematik, seterusnya mempengaruhi keputusan akademik mereka (Shah et al., 2021). Menurut Zuraida dan Mohamed, satu kajian terhadap pelajar pra-universiti di Malaysia menunjukkan bahawa tahap kemahiran literasi visual mereka perlu diperbaiki agar lebih berkesan dalam mata pelajaran matematik (Zuraida & Mohamed, 2024). Ini menunjukkan adanya keperluan mendesak untuk membangunkan model kemahiran ini melalui pendekatan yang sistematik dalam pendidikan.

Dalam konteks luar negara, kekurangan kemahiran visualisasi di kalangan pelajar kejuruteraan bukanlah fenomena baharu. Kajian menunjukkan bahawa kemahiran visualisasi yang rendah berkorelasi dengan prestasi akademik yang lemah dalam kursus-kursus teknikal, yang seterusnya mengurangkan kebolehpasaran graduan dalam bidang kejuruteraan (Ji et al., 2024; Park et al., 2022). Sebagai contoh, kajian di beberapa universiti di Eropah mengesahkan bahawa peningkatan kemahiran visualisasi melalui latihan yang berfokus dapat meningkatkan pemahaman pelajar terhadap konsep teknikal (Sawant et al.,2023).Walau bagaimanapun, terdapat cabaran dalam menentukan elemen utama yang menyumbang kepada pembangunan kemahiran visualisasi dalam kalangan pelajar. Oleh itu,

kajian ini bertujuan membangunkan model kemahiran visualisasi dengan menggunakan pendekatan *Nominal Group Technique* (NGT) dan *Interpretive Structural Modelling* (ISM).

NGT digunakan untuk mengenal pasti elemen utama yang menyumbang kepada peningkatan kemahiran visualisasi melalui sesi perbincangan kumpulan pakar. Seterusnya, ISM digunakan untuk menganalisis dan membina model hierarki yang menggambarkan hubungan antara elemen-elemen tersebut. Kajian ini diharapkan dapat memberikan panduan kepada pendidik dalam merangka strategi pengajaran yang lebih berkesan untuk meningkatkan pemahaman pelajar dalam mata pelajaran Grafik Komunikasi Teknikal.

Metodologi

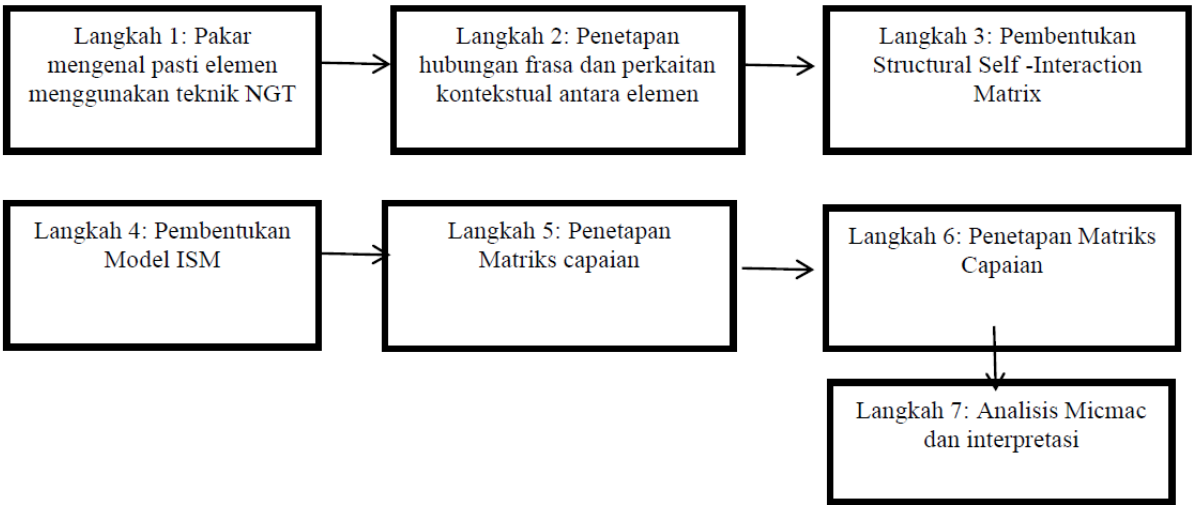
Sampel Kajian

Sampel kajian terdiri daripada 7 orang panel pakar yang mempunyai bidang yang luas dalam bidang pendidikan di mana mereka terlibat secara langsung dalam bahagian pendidikan TVET. Kriteria pemilihan pakar adalah berdasarkan **empat** kriteria, iaitu pensyarah universiti awam, pensyarah IPG, pegawai SiSC+ TVET dan guru pakar mata pelajaran Grafik Komunikasi Teknikal.

Kaedah Kajian

Fokus kajian ini adalah untuk membangunkan satu model kemahiran visualisasi dengan menggunakan kaedah *Interpretive Structural modeling (ISM)*. ISM adalah satu proses berpandukan komputer yang melibatkan pakar dalam bidang tertentu untuk mengenal pasti elemen dan hubungan antara elemen bagi mentakrifkan sesuatu masalah atau menghasilkan satu model (Warfield, 1976).

Kaedah ISM melibatkan langkah-langkah ditunjukkan seperti dalam Rajah 1 berikut:



Rajah 1: Carta Aliran Pembangunan Model Kemahiran Visualisasi Melalui Pendekatan ISM

Pendekatan ISM yang diaplikasikan dalam kajian ini adalah untuk membantu sekumpulan panel pakar mencapai kesepakatan dalam mendapatkan hubungan antara elemen utama

untuk meningkatkan Kemahiran visualisasi.Peringkat-peringkat yang menjadi asas kepada pembangunan model kemahiran visualisasi ini adalah seperti berikut:

Mengenal Pasti Elemen Yang Berkaitan Dengan Masalah

Nominal Group Technique (NGT) digunakan untuk mengesan elemen utama yang diperlukan untuk pembinaan model. Satu senarai semak yang mengandungi senarai elemen disediakan untuk dibincangkan oleh pakar semasa proses NGT. Para pakar boleh sama ada bersetuju atau tidak bersetuju dengan senarai elemen utama untuk meningkatkan kemahiran visualisasi yang telah disenaraikan. Para pakar juga digalakkan untuk memberi cadangan dan idea tambahan yang didapati tidak ada dalam senarai. Pada peringkat akhir NGT, setiap pakar diberikan senarai akhir yang membolehkan mereka memilih dengan meletakkan nombor pada elemen berdasarkan kepada kedudukan dan kepentingan elemen tersebut. Nombor penetapan kedudukan yang diberikan oleh para pakar akan dikumpulkan untuk mendapatkan nilai keutamaan pada setiap elemen yang senaraikan.

Penetapan Hubungan Frasa dan Perkaitan Kontekstual Antara Elemen

Hubungan kontekstual ditakrifkan sebagai matlamat yang perlu dicapai dengan menempuhi segala syarat batasan atau sempadan. Dalam erti kata yang lain, mewujudkan hubungan kontekstual bagaimana elemen-elemen akan dijana dan digabungkan antara satu sama lain. Dalam konteks kajian ini, frasa kontekstual dan frasa hubungan telah ditentukan melalui pendapat pakar mengenai bagaimana aktiviti dihubungkan. Hasilnya, frasa yang bersesuaian dengan konteks kajian ini adalah seperti berikut :

Dalam erti kata yang lain, Mewujudkan hubungan kontekstual bagaimana elemen-elemen akan dijana dan digabungkan antara satu sama lain. Dalam konteks kajian ini, frasa kontekstual dan frasa hubungan telah ditentukan melalui pendapat pakar mengenai bagaimana aktiviti dihubungkan. Hasilnya, frasa yang bersesuaian dengan konteks kajian ini adalah seperti berikut :

Frasa Hubungan :
Bagi penerapan elemen utama dalam mata pelajaran GKT elemen ……. mesti menjadi keutamaan berbanding

Frasa Kontekstual :
elemen …….. untuk meningkatkan kemahiran visualisasi

Pembentukan Structural Self Interaction Matrix (SSIM). Matrik ini bertujuan untuk menunjukkan perkaitan antara elemen dan dilakukan dengan bantuan perisian ISM. Setiap elemen dipasangkan dan dipaparkan supaya para pakar dapat membuat undian berdasarkan kepada perkaitan hubungan. Proses ini akan berulang sehingga semua elemen dipasangkan. Terdapat empat simbol yang digunakan untuk menunjukkan arah hubungan antara dua elemen (Ahmad et al., 2021)

V → pembolehubah baris mempengaruhi pembolehubah lajur yang sepadan
A → pembolehubah baris dipengaruhi oleh pembolehubah lajur yang sepadan
X → baris dan lajur yang sepadan saling mempengaruhi antara satu sama lain
O → pembolehubah baris dan lajur yang sesuai tidak mempunyai hubungan

Pembentukan Model ISM

Pembinaan model ISM. Model ini dihasilkan setelah proses penetapan pasangan semua elemen selesai dijalankan.

Penetapan Matriks Capaian

Langkah ini bertujuan untuk mengenal pasti driving power dan dependent power untuk setiap elemen yang ditunjukkan dalam Jadual 1.

Pengelasan Aktiviti berdasarkan Analisis MICMAC (Matrice d'Impacts Croises Multiplication Applique a Classment)

Menurut Mandal dan Deshmukh (1984), Analisis Micmac dilakukan untuk menganalisis kuasa pemanduan (driving power) dan kebergantungan (dependency) setiap elemen atau pembolehubah. Kuasa pemandu dan pergantungan setiap elemen kemudiannya boleh digunakan untuk membina gambah rajah pemandu- kebergantungan kepada empat kluster, iaitu kluster autonomi, kluster bebas, kluster bergantung dan kluster hubungan (Attri et al., 2013) seperti dalam Rajah 2.

Analisis Dan Taksiran Elemen
Data akan dapat dianalisa dan diinterpretasikan berdasarkan kepada kepentingan dan keutamaan elemen.

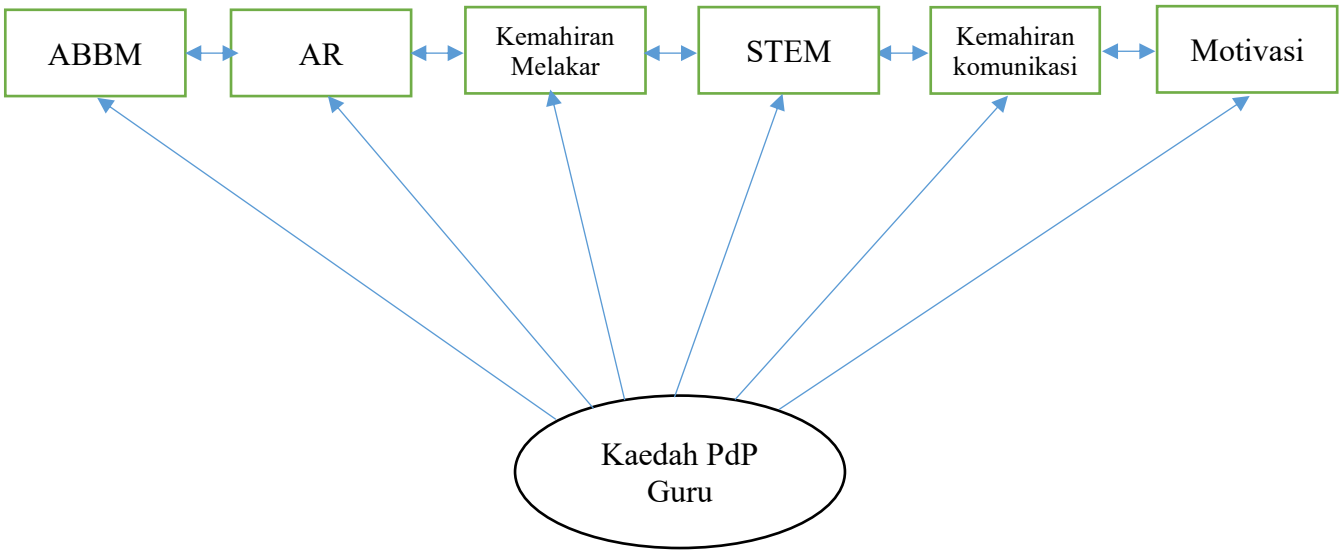
3. Dapatan kajian
Dapatan hasil daripada NGT ini adalah persepakatan di kalangan para pakar tentang senarai elemen utama yang sesuai dalam pembinaan model kemahiran visualisasi. Jadual 1 menunjukkan kedudukan dan keutamaan elemen berdasarkan keputusan undian panel pakar secara individu.

Jadual 1: Dapatan daripada NGT Keutamaan Elemen Utama Untuk Meningkatkan Kemahiran Visualisasi

Bil.	Elemen	Pakar							Jumlah	Rank
		1	2	3	4	5	6	7		
1	Kaedah Pengajaran dan Pembelajaran Guru	6	7	7	6	6	7	7	46	1
2	Alat Bahan Bantu Mengajar (ABBM)	6	6	6	7	6	7	6	44	2
3	Augmented Reality (AR)	6	6	5	7	6	6	6	42	3
4	Kemahiran Melakar	5	7	5	6	6	6	6	41	4
5	Kemahiran STEM	5	6	6	5	6	5	7	40	5
6	Kemahiran Komunikasi	6	5	5	6	6	6	6	40	5
7	Motivasi	6	5	5	4	6	6	6	38	6

Berdasarkan Jadual 1, keputusan yang diperolehi daripada proses NGT menunjukkan bahawa semua 7 elemen utama telah dipersetujui dalam pembinaan model kemahiran visualisasi. *Kaedah Pengajaran dan Pembelajaran Guru* menjadi elemen utama kerana ia

mempengaruhi keberkesanan elemen lain. *Alat Bahan Bantu Mengajar (ABBM)* dan *Augmented Reality (AR)* membantu meningkatkan pemahaman konsep visual pelajar. *Kemahiran melakar* dan STEM menyokong aspek teknikal dalam GKT, manakala *Kemahiran komunikasi* penting untuk pelajar menyampaikan idea teknikal dengan berkesan. *Motivasi* pula memainkan peranan dalam meningkatkan minat dan keterlibatan pelajar. Semua elemen ini saling berkaitan dalam membentuk kemahiran visualisasi yang lebih baik dalam PdP GKT.



Rajah 1: Model Kemahiran visualisasi mata pelajaran GKT melalui pendekatan ISM

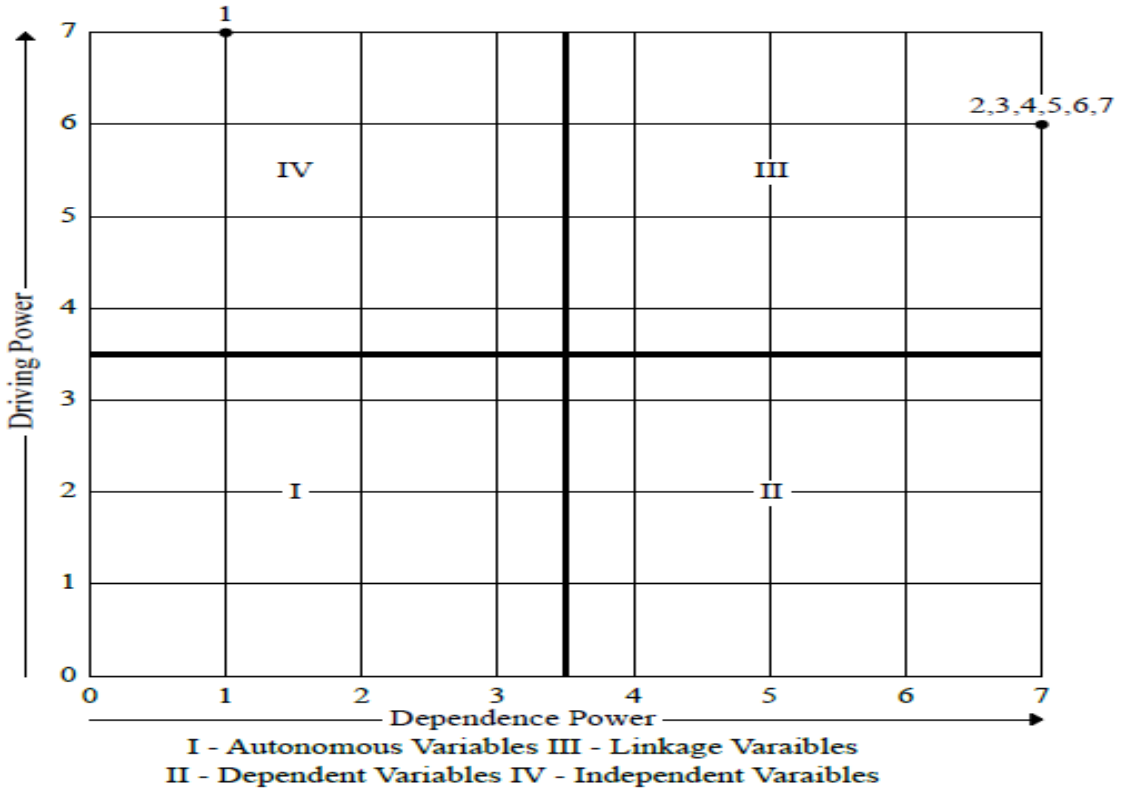
Setelah langkah NGT, Model Kemahiran visualisasi dibangunkan dengan bantuan perisian komputer ISM seperti yang ditunjukkan dalam Rajah 1. Berdasarkan Rajah 1, *Kaedah PdP Guru* sebagai elemen utama berada di tahap dasar, yang bermaksud ia dipengaruhi oleh beberapa faktor lain. Enam elemen utama iaitu *ABBM, AR, Kemahiran Melakar, STEM, Kemahiran Komunikasi* dan *Motivasi* merupakan faktor yang mempengaruhi keberkesanan PdP guru. Arah anak panah menunjukkan aliran pengaruh, di mana elemen-elemen ini saling menyokong dan membentuk pendekatan untuk *PdP*. *ABBM*, *AR,* Kemahiran Melakar dan STEM berperanan sebagai faktor utama dalam meningkatkan keberkesanan pengajaran, manakala *Motivasi* dan *Kemahiran Komunikasi* bergantung kepada faktor lain untuk menyokong pembelajaran. Melalui ISM, hubungan hierarki antara elemen boleh dikenalpasti untuk menentukan keutamaan dalam strategi pengajaran. Ini membantu membangunkan pendekatan PdP yang lebih sistematik dan berkesan dalam meningkatkan kemahiran visualisasi pelajar khususnya dalam mata pelajaran GKT.

Jadual 2: Matrik Capaian

Variable	1	2	3	4	5	6	7	Driving Power
Kaedah Pengajaran dan Pembelajaran Guru	1	1	1	1	1	1	1	7
Alat Bahan Bantu Mengajar (ABBM)	0	1	1	1	1	1	1	6
Augmented Reality (AR)	0	1	1	1	1	1	1	6

Kemahiran Melakar	0	1	1	1	1	1	1	6
Kemahiran STEM	0	1	1	1	1	1	1	6
Kemahiran Komunikasi	0	1	1	1	1	1	1	6
Motivasi	0	1	1	1	1	1	1	6
Dependence Power	1	7	7	7	7	7	7	

Selepas model dihasilkan , matriks capaian ditentukan seperti dalam Jadual 2 supaya elemen utama dapat diklasifikasikan kepada 4 kluster berbeza iaitu aktiviti *Autonomous*, aktiviti *Dependent*, aktiviti *Linkage* dan aktiviti *Independent*. Proses pengklasifikasian ini dilakukan berdasarkan nilai *Driving power* dan *Dependent power* seperti yang ditunjukkan dalam Rajah 2.



Rajah 2: Analisis MICMAC

Berdasarkan kepada Analisis Micmac, Rajah 2 menunjukkan *Kaedah PdP Guru* merupakan elemen dalam Quadrant IV *(Independent Variables)* yang mana elemen utama PdP guru boleh dianggap sebagai faktor penggerak. Oleh itu, elemen *Kaedah PdP Guru* merupakan kuasa pemandu tinggi tetapi kebergantungan rendah, yang berfungsi sebagai faktor utama dalam sistem kerana ia mempengaruhi banyak elemen lain. Elemen dalam Quadrant III (Linkage Variables) seperti *Augmented Reality (AR), ABBM*, *Kemahiran Melakar, STEM, Kemahiran Komunikasi* dan *Motivasi* memainkan peranan kritikal kerana ia boleh berubah-ubah bergantung kepada sistem yang diterapkan. Elemen ini turut mempunyai kuasa pemandu dan kebergantungan yang tinggi, menunjukkan sifat dinamik dan memerlukan kawalan kerana sebarang perubahan akan memberi kesan besar.Tiada elemen dapat diklasifikan dalam Quadrant I dan II. Maka, analisis MICMAC membantu mengenal pasti faktor utama dalam pembentukan model kemahiran visualisasi bagi Grafik Komunikasi

Teknikal (GKT) dan memberi cadangan untuk pengukuhan elemen yang berpengaruh tinggi.

4. Perbincangan

Hasil kajian menunjukkan klasifikasi elemen utama yang sesuai untuk dimasukkan ke dalam modul Kemahiran visualisasi. Pakar bersetuju bahawa 7 elemen utama akan diintegrasikan ke dalam modul Kemahiran visualisasi. Menurut Analisis Micmac, 7 aktiviti tersebut dapat dipisahkan menjadi 2 kelompok merangkumi elemen bebas *(Independent)* dan elemen yang berhubungan *(Linkage)*. Elemen bebas Kaedah PdP Guru iaitu mesti dilakukan dengan berkesan dan efektif oleh kerana ia sangat mempengaruhi elemen-elemen hubungan. ABBM dan AR bertindak sebagai pemacu utama dalam menyokong pengajaran yang lebih berkesan melalui penggunaan teknologi dan bahan bantu mengajar interaktif. Kemahiran Melakar dan STEM pula memainkan peranan penting dalam membangunkan kemahiran teknikal pelajar. Kemahiran Komunikasi dan Motivasi bergantung kepada faktor lain untuk meningkatkan keyakinan dan minat pelajar dalam pembelajaran.

Ini sejajar dengan literatur Dokuchayeva et al. (2020) menekankan kepentingan sistem pedagogi inovatif berasaskan pendekatan pelbagai bidang untuk meningkatkan keberkesanan PdP dalam pendidikan tinggi. Watkins et al. (2020) pula menyatakan bahawa pemahaman mendalam terhadap reka bentuk pendidikan membantu guru menyelaraskan pengajaran dengan pemikiran pelajar. Byvalkevych et al. (2020) mengenal pasti keperluan pedagogi untuk membangunkan kreativiti teknikal dalam pendidikan kejuruteraan seterusnya menyokong kemahiran visualisasi pelajar. Kajian oleh Zainuddin et al. (2023) menunjukkan bahawa teknologi Augmented Reality (AR) dapat meningkatkan kemahiran visualisasi dan penglibatan pelajar dalam pendidikan teknikal dan kejuruteraan.Kajian ini disokong oleh Sivakumar et al. (2024) membuktikan bahawa AR dapat membantu pelajar memahami grafik matematik 3D dengan lebih jelas. Secara keseluruhannya, penerapan alat bahan bantu mengajar (ABBM) dan teknologi Augmented Reality dalam pendidikan teknikal dan kejuruteraan terbukti meningkatkan kemahiran visualisasi pelajar yang membawa kepada pemahaman yang lebih mendalam dan penglibatan yang lebih tinggi dalam proses pengajaran dan pembelajaran (PdP).

Selain itu, aspek kemahiran melakar adalah asas dalam pendidikan teknikal dan kejuruteraan, bagi membolehkan pelajar menggambarkan dan menghasilkan idea secara visual (Zainuddin et al., 2023). Pendekatan STEM meningkatkan penglibatan pelajar dengan memahami konsep kompleks melalui pengalaman praktikal (Chew & Ismail, 2020). Kemahiran komunikasi juga penting dalam menyampaikan reka bentuk dan konsep teknikal secara jelas (Yusri et al., 2023). Selain itu, motivasi memainkan peranan dalam meningkatkan kemahiran visualisasi, di mana pelajar yang bermotivasi lebih komited dalam latihan melakar (Sivakumar et al., 2024). Gabungan elemen penyokong seperti kemahiran melakar, pendekatan STEM, komunikasi dan motivasi dalam model perlu diberi tumpuan dalam pendidikan teknikal bagi mempersiapkan pelajar menghadapi cabaran industri.

5. Kesimpulan

Kesimpulannya, kajian ini berjaya membangunkan model kemahiran visualisasi bagi mata pelajaran Grafik Komunikasi Teknikal (GKT) dalam rangka kerja TVET menggunakan kaedah *Nominal Group Technique (NGT)* dan *Interpretive Structural Modeling (ISM).*

Pengenalpastian tujuh elemen utama iaitu Kaedah Pengajaran dan Pembelajaran, Bahan Bantu Mengajar (ABBM), Argumented Realty (AR), Kemahiran Melukis, Kemahiran STEM, Kemahiran Komunikasi dan Motivasi menunjukkan peranan kritikalnya dalam meningkatkan kebolehan visualisasi pelajar. Analisis ISM seterusnya mendedahkan struktur hierarki dan saling bergantung antara elemen ini, memberikan pemahaman yang lebih jelas tentang pengaruhnya. Penemuan ini menawarkan pandangan berharga untuk pendidik dan pembangun kurikulum untuk meningkatkan strategi pengajaran dalam mata pelajaran Grafik Komunikasi Teknikal seterusnya meningkatkan kemahiran visualisasi pelajar dalam pendidikan teknikal dan kejuruteraan.

6. Penghargaan

Artikel ini merupakan sebahagian dari kajian penyelidikan yang bertajuk “Pembangunan Model Kemahiran Visualisasi Mata Pelajaran Grafik Komunikasi Teknikal Berasaskan Elemen Keseronokan di Sekolah Menengah” yang dilaksanakan oleh pengkaji di bawah seliaan Fakulti Pendidikan Teknikal dan Vokasional, Universiti Pendidikan Sultan Idris. Kajian ini telah ditaja oleh Bahagian Tajaan Pendidikan, Kementerian Pendidikan Malaysia melalui program Hadiah Latihan Persekutuan (HLP).

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PENGINTEGRASIAN SENI VISUAL DI DALAM PENGAJARAN PERLEMBAGAAN NEGARA MELALUI KURSUS JATI DIRI KEBANGSAAN

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Abstrak: *Cabaran arus globalisasi kini mendorong Malaysia mengambil inisiatif penting iaitu mewujudkan masyarakat yang mempunyai nilai jati diri yang tinggi terutamanya dalam kalangan golongan belia. Dalam konteks pendidikan, seni bukan hanya dilihat sebagai satu bentuk ekspresi kreatif tetapi juga sebagai alat untuk membangunkan pemikiran kritikal, kemahiran sosial, dan kecerdasan emosi pelajar. Oleh itu, pengintegrasian seni visual dalam pengajaran Perlembagaan Negara melalui kursus Jati Diri Kebangsaan dalam kalangan pelajar universiti adalah bertujuan untuk mewujudkan kaedah pembelajaran yang lebih menarik, efektif dan boleh meningkatkan kefahaman pelajar. Justeru, kajian ini bertujuan meneroka bagaimanakah pengintegrasian seni visual khususnya seni lukisan boleh dilakukan dalam pengajaran topik Perlembagaan Negara melalui kursus Jati Diri Kebangsaan dan impaknya kepada pemahaman pelajar. Seterusnya, apakah cabaran dan potensi yang boleh diketengahkan pada masa hadapan melalui pengintegrasian seni visual ini dalam pengajaran dan pembelajaran kursus Jati Diri Kebangsaan. Reka bentuk kajian tinjauan ini dilakukan dengan melibatkan 13 orang responden dalam kalangan pelajar Asasipintar Antarabangsa, Universiti Kebangsaan Malaysia berumur 17 hingga 19 tahun. Analisis dokumen dilakukan terhadap data yang diperolehi melalui rancangan pengajaran, pemerhatian dan temu bual secara terbuka. Dapatan kajian ini menunjukkan bahawa pengintegrasian seni visual dalam pengajaran topik Perlembagaan Negara melalui kursus Jati Diri Kebangsaan boleh dilakukan melalui persediaan penyelidik dan mempunyai impak terhadap kefahaman pelajar tentang Perlembagaan Persekutuan dan nilai-nilai jati diri kebangsaan. Akhir sekali, dapatan kajian menunjukkan bahawa terdapat cabaran dan potensi yang dihadapi oleh pelajar dalam melaksanakan pembelajaran menggunakan seni visual dalam kursus Jati Diri Kebangsaan.*

Keywords: Seni Visual, Pedagogi, Perlembagaan Negara, Jati Diri Kebangsaan,

Pengenalan

Malaysia sedang mendepani arus globalisasi kini dengan pelbagai inisiatif ke arah peningkatan pembangunan Malaysia. Antara inisiatif pentingnya adalah usaha mewujudkan masyarakat yang setia dan bersatu padu dengan penerapan nilai-nilai kewarganegaraan dan jati diri yang tinggi. Menurut Zamri Mahamod (2017), jati diri adalah harga diri yang menggambarkan watak peribadi setiap bangsa mahupun suku kaum. Dalam kajian Syaidatun Nadzirah, Kamilah Wati & Naimatul Apidah (2024), kemegahan terhadap bangsa sendiri wujud apabila adanya semangat cintakan tanah air dan ianya merangkumi kefahaman terhadap bahasa, budaya, sosial, politik dan ekonomi. Keteguhan jati diri rakyat yang sayang dan cinta kepada negara pula wujud apabila kefahaman terhadap undang-undang tertinggi negara iaitu Perlembagaan Persekutuan. Namun demikian, penerapan jati diri ini bukanlah satu proses yang mudah kerana ia adalah proses untuk memantapkan keyakinan masyarakat terhadap sistem kepercayaan yang

dianuti masyarakat kerana apabila setiap anggota masyarakat berpegang teguh pada ajaran agama, maka mereka tidak akan melakukan perkara yang tidak baik.

Dalam konteks pendidikan, seni bukan hanya dilihat sebagai satu bentuk ekspresi kreatif tetapi juga sebagai alat untuk membangunkan pemikiran kritikal, kemahiran sosial, dan kecerdasan emosi pelajar. Menurut Mohd Jamel Ismail (2017), pendidikan seni visual dan seni muzik adalah bidang-bidang yang mempunyai konsep irama, warna, lukisan dan ruang yang boleh di zahirkan melalui pelbagai aktiviti seperti penerokaan, pengalaman dan ekspresi. Seni dalam pendidikan mempunyai pelbagai bentuk ekspresi kreatif dan boleh digunakan juga sebagai suatu alat untuk meningkatkan perkembangan individu dari segi intelektual, sosial, dan emosi.

Justeru, terdapat masalah kajian yang wujudnya pada kajian-kajian lepas iaitu tidak ada satu kaedah yang jelas untuk menunjukkan bagaimanakah pengintegrasian seni visual khususnya lukisan di lakukan dalam pembelajaran kursus Jati Diri Kebangsaan. Penglibatan pelajar dan keberkesanan kaedah pengajaran ini juga tidak dikaji dengan lebih mendalam dalam konteks pengajaran kursus Jati Diri Kebangsaan. Apabila ini berlaku, akan menyebabkan impak dan potensi pengintegrasian seni visual ini tidak ditonjolkan secara optimal. Ini turut sama akan memberi kesan kepada minat dan potensi pelajar dalam mempelajari kursus jati diri kebangsaan ini.

Oleh itu, kajian ini bertujuan meneroka bagaimanakah pengintegrasian seni visual khususnya lukisan boleh dilakukan dalam pengajaran dan pembelajaran kursus Jati Diri Kebangsaan serta impaknya kepada pemahaman pelajar. Seterusnya, apakah potensi dan cabaran yang boleh diketengahkan pada masa hadapan melalui pengintegrasian seni visual ini dalam pengajaran dan pembelajaran kursus Jati Diri Kebangsaan. Terdapat 3 Objektif Kajian ini iaitu untuk:

1. Mengenalpasti bagaimanakah seni visual khususnya lukisan boleh diintegrasikan dalam pengajaran topik Perlembagaan Persekutuan melalui kursus Jati Diri Kebangsaan di Pusat PERMATA@Pintar Negara.
2. Menganalisis impak pengintegrasian seni visual terhadap kefahaman pelajar terhadap topik Perlembagaan Persekutuan melalui pembelajaran kursus Jati Diri Kebangsaan di Pusat PERMATA@Pintar Negara.
3. Meneroka potensi yang diperolehi oleh pelajar dalam melaksanakan pengajaran dan pembelajaran menggunakan seni visual khususnya lukisan dalam kursus Jati Diri Kebangsaan di Pusat PERMATA@Pintar Negara.

Bagi menjawab Objektif Kajian tersebut, penyelidik akan mengemukakan beberapa soalan kajian yang akan diterokai dalam penyelidikan ini:

a) Soalan Kajian bagi Objektif Kajian 1:
i. Apakah lukisan yang dilukis sesuai untuk menggambarkan topik yang dipelajari?
ii. Apakah lukisan yang dilukis menonjolkan ekpresi perasaan anda yang berkaitan dengan topik yang dipelajari?

b) Soalan Kajian bagi Objektif Kajian 2:
i. Apakah perasaan anda selepas melukis lukisan yang berkaitan dengan topik yang dipelajari?

ii. Bagaimanakah lukisan itu menggambarkan kefahaman anda semasa mempelajari topik yang dipelajari?

c) Soalan Kajian bagi Objektif Kajian 3:

i. Apakah ekpresi diri yang anda perolehi selepas menjalankan aktiviti melukis lukisan tersebut?
ii. Apakah anda mahu meneruskan aktiviti seni lukisan ini pada topik pembelajaran yang seterusnya?

Ulasan Literatur

Dalam konteks pendidikan, kreativiti para pelajar dapat ditonjolkan melalui ekspresi perasaan, idea dan pandangan dunia mereka semasa belajar terutamanya sesuatu ilmu yang baru. Ia boleh dilakukan melalui penyesuaian kaedah seni dalam pendidikan. Menurut Siti Hawa & Faridah (2020), pendidikan seni visual mempunyai unsur seni iaitu menggambar, membentuk dan membuat binaan, membuat corak dan rekaan serta mengenal kraf tradisional. Justeru, pelajar berpeluang untuk menterjemahkan pengalaman hidup mereka melalui seni kreatif seperti lukisan. Sementara itu, Bileron Buruntong dan Salbiah Kindoyup (2024) dalam kajian mereka melihat kepada kesan integrasi seni visual dalam pendekatan STEAM menegaskan bahawa pendekatan kaedah ini memberi impak positif terhadap kemahiran aras tinggi (KBAT) dan kemahiran abad ke-21 dalam kalangan murid sekolah menengah. Murid-murid dikatakan lebih memahami dan menguasai konsep-konsep yang dipelajari dan mencipta karya seni yang berkaitan dengan konsep STEAM. Data kajian yang dikumpul memperlihatkan aktiviti penghasilan karya seni visual berpotensi sebagai alat sokongan dalam aktiviti pengajaran dan pembelajaran (PdP) yang menyokong kepada kemenjadian murid. Buktinya, kaedah ini berupaya memperlihatkan elemen komunikasi dalam kemahiran abad ke-21 (PAK21) apabila murid meneroka potensi diri mereka dan melibatkan diri secara aktif dalam proses pembelajaran yang seterusnya mencetuskan interaksi yang dinamik.

Pengintegrasian seni visual dalam pendidikan telah berkembang melalui beberapa model. Dalam Model Integrasi Subjek, ia menggabungkan seni visual dengan pelbagai mata pelajaran dalam kurikulum. Menurut Poonam Srivastava (2023), ia menerangkan bagaimana seni visual dapat digunakan untuk memperkaya pengalaman pembelajaran dalam subjek kurikulum yang lain seperti Matematik, Sains, dan bahasa. Sebagai contoh, pelajar dapat menggunakan seni visual untuk menggambarkan formula matematik atau meneroka peristiwa sejarah melalui lukisan. Namun demikian, kurangnya kajian khusus terhadap bagaimanakah pengintegrasian seni visual khususnya lukisan dibuat di dalam konteks pengajaran dan pembelajaran topik Perlembagaan Negara melalui kursus Jati Diri Kebangsaan.

Menurut Mohd Shazlan Shahudin dan Khairul Azhar Jamaludin (2024) pula pengintegrasian gaya pembelajaran bagi mata pelajaran Pendidikan Seni Visual (PSV) dan teknologi media baru berpotensi mengatasi masalah persekitaran pembelajaran yang membosankan kepada murid. Malah penggunaan TMK adalah satu strategi berpusatkan murid yang perlu digilap oleh guru dalam melahirkan murid bidang seni visual yang kreatif dan inovatif untuk keperluan masa depan. Pengkaji turut mengakui bahawa penggunaan gambaran grafik secara interaktif melalui paparan multimedia semasa PdP menyebabkan murid mudah mengingati pembelajaran yang diajar oleh guru, meneguhkan mesej yang ingin disampaikan dan meninggalkan kesan yang mendalam ke atas pembelajaran murid. Pedagogi aplikasi TMK dalam pembelajaran juga disokong oleh Yusoff & Husain (2020) kerana ia berupaya mewujudkan suasana pembelajaran

yang aktif di mana murid melibatkan diri dalam pelbagai aktiviti yang menyeronokkan dan dapat membantu murid yang lemah untuk lebih memahami serta memberi respon yang pantas berkaitan hasil pembelajaran (Kamaluddin & Husnin, 2022). Oleh itu, menjadi tanggungjawab guru mempelbagaikan pedagogi dalam menyampaikan kandungan pelajaran supaya dapat mengekalkan minat dan motivasi murid melalui teknik dan pendekatan supaya pembelajaran bermakna dapat disampaikan. Tambahan lagi, kajian ini juga mendapati integrasi TMK dalam PSV meningkatkan kreativiti dan inovasi dalam pengajaran guru serta pengkaryaan artistik murid.

Pengintegrasian seni visual dalam pendidikan telah menjadi topik penting dalam teori pendidikan moden. Ini adalah kerana ia tidak hanya terhad kepada teknik dan penciptaan karya seni, tetapi juga perlu dilihat bagaimana seni dapat digunakan sebagai alat untuk memupuk kemahiran kehidupan. Dalam kajian Nafisah Md Noor, Abdul Halim Husain & Siti Hayati Mohd Yusoff (2020) yang berfokus kepada ekspresi seni visual terhadap karya seni anak-anak gelandangan di Sekolah Bimbingan Jalinan Kasih (SBJK), beliau mengatakan seni dapat membantu dalam pembentukan jati diri dan meningkatkan kesedaran sosial. Melalui lukisan dan catan, anak-anak di SBJK dapat meneroka dan memahami diri mereka sendiri. Karya seni tersebut menggambarkan pengalaman visual dan emosi yang mereka alami. Ini sekaligus menjadikannya satu bentuk komunikasi bukan verbal yang membina keyakinan serta kesedaran terhadap pengukuhan nilai diri mereka dalam masyarakat. Selain itu, anak-anak gelandangan perlu dibimbing untuk meluahkan perasaan dengan cara yang betul dan dalam suasana yang positif. Pendekataan aktiviti pengajaran seni yang lebih inklusif sememangnya dapat memberi ruang kepada murid untuk mengekpresikan diri mereka secara bebas. Justeru, kajian ini dilihat membantu penyelidik tentang bagaimanakah pengintegrasian seni visual khususnya lukisan dilakukan dalam pengajaran Perlembagaan negara bagi kursus Jati Diri Kebangsaan.

Di samping itu, pendekatan seni visual dalam pendidikan juga dapat membantu guru dalam memahami ekspresi dan emosi murid terhadap sesuatu pembelajaran terutamanya bagi murid berkeperluan khas (MBK). Dalam kajian Ida Puteri Mahsan (2021) yang bertajuk “Ekspresi Seni dan Komunikasi Visual Terhadap Murid Berkeperluan Khas dalam Mata Pelajaran Pendidikan Seni Visual,” beliau menyimpulkan komunikasi visual dalam karya seni berfungsi sebagai alat untuk menyampaikan maklumat medium penting bagi MBK untuk meluahkan perasaan dan pemikiran. Komunikasi visual ini boleh wujud dalam karya murid sewaktu guru menjalankan aktiviti seperti menggambar, mewarna, membina objek binaan dan penggunaan tanda atau simbol yang dilukis oleh murid. Aktiviti ini sememangnya memberi peluang kepada murid untuk mengekspresikan diri mereka dalam bentuk seni. Tambahnya lagi, kaedah ini membolehkan guru dan murid meningkatkan kemahiran berkomunikasi dan merangsang interaksi sosial di dalam bilik darjah apabila murid dan guru membuat perbincangan tentang emosi yang diterjemahkan dalam lukisan. Sebagai contoh, hasil kajian terhadap guru Pendidikan Seni Visual (PSV) dan lima orang murid di bawah Program Pendidikan Khas Integrasi (PKKI) menunjukkan bahawa penggunaan warna, garisan, bentuk, komposisi dan teknik seni yang sesuai berupaya merangsang murid MBK dalam mengekspresikan diri mereka dengan lebih baik. Hal ini kerana, setiap karya yang terhasil oleh kanak-kanak membuka rangsangan tindakan artistik dalam pengajaran oleh guru (Ramli & Musa, 2020). Justeru, seni bukanlah sekadar aktiviti kreatif tetapi juga berperanan sebagai alat komunikasi yang berkesan dalam membentuk modal insan yang lebih kreatif, inovatif dan produktif terutamanya bagi golongan kurang upaya atau murid berkeperluan khas. Namun, seperti kajian-kajian di atas, kajian ini sekali lagi tidak memfokuskan tentang pengaplikasian seni visual dalam topik

Perlembagaan Negara melalui kursus Jati Diri Kebangsaan yang menyebabkan penyelidik ingin menjalankan kajian mengenai integrasi seni dalam pengajaran perlembagaan.

Sementara itu, Jati Diri Kebangsaan merangkumi pemahaman dan penghargaan terhadap aspek bahasa, adat, budaya, agama, sejarah, patriotisme, integriti yang membentuk identiti seseorang dalam sesebuah negara. Kajian daripada Siti Hayati (2021) menunjukkan dalam konteks pendidikan seni visual, pelajar Orang Asli di Negeri Perak menggunakan seni sebagai medium bagi mengekspresikan identiti mereka termasuk unsur budaya dan warisan yang mencerminkan jati diri mereka. Selain memupuk kreativiti dan inovasi, seni visual juga membolehkan pelajar memahami dan menghargai warisan budaya mereka. Ini terbukti apabila Orang Asli sering mengunakan motif tradisional dan elemen alam semula jadi dalam karya seni yang mencerminkan hubungan erat mereka dengan budaya dan persekitaran. Bukan itu sahaja, kajian ini juga mendapati bahawa modul pembelajaran seni visual yang dirancang dengan baik berupaya membantu pelajar untuk mencapai kejayaan akademik, mengekspresikan nilai budaya dan adat serta kepercayaan yang berkait dalam kehidupan seharian seterusnya mememperkukuhkan jati diri mereka.

Justeru, dapatlah disimpulkan bahawa terdapat pelbagai kajian yang telah dilakukan yang menunjukkan bahawa banyak manfaat yang diperoleh daripada pengintegrasian seni dalam pendidikan merentasi pelbagai bidang pendidikan. Ini adalah kerana, ia melibatkan pelbagai aspek sosio-emosi pelajar dan menggalakan peningkatan terhadap pemahaman pelajar. Namun demikian, kurangnya kajian khusus terhadap bagaimanakah pengintegrasian seni visual khususnya lukisan dibuat di dalam konteks pengajaran dan pembelajaran topik Perlembagaan Negara melalui kursus Jati Diri Kebangsaan. Oleh hal yang demikian, fokus kajian penyelidik adalah untuk mengkaji pengintegrasian seni visual khususnya dalam pengajaran dan pembelajaran kursus Jati diri Kebangsaan. Fokus kajian yang perlu dirujuk adalah bagaimanakah pengintegrasian seni visual iaitu lukisan boleh dilakukan dan memberi impak kepada pembelajaran pelajar. Oleh kerana kekurangan kajian yang menunjukkan cabaran dan potensi pengintegrasian seni visual ini dalam kurusus Jati Diri Kebangsaan, penyelidik juga berhasrat untuk mengkaji apakah cabaran dan potensi yang signifikan kepada pembelajaran dan pengajaran oleh pelajar. Justeru, bagi mencapai potensi penuh seni visual dalam kursus Jati Diri Kebangsaan, kajian yang lebih mendalam diperlukan dalam aspek-aspek ini agar pengintegrasiannya dapat dilaksanakan dengan lebih berkesan dan memberi impak yang lebih besar dalam pembentukan jati diri pelajar.

Metodologi Kajian

Penyelidik menjalankan kajian kualitatif berdasarkan metodologi *'Penyelidikan Berasaskan Seni'*. Ia memberi fokus kepada pengintegrasian seni visual dalam pendidikan khususnya lukisan bagi menjawab fokus kajian iaitu bagaimanakah pengintegrasian seni visual di dalam pendidikan boleh dibuat melalui lukisan. Melalui kaedah ini, pelajar akan mengalami pemahaman atau interpretasi yang berbeza bergantung kepada situasi atau keadaan sebenar yang relevan. Ini adalah kerana hasil seni adalah sesuatu yang sukar untuk diukur atau dinilai kerana bersifat subjektif. Pendekatan ini dipilih kerana ia membolehkan penyelidik mendalami pengalaman dan persepsi peserta mengenai pengintegrasian seni visual khususnya lukisan dalam pengajaran kursus Jati Diri Kebangsaan. Data juga diperoleh melalui analisis dokumen seperti rancangan pengajaran yang menggunakan seni visual dan bahan-bahan pengajaran yang berkaitan.

Justeru, penyelidik menggunakan pendekatan induktif bagi mengumpulkan data kajian menggunakan persampelan mudah iaitu penyertaan sebanyak 10 orang pelajar sebagai sampel kajian. Penyelidik merujuk kepada kerangka persampelan dan menggunakan kaedah pemerhatian tersembunyi dari jarak jauh dengan interaksi minimum terhadap pelajar tersebut. Seterusnya penyelidik beralih ke peringkat pemerhati sebagai peserta untuk berinteraksi secara ringkas untuk membantu dan menjawab soalan daripada pelajar dan akhir sekali beralih ke fasa peserta sebagai pemerhati pula untuk berinteraksi secara aktif dengan pelajar sambil terus memerhati dan mencatat. Namun begitu, penyelidik telah berinteraksi dengan pelajar untuk memberi maklum balas terhadap soalan yang ditanya oleh pelajar. Akhirnya, dalam fasa peserta sepenuhnya, penyelidik menyertainya sebagai peserta aktif dan penyelidik.

Dalam kajian ini, penyelidik telah menyediakan temu bual secara terbuka, mencatat maklumat-maklumat dan menganalisis secara pemerhatian terhadap hasil seni yang dihasilkan 10 orang pelajar tersebut untuk mendapatkan data kajian. Temu bual dengan pelajar pula bertujuan untuk mendapatkan maklum balas mereka mengenai kesan penggunaan seni visual terhadap pemahaman mereka tentang jati diri kebangsaan. Seterusnya, penyelidik menganalis data tersebut melalui 3 fasa analisis iaitu pembinaan kategori, penamaan kategori, dan penyesuaian teori. Kesemua proses dalam 3 fasa ini bertujuan untuk membantu penyelidik untuk menyesuaikan atau membina teori yang bersesuaian untuk menjelaskan aspek amalan yang terbaik untuk merangka aktiviti pengajaran pada masa hadapan.

Penyelidik juga merekodkan data yang dibuat semasa intervensi melalui temubual fokus kumpulan untuk menjelaskan keberkesanan fokus kajian. Selepas itu, penyelidik luar yang tidak terlibat dengan kajian akan memberi ulasan berkenaan kekuatan dan kelemahan data yang dilaporkan dalam laporan kajian. Ini bertujuan untuk mengesahkan kebolehpercayaan data yang diperolehi.

Semasa menjalankan persampelan ini, penyelidik juga akan mengedarkan borang persetujuan kebenaran rasmi untuk mengumpulkan data, rakaman dan penggunaanya bagi tujuan keselamatan perlindungan data peribadi kerana ia melibatkan pelajar sebagai sampel kajian serta memastikan bahawa prinsip-prinsip etika seperti persetujuan daripada peserta dipatuhi.

Dapatan kajian

Kajian ini dimulakan dengan pembinaan rancangan pengajaran dan seterusnya pengajaran dilakukan selaras dengan setiap objektif kajian berikut:

Objektif Kajian 1: Strategi Pengintegrasian Seni Visual

Selepas membahagikan data mengikut kategori bagi setiap domain semasa proses integrasi, penyelidik mengenalpasti bahawa terdapat 3 kunci strategi utama yang membuktikan bahawa pengintegrasian seni visual di dalam kelas Jati Diri adalah efektif khususnya, seni lukisan. Strategi yang berkesan ini digunakan sepanjang proses pengintegrasian seperti berikut:

1. ‘Milik Saya’ untuk mencetuskan pemikiran.
2. Berinteraksi dengan deria.
3. Memberi izin untuk berimaginasi.

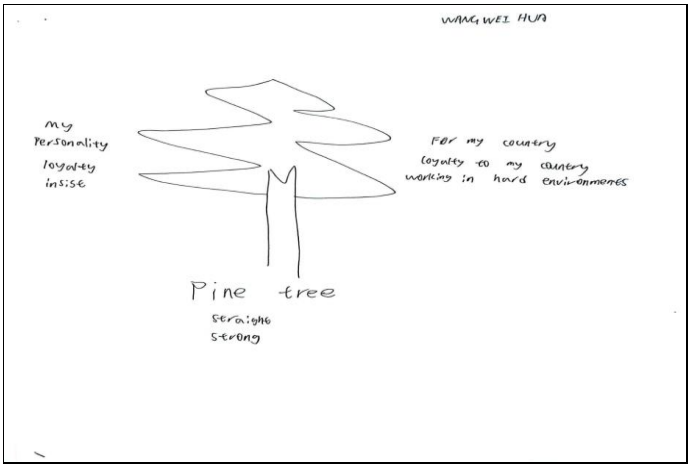
Strategi 1: "Milik Saya" Untuk Mencetuskan Pemikiran

Pada mulanya, pelajar diberi arahan untuk melukis imej atau gambar bagi menggambarkan apakah personaliti diri mereka berkaitan dengan topik Perlembagaan Negara dan jati diri melalui tema 'pokok' selepas ditayangkan satu imej pokok dan diberi penerangan tentang personaliti diri. Penyelidik menyedari bahawa telah wujud satu kekeliruan melalui maklum balas yang pelajar berikan.

> *Pelajar A: Bagaimanakah saya perlu melukis pokok yang mewakili personaliti diri saya? Pokok besar atau kecil? Saya tidak pernah tahu adanya pokok yang boleh menjadi simbol personaliti diri saya.*

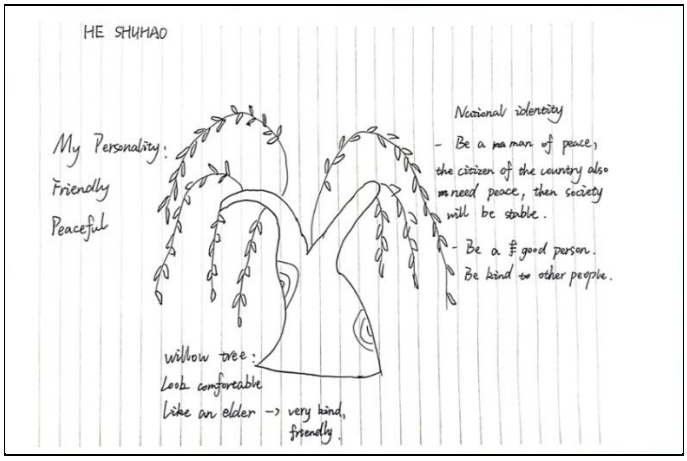
Walaupun menghadapi cabaran pada permulaan, penyelidik menyedari bahawa pengalaman bersama ini memberi nilai bermakna kerana ia memberi peluang kepada penyelidik untuk mendalami emosi, pemikiran dan perasaan pelajar. Semasa temu bual, pelajar menyatakan bahawa pemahaman tentang tugasan ini tetapi mempunyai kesukaran untuk melaksanakannya. Penyelidik percaya bahawa pengalaman bersama ini adalah penting kerana ini menggalakkan penerokaan lanjut. Penyelidik telah mengemukakan soalan tambahan seperti berikut:

i) Apakah perasaan kamu selepas melihat imej pokok yang diberikan?
ii) Apakah jenis pokok yang boleh menggambarkan personaliti jati diri kamu?
iii) Bagaimanakah kamu boleh mengekspresikan personaliti jati diri kamu melalui simbolik imej pokok?



Gambar Rajah 1

Keputusan intervensi adalah pelajar mula terlibat secara aktif dengan penyelidik semasa kajian dijalankan. Berdasarkan Gambar Rajah 1, seorang pelajar menyatakan bahawa imej 'Pokok Pine' yang dilukis adalah lurus dan kuat. Ia sesuai bagi menggambarkan personaliti jati dirinya iaitu seorang yang setia dan ingin berusaha kuat demi negaranya. Pelajar memilih imej 'Pokok Pine' bagi menggambarkan personaliti dirinya kerana sifat pokok tersebut yang tumbuh tinggi, lurus ke atas serta mempunyai batang yang kuat.



Gambar Rajah 2

Seterusnya, Gambar Rajah 2 menunjukkan bahawa keputusan intervensi melalui imej 'Pokok Willow' yang dilukis oleh seorang pelajar lain. Pelajar ini memilih 'Pokok Willow' yang banyak tumbuh di negara China bagi menggambarkan personaliti dirinya seperti pokok yang tumbur besar dan rendang yang mempunyai banyak dahan dan daun yang memayungi ke bawah bumi serta mempunyai jangka hayat yang lama. Pelajar menggambarkan personaliti dirinya sebagai 'abang sulung' seperti pokok ini yang besar dan hidup lebih lama. Pelajar juga menyatakan dirinya seorang yang peramah dan mudah berkawan dengan sesiapa seperti pokok ini yang besar mempunyai dahan dan daun yang boleh menjadi tempat semua orang untuk berteduh. Melalui pemilihan imej "Pokok Willow' ini, pelajar menggambarkan personaliti dirinya sebagai seorang lelaki yang mementingkan keamanan seperti negaranya supaya masyarakat dapat hidup stabil. Pelajar ini juga merasakan dirinya perlu berbuat baik kepada orang lain dan menjadi warganegara yang baik.

Melalui intervensi penyelidik ini, terdapat perubahan yang ketara di mana para pelajar dapat meneroka lebih mendalam terhadap pemikiran mereka berbanding sekadar melihat imej pokok yang ditayangkan di hadapan semasa awal kelas pembelajaran bermula. Dengan menyelami proses pemikiran dalaman mereka, pelajar diperhatikan dapat melihat perspektif yang berbeza tentang personaliti diri masing-masing dalam imej pokok yang dipilih yang berkaitan dengan topik Perlembagaan Negara.

Strategi 2: Berinteraksi dengan Deria

Penciptaan sesuatu karya seni memerlukan seorang pelukis yang menggunakan elemen seni asas bagi menggambarkan subjek lukisan mereka. Elemen-elemen ini termasuk keseimbangan, bentuk, ruang, cahaya, pergerakan, bentuk, ekspresi, dan dinamik (Arnheim, 1974). Dalam kajian ini, penyelidik membimbing pelajar untuk menggabungkan prinsip dan elemen seni ini, bertujuan untuk memudahkan penciptaan karya seni yang menyentuh emosi dan pengalaman yang diterjemahkan. Setelah pelajar digalakkan untuk mendalami pemikiran mereka, mereka diberikan tugas untuk menterjemahkan pemikiran ini ke atas kertas. Proses ini melibatkan penyampaian pemikiran, emosi, dan idea yang abstrak secara semula jadi bersifat subjektif.



Gambar Rajah 3

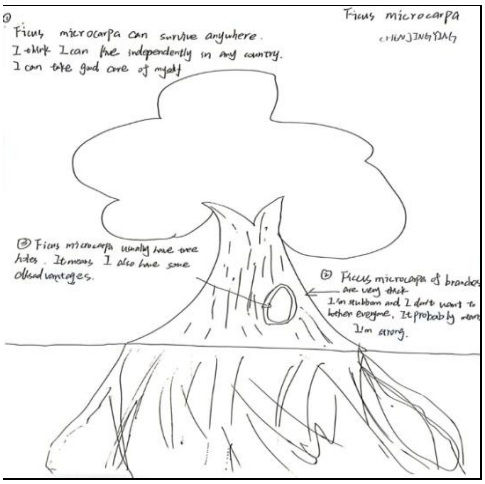
Berdasarkan Gambar Rajah 3, menjelaskan bahawa warna berinteraksi dengan bentuk, ruang dan cahaya untuk mencipta kesan, suasana dan emosi bagi menambah ketegangan dinamik kepada komposisi karya seni seorang pelajar. Penyelidik memberikan pelajar 30 minit sebagai masa tambahan untuk mencipta karya seni mereka dan memberi ruang yang cukup untuk ekspresi individu. Penyelidik melihat ini sebagai situasi aktif dan menarik kerana peserta secara aktif terlibat dalam perbincangan dengan rakan-rakan mereka mengenai pemilihan tema pokok dalam topik Perlembagaan Negara. Perbualan mereka tertumpu kepada pokok yang besar, cantik dan tumbuh banyak di sekitar. Mereka juga berbual mengenai elemen warna yang boleh dimasukkan dalam imej pokok mereka. Masa tambahan 30 minit yang diberi untuk menghasilkan imej pokok yang lebih menarik iaitu dengan menggunakan elemen warna yang ceria. Pelajar telah mewarnakan lukisan tersebut dengan pelbagai warna ceria seperti hijau, kuning dan biru bagi mengekpresikan emosi dan pemikirannya. Pemilihan 'Pokok Teh' sebagai simbol personaliti jati dirinya iaitu seorang yang tenang, baik hati dan sederhana. Ini adalah kerana sifat daun teh yang menjadi air teh untuk memberi kelegaan kepada seseorang yang meminumnya. Sifat pokok teh juga yang tumbuh rendah dan menjadi lanskap pagar menjadi kegemaran ramai menggambarkan dirinya yang baik hati dan menenangkan kepada orang lain.

Strategi 3: Memberi Izin Untuk Berimaginasi

Menurut Yenawine (2014), ia membincangkan konsep 'memberi keizinan untuk berimaginasi' kepada pelajar seperti yang digariskan dalam Visual Thinking Strategies (VTS). Ia menekankan pendekatan berpusatkan pelajar untuk meneroka karya seni, menggalakkan pelajar untuk memerhati secara kritis, terlibat dalam perbincangan mengenai tafsiran mereka, mendalami pemahaman dan menyokong idea dengan bukti. Pada masa yang sama, ia juga membina persekitaran di mana pelajar boleh mendengar dan menghormati pandangan yang berbeza.

Dalam kajian ini, penyelidik memainkan peranan penting dalam memudahkan perbincangan ini dengan mewujudkan ruang yang selamat untuk pelajar meneroka tafsiran baru dan pelbagai tentang karya seni. Semasa proses pengajaran, pelajar diarahkan untuk memerhati dengan

senyap lukisan yang dihasilkan oleh rakan mereka supaya suasana yang reflektif dapat diwujudkan.



Gambar Rajah 4

Pada fasa pemerhatian dan pemikiran senyap ini, penyelidik memberi masa kepada pelajar untuk berfikir sebelum menggalakkan mereka untuk bercakap. Melalui sesi ini, ia dapat merangsang perasaan ingin tahu yang mendalam berkenaan personaliti yang ada dalam diri mereka yang dapat dikaitkan dengan Perlembagaan Negara dan jati diri terhadap negara. Ia juga membolehkan pelajar terlibat dalam pemikiran aktif dan memperoleh makna daripada situasi yang kompleks. Sesi penerokaan visual ini menggalakkan kemahiran pemerhatian dan penyelidikan kritikal terhadap makna atau mesej subjek tersebut. Selepas aktiviti penghasilan lukisan, pelajar diberi masa selama 10 minit untuk melihat hasil lukisan mereka yang dipaparkan di dinding 'gallery walk'.

Berdasarkan Gambar Rajah 4, salah seorang pelajar telah melukis imej 'lubang' pada batang pokok 'Ficus Microcarpa" tersebut bagi menggambarkan dirinya yang mempunyai kelemahan diri walaupun merasakan diri adalah kuat dan besar seperti batang pokok tersebut. Terdapat tiga orang pelajar yang kembali semula kepada lukisan mereka dan menambahkan elemen tambahan pada lukisan mereka. Penyelidik bertanya kepada pelajar tersebut dan mereka menjelaskan bahawa mereka telah mendapat idea baru mengenai imej pokok tersebut yang mewakili personaliti jati diri dan menggambarkan kekuatan Perlembagaan Negara bagi sesebuah negara. Pelajar-pelajar ini mula membincangkan tema-tema pokok yang mempunyai sifat seperti berakar panjang dan besar bagi menggambarkan personaliti jati diri yang kukuh dan keras.

Objektif Kajian 2: Emosi dan Kefahaman Mengintegrasikan Seni Visual

Setelah menganalisis data, penyelidik mengesahkan bahawa integrasi seni visual secara efektif mengukuhkan pemahaman terdahulu melalui imej mental dan rangsangan deria.

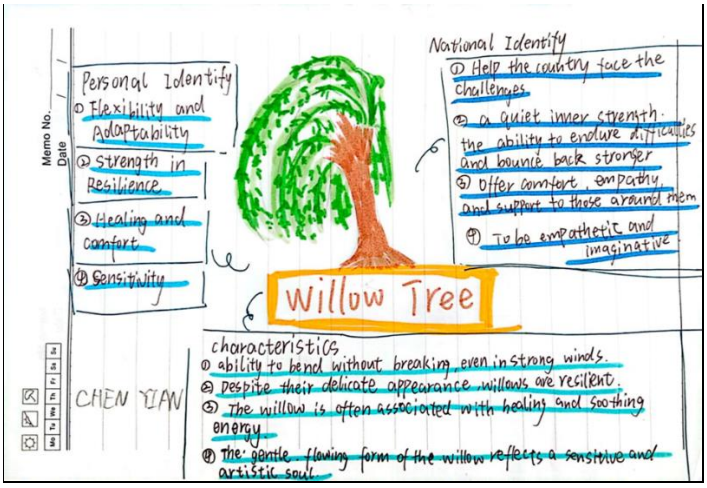
Keberkesanan 1: Mengesahkan Emosi Terdahulu Melalui Imej Mental

Melalui kajian ini, terdapat salah satu penemuan menarik berkenaan kebolehan pelajar untuk mencipta imej mental dan simbol. Pada awalnya, peserta melaporkan bahawa mereka sedikit bercelaru dan emosi tidak tenang untuk memahami imej yang ditayangkan oleh penyelidik

pada awal sesi pembelajaran tersebut dan proses integrasi seni lukisan ini telah meningkatkan pemahaman mereka berkenaan topik Perlembagaan Negara dan personaliti jati diri. Salah seorang pelajar telah menyatakan seperti berikut:

> *Pelajar B: Ya, apabila saya melihat lukisan pokok tersebut, saya lebih memahami pemikiran saya terhadap ciri-ciri personaliti diri saya yang berkaitan dengan Perlembagaan Negara dan kaitannya dengan jati diri terhadap negara.*

Petikan temu bual ini menekankan bagaimana pelajar telah membentuk idea tema pokok yang menggambarkan personaliti jati diri dalam keadaan tidak tenang dan sedikit beremosi selepas kali pertama melihat imej pokok yang ditayangkan oleh penyelidik di awal sesi pembelajaran. Apabila pelajar mula terlibat dengan proses pemilihan dan melukis jenis pokok tersebut, mereka menjadi lebih tenang dan fokus kerana berasa seronok sehingga membolehkan mereka mengukuhkan imej mental seterusnya meningkatkan pemahaman mereka tentang topik yang dipelajari melalui representasi visual.



Gambar Rajah 5

Dalam Gambar Rajah 5, seorang pelajar menggambarkan dirinya yang mempunyai personaliti diri sebagai fleksibel dan boleh menyesuaikan diri dengan pelbagai situasi, mempunyai tahap ketahahanan diri yang tinggi, seorang yang tenang dan sensitif. Ia digambarkan dengan lukisan 'Pokok Willow' yang mempunyai ketahanan hidup yang tinggi walaupun ditiup angin kuat meskipun mempunyai fizikal berdahan dan berdaun kecil. Sifat pokok ini yang tenang tetapi bertenaga tetapi mempunyai ciri-ciri sensitif terhadap persekitaran. Pemilihan pokok ini sebagai simbol perkaitan bahawa Perlembagaan Negara yang merangkumi semua aspek pentadbiran negara yang bersesuaian. Melalui sesi penghasilan lukisan ini, dua pelajar telah berkongsi semasa temu bual berikut:

> ***Pelajar C**: Saya rasa dengan melukis, kita dapat memahami bahawa seni visual lukisan dan emosi ini saling berkait rapat kerana semasa melukis saya rasa seronok dan tenang.*
>
> ***Pelajar D**: Saya dapat memikirkan ciri-ciri personaliti diri yang tidak pernah saya sedar selama ini wujud dalam diri saya. Pada mulanya, saya rasa tidak seronok dan pemikiran saya bercelaru kerana tidak dapat kenal ciri-ciri diri tetapi apabila mula melukis, saya rasa tenang dan seronok kerana dapat*

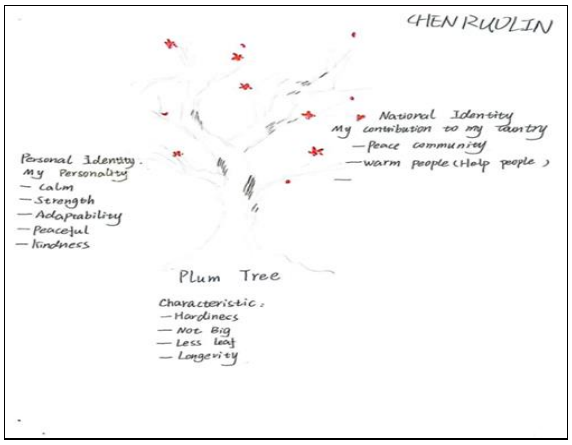
melukis mengikut apa yang saya fikir dan rasai. Personaliti diri ini wujud dan saya dapat fikirkan dalam keadaan tenang kaitannya dengan kesetiaan kepada negara.

Keberkesanan 2: Mencetuskan Kefahaman

Penyelidik memerhatikan bahawa pelajar mendalami topik personaliti jati diri melalui integrasi seni visual khususnya seni lukisan. Seorang pelajar menyatakan bahawa seni lukisan membolehkannya mengekspresikan karakteristik dirinya secara nyata ke dalam bentuk lukisan pokok sekaligus mengukuhkan pemahamannya terhadap topik yang dipelajari.

***Pelajar E**: Melukis imej pokok di atas kertas dan menambah elemen warna dan bentuk abstrak yang berkaitan dengan personaliti jati diri saya dapat membantu saya memahami personaliti diri dengan lebih baik.*

***Pelajar F**: Bahagian yang paling menarik bagi saya adalah proses melukis. Apabila saya melukis, saya boleh sepenuhnya tenggelam dalam pemikiran kerana pemikiran kerana saya berusaha untuk mengenali personaliti diri saya. Memikirkan personaliti diri dalam pemikiran saya mungkin kelihatan abstrak dan kabur, tetapi apabila melukis imej lukisan pokok ini sayaseolah-olah lebih kenal diri saya.*



Gambar Rajah 6

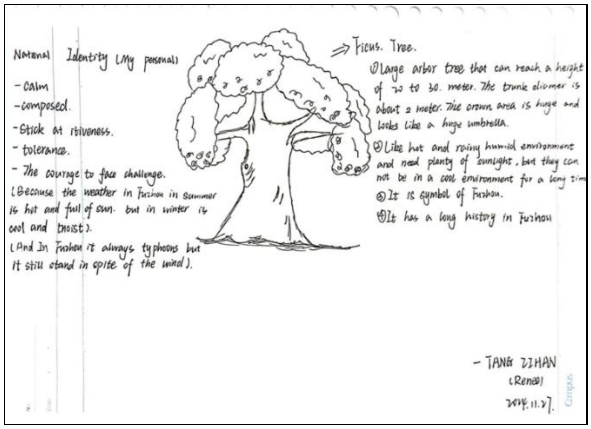
Berdasarkan Gambar Rajah 6, pelajar telah melukis imej 'Pokok Plum' yang digambarkan sebagai sebuah pokok mempunyai batang yang keras walaupun tidak tumbuh besar, mempunyai daun-daun yang kecil dan mempunyai jangka hayat tumbuh lebih lama serta mempunyai buah plum yang dapat dimakan oleh manusia. Umum mengetahui bahawa buah plum menjadi kegemaran untuk di makan kerana rasanya yang manis dan masam. Pelajar menggambarkan dirinya seperti 'Pokok Plum' dengan personaliti jiwa yang kuat dan dapat memberikan ketenangan kepada rakan-rakan melalui kebaikan dirinya dan sebagai warganegara yang mempunyai sifat menyumbang kepada negara melalui kebaikan kepada masyarakat sekitarnya dan mementingkan keamanan negara seperti yang dianjurkan dalam Perlembagaan Negara.

Objektif Kajian 3: Cabaran Pengintegrasian Seni Visual

Pelajar menyatakan bahawa bagaimana proses integrasi seni lukisan membolehkan mereka mengenali dan memahami lebih mendalam dengan personaliti diri. Sebagai contoh, seorang pelajar pada mulanya menghadapi kesukaran untuk mengenal personaliti diri hanya melalui pemikiran dan imaginasi. Walau bagaimanapun, melalui aktiviti melukis, pelajar ini dapat lebih mendalami personaliti diri yang wujud apabila melukis imej pokok yang mempunyai kaitan dengan diri sendiri. Justeru, pelajar dapat mengenali diri dan meningkatkan kefahaman topik jati diri.

> ***Pelajar F**: Pada mulanya, saya rasa susah fikir personaliti diri sebab saya tidak pernah fikirkannya sebelum ini. Tetapi, apabila saya melihat imej pokok yang ditayangkan pada awal kelas, saya dapat idea baru.*
>
> ***Pelajar G**: Saya tidak minat melukis tetapi apabila diminta memilih satu jenis pokok dan melukis mengikut personaliti, saya rasa seronok. Saya mahu melukis lagi pada kelas yang akan datang kerana saya lebih seronok belajar jika ada aktiviti melukis.*

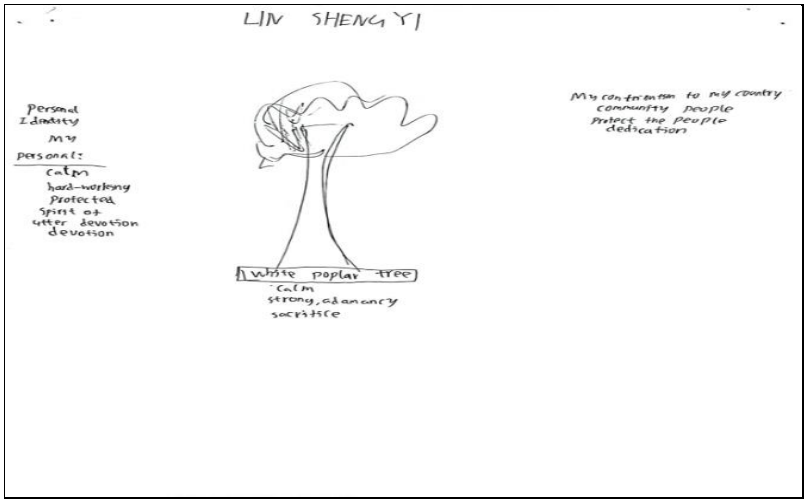
Melalui penerokaan deria mereka secara nyata, proses melukis membolehkan peserta untuk mengatasi cabaran terhadap imaginasi mereka yang sukar untuk menggambarkan personaliti diri yang difikirkan. Cabaran untuk menghasilkan lukisan pokok ini dapat diatasi apabila pelajar diberi tempoh masa yang mencukupi iaitu 30 minit untuk menyiapkan lukisan tersebut. Proses berfikir dan melukis dengan tempoh masa yang mencukupi ini membolehkan pelajar mengatasi cabaran dan ingin meneruskan aktiviti seumpama ini pada masa hadapan.



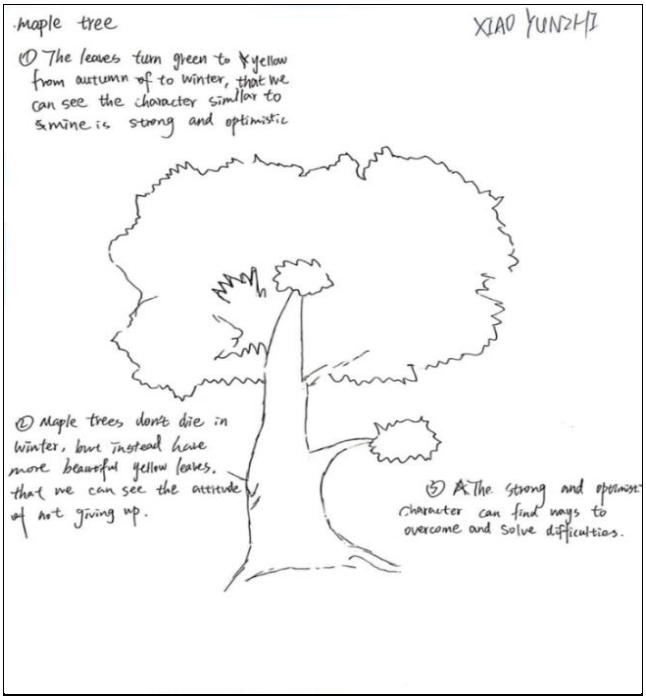
Gambar Rajah 7

Berdasarkan Gambar Rajah 7, pada mulanya pelajar ini hanya melukis imej sebatang 'Pokok Fiscus' kerana pelajar tidak minat melukis. Namun begitu, apabila penyelidik memberi tempoh masa 30 minit untuk aktiviti melukis, pelajar telah meneruskan aktiviti dengan melukis imej pokok yang mempunyai pohon yang rimbun dan disertai dengan keterangan lebih mendalam. Pelajar melukis dan menulis ciri-ciri pokok yang mempunyai ketinggian 20 hingga 30-meter dan mempunyai diameter batang 2 meter. Pelajar menyatakan bahawa pokok ini tumbuh besar dan merendang seperti payung yang besar memayungi alam dan memerlukan persekitaran yang panas dan kering untuk jangka hayat hidup yang lama. Apabila pelajar melukis lukisan ini, pelajar mengaitkan tempat asal dirinya iaitu daerah Fuzhou, China di mana pokok ini tumbuh dengan banyak. Pada mulanya pelajar rasa sukar untuk memilih pokok apa yang sesuai dengan

personaliti diri, namun pelajar dapat mengaitkan dirinya dengan tempat asalnya. Idea pelajar ini terus berkembang dan seronok untuk meneruskan aktiviti melukis. Keseronokan ini telah merangsang pelajar untuk mengenal personaliti dirinya yang berkaitan dengan negara.



Gambar Rajah 8



Gambar Rajah 9

Gambar Rajah 8 dan 9 menunjukkan sebuah ‘Pokok White Pollar Tree’ dan ‘Pokok Maple’. Hasil temu bual bersama dua pelajar, pemilihan pokok ini dibuat selepas pelajar ini berfikir lama. Pelajar menyatakan kesukaran untuk membuat pilihan pokok bagi menggambarkan personaliti dirinya kerana aktiviti seumpama ini tidak pernah dilakukan sebelum ini. Pelajar merasakan bahawa dia tidak menyedari kewujudan personaliti dalam dirinya apatah lagi mengaitkannya dengan elemen Perlembagaan Negara dan jati diri kebangsaan. Namun demikian, selepas dirangsang dan digalakkan oleh penyelidik, pelajar ini dapat memikirkan ‘Pokok White Polar Tree’ dan ‘Pokok Maple’ sebagai pokok yang mempunyai elemen

personaliti mereka. Walaupun lukisan pokok yang dilukis agak ringkas, tetapi pelajar berusaha untuk melukisnya dan berjaya menulis personaliti dirinya. Ini menujukkan wujudnya cabaran atau kesukaran pada awal sesi penghasilan seni lukisan ini tetapi akhirnya pelajar berjaya mengatasi cabaran tersebut. Hasil temubual bersama pelajar adalah seperti berikut:

> *Pelajar H: Pada mulanya, saya tidak pasti mahu melukis pokok apa yang sesuai. Saya tidak pernah tahu pokok boleh dikaitkan dengan diri saya. Tapi apabila berfikir mendalam, saya terbayang satu pokok yang pernah saya lihat dahulu. Pokok tersebut mempunyai rupa yang boleh dikaitkan dengan diri saya. Selepas itu, baru saya boleh melukis lukisan pokok ini.*
>
> *Pelajar I: Saya memang berfikir lama untuk memilih jenis pokok yang sesuai sebab saya tidak pernah buat aktiviti melukis pokok. Tetapi, saya cuba untuk melukis pokok yang sesuai walaupun lukisan saya tidak cantik, saya tetap seronok melukis hari ini.*

Perbincangan Hasil Kajian

Berdasarkan kajian ini, ianya jelas bahawa penggabungan seni visual khususnya seni lukisan dalam pembelajaran memberikan kesan positif seterusnya memanfaatkan pengajaran dan pembelajaran. Menurut Telfer Radzat dan Brouillette (2021), pengintegrasian seni visual dengan imej dan imaginasi akan menggalakkan seseorang untuk menghasilkan imej-imej seni sebagai idea yang kekal. Data kajian ini menunjukkan bahawa kekurangan arahan yang jelas daripada penyelidik pada awal kelas pembelajaran boleh mendedahkan pelajar terhadap pandangan yang mendalam mengenai kesan pengintegrasian seni lukisan dalam kelas pembelajaran.

Melalui pemerhatian penyelidik terhadap tindak balas pelajar, penyelidik mendapati bahawa pelajar telah mampu untuk meningkatkan pemahaman mereka tentang topik Perlembagaan Negara dan personaliti jati diri melalui seni lukisan. Namun begitu, hanya terdapat cabaran bagaimana pelajar dapat mengenalpasti pemilihan tema pokok, berimaginasi mengenai imej pokok serta mendalami personaliti yang wujud dalam diri.

Van Duinen dan Mawdsley Sherwood (2019) mencadangkan bahawa mengajar sastera melalui seni visual melibatkan penandaan pola teks dan mempersoalkan pola yang dikenalpasti. Ia mendorong pelajar untuk mengekpresikan bahasa kiasan. Seterusnya, pelajar menganalisis karya seni untuk mengubah perspektif dan meneroka bagaimana bentuk, subjek, dan bahan menyumbang kepada makna imej tersebut.

Telfer-Radzat dan Brouillette (2021) berpendapat bahawa penekanan terhadap penggabungan seni visual telah menggalakkan pelajar untuk membina penceritaan yang disokong oleh hasil seni lukisan. Proses menghasilkan seni lukisan ini mempengaruhi sikap dan tingkah laku pelajar terhadap topik, merangsang hubungan antara persepsi deria dan pusat bahasa di otak. Manakala menurut Mayer (2020), terdapat hubungkait antara perkataan dan
imej yang merangsang pembelajaran apabila pelajar boleh menghasilkan karya seni lukisan yang boleh difahami daripada bahan atau hasil seni yang dibentangkan. Justeru, pelajar berperanan aktif dalam sesi aktiviti melukis tersebut untuk meningkatkan pemahaman terhadap topik personaliti jati diri.

Berdasarkan Prinsip Kontiguiti Temporal, pembelajaran pelajar akan ditingkatkan apabila perkataan dan imej yang sepadan dipersembahkan secara serentak. (Shigang Ge et all, 2022). Pelajar akan lebih mudah memahami dan mengingati maklumat apabila perkataan dan imej yang berkaitan ditunjukkan pada masa yang sama. Ini kerana hubungan antara kedua-duanya membantu pelajar membina gambaran pemikiran yang lebih jelas dan memudahkan pemahaman mereka terhadap bahan yang dipelajari. Hasil kajian ini mendapati bahawa setiap lukisan pokok yang dilukis oleh pelajar disertai dengan perkataan-perkataan bagi mewakili personaliti diri mereka dan kaitannya dengan jati diri negara. Apabila para pelajar terlibat aktif dalam prosen penghasilan karya seni beserta elemen-elemennya, ia membolehkan mereka menggunakan kemahiran kognitif untuk menggambarkan pemikiran mereka secara visual.

Semasa fasa pengumpulan data berdasarkan tema pokok, pelajar diminta untuk memilih jenis dan karakteristik pokok untuk mewakili personaliti diri yang berkaitan dengan jati diri negara, yang menggalakkan pelajar untuk menggunakan bentuk pokok sebagai simbol representasi diri. Pelajar berjaya mengalihkan pemikiran mereka ke dalam bentuk karya seni lukisan melalui penekanan keseimbangan dan bentuk.

Selain itu, dinyatakan bahawa cahaya bertindakbalas dengan bentuk dan ruang untuk mencipta kesan visual yang membangkitkan makna, suasana, dan emosi. Penggunaan cahaya melalui pelbagai warna dan kepekatan membolehkan pelukis untuk menyuntikkan karya seni dengan pelbagai sifat emosi dan suasana seterusnya menguatkan idea bahawa pelajar boleh menggunakan kedua-dua medium verbal dan visual serentak untuk meningkatkan pembelajaran.

Schraw dan Richmond (2022) menyatakan bahawa pelajar adalah mampu untuk menyampaikan pemikiran dan idea mereka melalui grafik iaitu dengan menggunakan pemikiran metafora dan visualisasi untuk menyampaikan mesej secara simbolik. Proses visualisasi pemikiran ini menggalakkan pelajar untuk membina persekitaran pembelajaran mereka secara bebas dan menggalakkan penyertaan aktif dan refleksi tanpa kawalan berterusan penyelidik sepenuhnya. Oleh itu, disimpulkan bahawa tahap pembelajaran pelajar akan meningkat apabila mereka terlibat dalam proses kognitif untuk membentuk representasi pemikiran yang koheren tentang pengalaman pembelajaran mereka dengan menganalisis maklumat melalui maklumat dan imej yang relevan, menyusunnya ke dalam struktur kognitif, dan mengintegrasikannya dengan pengetahuan terdahulu (Mayer, 2020).

Pemerhatian dalam kajian ini juga mendapati bahawa tahap penglibatan aktif pelajar, perbincangan kritikal tentang pemahaman mereka dan maklum balas emosi terhadap aktiviti seni lukisan adalah tinggi. Tambahan pula, pelajar telah melakukan penyelidikan sendiri untuk meningkatkan pemahaman mereka terhadap topik jati diri dan berkongsi pengetahuan baru. Penglibatan ini juga meningkatkan motivasi dan keterlibatan dalam kalangan peserta yang lebih pendiam semasa sesi penghasilan karya seni lukisan seterusnya memudahkan perbincangan terbuka mengenai karya seni mereka dan meningkatkan peluang pembelajaran.

Semasa temu bual, beberapa orang pelajar memberi maklum balas berkenaan kesan positif pengintegrasian seni visual dalam pembelajaran manakala terdapat juga beberapa orang pelajar teragak-agak apabila mempertimbangkan sama ada integrasi seni visual benar-benar menyokong pembelajaran mereka. Dapatan ini adalah selaras dengan kajian Salleh et al (2023), yang mencadangkan bahawa penggunaan aplikasi ApSeL dalam pengajaran Pendidikan Seni

Visual (PSV) dilihat mampu membantu guru menyampaikan isi pelajaran dengan lebih interaktif dan menarik minat pelajar untuk terlibat secara aktif dalam proses pembelajaran. Oleh itu, seni visual dalam pendidikan bertujuan bukan untuk menilai prestasi tetapi untuk meningkatkan pemahaman dan pengalaman pembelajaran di kalangan pelajar. Van Duinen dan Mawdsley Sherwood (2019) berpendapat bahawa pembelajaran tentang kesusasteraan melalui seni visual memerlukan banyak sesi pemikiran, penyelidikan, dan amalan untuk mengukuhkan pemahaman tentang aspek budaya, sejarah, dan sosial dalam karya-karya sastera. Menurut kajian Zhang (2022), integrasi seni visual meningkatkan kemahiran sosial-emosi, strategi komunikasi, dan kesedaran budaya semasa aktiviti pendidikan. Justeru, adalah penting untuk mengiktiraf respons dan pengalaman pelajar semasa menggunakan seni visual sebagai medium dalam meneroka pembelajaran.

Pendekatan ini menyokong kenyataan Becker (2020) bahawa integrasi seni visual berfungsi sebagai pendekatan alternatif di mana pelajar membina dan menunjukkan pemahaman melalui ekspresi seni, meningkatkan hubungan antara disiplin dan mempromosikan hasil sosial serta akademik. Selain itu, integrasi seni visual memupuk persekitaran pembelajaran yang lebih inklusif, melebihi kaedah akademik konvensional yang tertumpu pada pencapaian akademik semata-mata.

Kesimpulan

Para pendidik disarankan untuk mempelbagaikan kaedah pedagogi dalam pengajaran bersesuaian dengan tahap perkembangan dan kemampuan pelajar. Pendidikan Jati Diri Kebangsaan bukan sahaja berkisar mengenai penceritaan kenegaraan namun ia perlu disertai dengan elemen-elemen personaliti diri sebagai asas pemangkin jati diri kebangsaan. Justeru, cabaran tetap ada untuk menyediakan satu platform dan kaedah pengajaran dan pembelajaran yang bersesuaian. Justeru, pengintegrasian seni visual khususnya seni lukisan dalam pengajaran kursus Jati Diri adalah salah satu alternatif yang berkesan untuk digunakan dalam pembelajaran.

Namun, cabaran tetap ada mengenai masa yang diperlukan dan persediaan pendidik untuk integrasi seni visual dalam pengajaran kursus Jati Diri. Keperluan untuk latihan dan sumber yang lebih baik perlu diberi perhatian bagi memanfaatkan seni visual dengan berkesan dalam amalan pengajaran mereka. Penyelidikan masa depan boleh memfokuskan pada kajian kuantitatif untuk mengesahkan kesan integrasi seni visual khususnya seni lukisan terhadap hasil pembelajaran di dalam kelas.

Justeru, kajian ini diharapkan dapat memberikan sumbangan kepada tahap peningkatan pengajaran kursus Jati Diri Kebangsaan dengan memberi sinar baru mengenai bagaimanakah pengintegrasian seni visual khususnya lukisan dapat memperkukuhkan pemahaman pelajar terhadap kursus ini. Selain itu, kajian ini juga dapat memberi panduan dan potensi kepada pendidik dalam merancang dan melaksanakan pengajaran yang lebih kreatif dan berkesan menggunakan seni visual khususnya lukisan sebagai medium pengajaran dan pembelajaran di dalam kelas.

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CABARAN INDIVIDU DALAM MEMPENGARUHI PENGLIBATAN ORANG KURANG UPAYA (OKU) SECARA INKLUSIF DALAM KEBUN KOMUNITI BANDAR

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Abstrak: *Golongan Orang Kurang Upaya (OKU) sering berdepan dengan pelbagai cabaran dalam menjalani kehidupan seharian khususnya dalam aspek penyertaan sosial. Dalam konteks pembangunan komuniti, penyertaan OKU dalam aktiviti seperti kebun komuniti bandar dilihat sebagai salah satu inisiatif yang dapat membentuk kemahiran pertanian mereka. Namun begitu, penyertaan ini tidak terlepas daripada pelbagai bentuk cabaran yang memerlukan perhatian dan penyelesaian strategik. Kajian ini dijalankan bagi menilai aspek cabaran individu yang dihadapi oleh golongan OKU terhadap penglibatan mereka dalam aktiviti kebun komuniti bandar. Kajian melibatkan enam buah Pusat Pemulihan dalam Komuniti (PDK) di Selangor yang menjalankan aktiviti kebun komuniti bandar. Kajian kuantitatif melibatkan analisis deskriptif dijalankan ke atas 56 orang responden. Hasil kajian mendapati cabaran individu melibatkan ketidakupayaan diri, kesediaan mental dan keadaan fizikal diri tidak menjadi penghalang untuk peserta OKU melibatkan diri secara aktif dalam kebun komuniti bandar. Implikasi kajian ini menunjukkan bahawa aktiviti kebun komuniti berpotensi menjadi medium intervensi yang efektif bagi peserta OKU.*

Keywords: *Orang Kurang Upaya (OKU), Kebun Komuniti Bandar, Pusat Pemulihan dalam Komuniti, pertanian, ketidakupayaan diri*

Pengenalan

Menurut World Health Organisation (2025), 1.3 bilion individu, iaitu 16% populasi global mengalami keupayaan terhad. Jumlah ini dijangka terus meningkat akibat pertumbuhan populasi, kemajuan perubatan dan penuaan. Menurut International Labour Organisation (2025), 80% daripada Orang Kurang Upaya (OKU) berada dalam usia bekerja, namun mereka berdepan cabaran besar seperti masalah akses fizikal dan digital, pengasingan sosial, ketiadaan teknologi bantuan, dan diskriminasi dalam kesihatan, serta pekerjaan. Undang-undang ketidakupayaan penting bagi menghentikan diskriminasi dan menjamin hak OKU (United Nations, 2025). Di Malaysia, Akta OKU 2008 dan Dasar OKU 2007 menunjukkan komitmen kerajaan dalam memastikan akses setara bagi OKU dalam kehidupan sosial, ekonomi dan perkhidmatan asas.

Dalam menjamin inklusif OKU, penglibatan mereka dalam sektor pertanian sebagai usaha untuk menjamin ruang pekerjaan dan keselamatan makanan wajar diberi perhatian.

Penglibatan dalam kebun komuniti bandar dapat memberi pelbagai manfaat kepada golongan OKU (Modul Pertanian bagi Komuniti, 2024; Pīrāga, 2022; Spencer et al, 2023; Tigere & Moyo, 2022; Ursini, 2016). OKU memiliki bakat dalam bidang kebun komuniti bandar, tetapi memerlukan sokongan fizikal, pengubahsuaian kebun yang mesra OKU, serta latihan dan penyertaan aktif dalam komuniti (Frost & Kett, 2013). Kesedaran isu OKU semakin meningkat, namun kajian akademik masih kurang (Mohd Rizal & Rosmawati, 2017). Justeru, terdapat keperluan mendesak untuk kajian lanjut bagi memahami halangan penyertaan OKU dalam kebun komuniti bandar, termasuk faktor fizikal, mental dan ketidakupayaan diri, bagi merangka strategi sokongan yang lebih efektif dan inklusif. Oleh itu, kajian dilakukan bagi meneliti aspek cabaran individu yang mempengaruhi penglibatan OKU dalam kebun komuniti bandar.

Kajian Literatur

Dalam konteks fizikal diri, kajian oleh Pīrāga (2022) menunjukkan bahawa penyertaan dalam kebun komuniti bandar bukan sahaja tidak menjejaskan keadaan fizikal OKU, malah dapat meningkatkan kebolehan fizikal mereka melalui aktiviti berkebun seperti menggali tanah dan menyiram tanaman. Malah, dapat meningkatkan tahap kebolehan fizikal peserta OKU kerana berkebun dapat mengatasi ketidakupayaan fizikal diri yang dialami (Triguero-Mas et al., 2020). Meskipun demikian, peserta OKU yang terlibat dengan program kebun komuniti bandar tetap menghadapi cabaran dari segi keadaan fizikal dirinya (Frost & Kett, 2013; Pīrāga, 2022). Peserta OKU memerlukan peralatan berkebun yang lebih ergonomik dan mudah dikendalikan, serta dapat mengurangkan keperluan tenaga fizikal yang tinggi (Tigere & Moyo, 2022). Tambahan pula, peserta dengan keupayaan fizikal, penglihatan dan pendengaran memerlukan bantuan dalam tugas-tugas pertanian seperti membajak, mengangkut hasil pertanian ke tempat penyimpanan, menuai, merumput dan menanam (Sango et al., 2022).

Kajian Spencer et al. (2023) turut mengenal pasti strategi bagi mewujudkan persekitaran sosial fizikal yang sesuai untuk OKU supaya dapat meningkatkan penglibatan OKU serta dapat meningkatkan kebolehan fizikal mereka. Hakikatnya, golongan OKU perlu mempelajari kaedah penanaman yang sesuai dengan golongan OKU supaya dapat mengurangkan keperluan fizikal. Oleh hal yang demikian, teknologi seperti pertanian hidropronik menjadi lebih mudah diaplikasikan dan mesra pengguna OKU (Puteri Sidrotul et al., 2024).

Kesediaan mental peserta OKU bagi melibatkan diri dalam kebun komuniti bandar adalah penting. Kehadiran rakan sebaya, fasilitator dan anggota masyarakat sekitar berperanan dalam meningkatkan rasa keyakinan individu OKU dalam program kebun komuniti bandar (Charlotte, Jarvis, & Stewart, 2023; Frost & Kett, 2013; Pīrāga, 2022). Kajian Pīrāga (2022) menunjukkan bahawa interaksi positif dalam suasana berkebun dapat memberikan sokongan moral, serta mendorong mereka untuk terlibat secara aktif. Rasa kepunyaan dan penerimaan juga merupakan elemen penting dalam kesediaan mental OKU yang akan membina hubungan sosial yang positif (Frost & Kett, 2013; Normazian, Magdelane, & Mahezan, 2021; Pīrāga, 2022).

Di samping itu, cabaran mendapatkan kepercayaan daripada pihak tertentu juga menjadi salah satu halangan utama yang dihadapi oleh OKU dalam sektor kebun komuniti bandar. Kajian oleh Tigere dan Moyo (2022) dan Jones Charlotte et al. (2023), walaupun peserta

OKU mengalami diskriminasi dan sukar mendapatkan kepercayaan masyarakat, namun kesungguhan dan komitmen yang ditunjukkan dalam menjalankan kebn komuniti bandar telah membuktikan kemampuan mereka. Hal ini telah mengubah persepsi masyarakat terhadap keupayaan mereka.

Mobiliti sering menjadi cabaran dalam pengurusan kebun komuniti bandar. Justeru, peserta OKU memerlukan reka bentuk kebun yang bersesuaian (Tigere & Moyo, 2022; Triguero-Mas et al., 2020), serta penggunaan teknologi yang mesra OKU bagi mengurangkan mobiliti. Namun begitu, peserta OKU turut menunjukkan mereka mampu menjalankan tugas pertanian walaupun menghadapi cabaran seperti aksesibiliti dan kekurangan sokongan teknikal (Andy Frost & Maria Katt, 2013; Triguero-Mas et al., 2020).

Metodologi Kajian

Pendekatan kuantitatif digunakan bagi mengutip data dalam kajian ini dengan melibatkan 56 peserta OKU yang terlibat dengan program kebun komuniti bandar di Pusat Pemulihan dalam Komuniti (PDK) di Selangor. Kajian ini dijalankan bagi menganalisis cabaran dari segi individu OKU terhadap penglibatan mereka dalam sektor kebun komuniti bandar. Teknik persampelan bertujuan dijalankan ke atas 6 buah Pemulihan dalam Komuniti yang menjalankan program kebun komuniti bandar. Kaedah survei menggunakan instrumen soal selidik yang mempunyai Skala Likert 5 tahap. Nilai min digunakan sebagai petunjuk dalam analisis deskriptif. Interpretasi skor min "Rendah" dengan julat antara 1.00 hingga 2.33, "Sederhana" (2.34 hingga 3.66) dan "Tinggi" (3.67 hingga 5.00) (Newman, 2014).

Hasil kajian dan Perbincangan

Demografi Responden

Kajian deskriptif dijalankan ke atas 56 orang responden. Majoriti peserta adalah lelaki (62.5%) dan selebihnya perempuan (37.5%). Sebanyak 91.1% responden adalah Melayu, diikuti Cina (7.1%) dan India (1.8%). Dari aspek kategori OKU, majoriti responden (89.3%) tergolong dalam kategori kurang upaya pembelajaran, manakala 5.4% masing-masing dalam kategori kurang upaya fizikal dan mental. Pusat Pemulihan Dalam Komuniti (PDK) 1 dan 2 masing-masing melibatkan 15 responden (26.8%). PDK 3, 4, 5 dan 6 mencatatkan penglibatan antara 1.8% hingga 17.9%. Sebanyak 30.4% responden menggunakan kawasan bertanah, manakala 69.6% menggunakan kawasan perumahan. Dari segi tempoh penglibatan, majoriti (55.4%) telah mengusahakan kebun selama 1–2 tahun, diikuti 26.8% lebih dari 4 tahun. Semua kebun mengusahakan sayur-sayuran (100%). Sebanyak 89.3% hasil digunakan untuk keperluan bahan makanan sendiri, manakala 10.7% menjana pendapatan kurang daripada RM500 sebulan hasil jualan sayur-sayuran daripada kebun komuniti yang diusahakan (Jadual 2).

Jadual 2: Profil Demografi dan Pengusahaan Kebun Komuniti Bandar

Demografi	Kategori	Kekerapan	Peratusan (%)
Jantina	Lelaki	35	62.5
	Perempuan	21	37.5
Bangsa	Melayu	51	91.1
	Cina	4	7.1
	India	1	1.8

Kategori OKU	Kurang Upaya fizikal	3	5.4
	Kurang Upaya pembelajaran	50	89.3
	Kurang upaya mental	3	5.4
Pemulihan dalam Komuniti (PDK)	PDK 1	15	26.8
	PDK 2	15	26.8
	PDK 3	10	17.9
	PDK 4	9	16.1
	PDK 5	6	10.7
	PDK 6	1	1.8
Kawasan yang Digunakan	Kawasan bertanah	17	30.4
	Kawasan perumahan	39	69.6
Status Penyertaan	Sepenuh masa	1	1.8
	Sambilan	55	98.2
Jangka masa mengusahakan kebun komuniti bandar	1-2 tahun	31	55.4
	2-3 tahun	9	16.1
	3-4 tahun	1	1.8
	Lebih dari 4 tahun	15	26.8
Kegunaan hasil kebun	Keperluan bahan makanan sendiri	50	89.3
	Dijual	6	10.7

Hasil Kajian dan Perbincangan

i) *Keadaan fizikal diri*

Berdasarkan Jadual 3, peserta OKU mencatat skor min rendah 2.47 (SP=1.165) bagi cabaran fizikal, menunjukkan keadaan fizikal tidak menjejaskan penglibatan aktif mereka dalam kebun komuniti bandar. Hanya sebilangan kecil (19.6%) kurang setuju, 10.7% setuju, dan 8.9% sangat setuju bahawa fizikal menjadi cabaran. Dapatan ini selari dengan kajian Pīrāga (2022) yang mendapati aktiviti kebun membantu meningkatkan kebolehan fizikal OKU, berbeza dengan kajian Frost dan Kett (2013) yang melaporkan wujud halangan fizikal untuk melakukan aktiviti tanaman di kebun komuniti bandar.

ii) *Ketidaksediaan mental*

Cabaran ketidaksediaan mental mencatat skor min tertinggi 2.71 (SP=1.204), namun majoriti peserta OKU kurang setuju bahawa ia menjejaskan penglibatan mereka dalam kebun komuniti bandar. Hanya 21.4% setuju atau sangat setuju, manakala 78.6% kurang setuju hingga sangat tidak setuju. Ini menunjukkan ketidaksediaan mental memberi kesan sederhana sahaja. Dapatan ini disokong oleh kajian Triguero-Mas et al. (2020) dan Charlotte et al. (2023) yang menekankan bahawa dengan sokongan dan pengalaman positif, kesediaan mental peserta OKU dapat dipupuk (Jadual 3).

iii) Ketidakupayaan diri (OKU) menyebabkan sukar mendapat kepercayaan pihak tertentu untuk pelbagai berurusan berkaitan

Cabaran ketidakupayaan diri dalam mendapatkan kepercayaan mencatat skor min sederhana 2.66 (SP=1.139). Hanya 25% responden OKU setuju atau sangat setuju ketidakupayaan menjadi halangan, manakala selebihnya kurang setuju hingga sangat tidak setuju. Hal ini menunjukkan ketidakupayaan diri bukan faktor utama menghalang penglibatan. Dapatan ini sejajar dengan kajian Tigere dan Moyo (2022) dan Charlotte et al. (2023) yang membuktikan bahawa dengan peluang, latihan, dan sokongan menjadikan peserta OKU mampu mengubah persepsi masyarakat dan membina kepercayaan melalui projek kebun komuniti bandar (Jadual 3).

iv) Ketidakupayaan diri (OKU) menyukarkan pergerakkan untuk mengelola aktiviti pengurusan tanaman

Berdasarkan Jadual 3, cabaran pergerakan peserta OKU menunjukkan skor min sederhana 2.66 (SP=1.124), dengan majoriti responden tidak setuju atau kurang setuju bahawa ketidakupayaan diri menyukarkan pengurusan tanaman. Hanya sebilangan kecil setuju atau sangat setuju. Hal ini membuktikan bahawa peserta OKU tidak menghadapi masalah besar dalam pergerakan semasa berkebun. Dapatan ini berbeza dengan kajian Tigere dan Moyo (2022) dan Triguero-Mas et al. (2020) yang menekankan keperluan reka bentuk kebun mesra OKU, namun disokong oleh kajian Correia (2014) dan Puteri Sidrotul et al. (2024) melalui penggunaan teknologi seperti hidroponik.

v) Ketidakupayaan diri (OKU) memerlukan individu lain untuk membantu dalam menjalankan sesuatu aktiviti

Dapatan kajian menunjukkan bahawa peserta OKU dalam program kebun komuniti bandar di PDK kurang memerlukan bantuan individu lain untuk menjalankan aktiviti, dengan skor min 2.54 (SP=1.088). Sebahagian besar responden menunjukkan ketidaksetujuan terhadap keperluan bantuan, dan hanya 3 orang yang sangat setuju bahawa mereka memerlukan bantuan individu lain. Kajian ini sejajar dengan kajian Frost dan Kett (2013) yang mendapati peserta OKU dapat mengurus tanaman tanpa sokongan tambahan, serta kajian Tigere dan Moyo (2022) yang menunjukkan peserta OKU boleh menjalankan tugas pertanian secara autonomi, walaupun menghadapi cabaran tertentu (Jadual 3).

Jadual 3: Cabaran Individu dalam Mempengaruhi Penglibatan Orang Kurang Upaya (OKU) dalam Kebun Komuniti Bandar

Cabaran Individu	Sangat Tidak Setuju	Tidak Setuju	Kurang Setuju	Setuju	Sangat Setuju	Min	Sisihan Piawai	Interpretasi Min
Keadaan fizikal diri	10 17.9%	24 42.9%	11 19.6%	6 10.7%	5 8.9%	2.47	1.165	Sederhana
Ketidaksediaan mental	9 16.1%	15 26.8%	20 35.7%	5 8.9%	7 12.5%	2.71	1.204	Sederhana

Ketidakupayaan diri (OKU) menyebabkan sukar mendapat kepercayaan pihak tertentu untuk pelbagai berurusan berkaitan	10 17.9%	14 25.0%	18 32.1%	11 19.6%	3 5.4%	2.66	1.139	Sederhana
Ketidakupayaan diri (OKU) menyukarkan pergerakkan untuk mengelola aktiviti berkaitan pengurusan tanaman	8 14.3%	18 32.1%	17 30.4%	9 16.1%	4 7.1%	2.66	1.124	Sederhana
Ketidakupayaan diri (OKU) memerlukan individu lain untuk membantu dalam menjalankan sesuatu aktiviti	9 16.1%	20 35.7%	16 28.6%	8 14.3%	3 5.4%	2.54	1.088	Sederhana
Min keseluruhan						2.61		Sederhana

Kesimpulan

Kesediaan mental peserta OKU dalam program kebun komuniti bandar boleh dipupuk melalui pengalaman, interaksi sosial, dan bimbingan yang sesuai, membolehkan mereka menyesuaikan diri dalam aktiviti tersebut. Dapatan kajian menunjukkan bahawa ketidakupayaan diri bukan halangan utama bagi OKU untuk terlibat aktif dalam kebun komuniti bandar. Penyediaan persekitaran inklusif, kemudahan yang bersesuaian, serta bimbingan berterusan, potensi OKU dapat diketengahkan dalam sektor ini. Oleh itu, agensi kerajaan, pihak PDK dan masyarakat boleh memperkasa OKU dengan memperluaskan program latihan pertanian, meningkatkan keupayaan dan kemandirian mereka, serta mewujudkan projek kebun komuniti bandar inklusif dengan peralatan yang sesuai. Selain itu, kesedaran masyarakat perlu dipertingkatkan untuk menghapuskan persepsi bahawa OKU sentiasa memerlukan bantuan.

Penghargaan

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KESEDIAAN PELAJAR TAHFIZ DALAM MENGAPLIKASIKAN KAEDAH PEER COACHING DALAM PEMBELAJARAN DI UNITEN

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Abstrak: *Pendekatan Peer Coaching yang melibatkan bimbingan rakan sebaya, berkesan dalam meningkatkan kefahaman akademik dan kemahiran insaniah seperti komunikasi, kepimpinan, dan keyakinan diri. Dalam pendidikan tahfiz, cabaran seperti kekangan masa, motivasi pelajar, dan komitmen yang pelbagai sering menjadi halangan utama dalam pelaksanaan kaedah ini secara berkesan. Kajian ini bertujuan untuk meneliti tahap kesediaan pelajar tahfiz dalam mengaplikasikan kaedah Peer Coaching dalam pembelajaran di UNITEN. Kajian ini menggunakan reka bentuk kualitatif dengan pendekatan sorotan literatur. Data diperoleh melalui temu bual separa berstruktur bersama pelajar tahfiz dan analisis dokumen yang berkaitan. Data dianalisis melalui triangulasi untuk memperoleh pemahaman yang lebih mendalam tentang amalan pengajaran sedia ada dan elemen-elemen penting dalam pelaksanaan coaching pengajaran tahfiz. Isu utama yang dikenalpasti dalam pembelajaran tahfiz adalah kekangan masa, masalah komitmen pelajar, tingkah laku yang tidak produktif, serta ketidakseimbangan dalam tahap penguasaan hafazan. Hasil dapatan menunjukkan bahawa Peer Coaching dapat meningkatkan disiplin, daya ingatan, dan pemahaman pelajar terhadap ayat-ayat al-Quran secara lebih mendalam. Penggunaan teknologi pendidikan pula dikenalpasti sebagai pemangkin yang membantu meningkatkan keberkesanan kaedah ini dengan menyediakan akses kepada bahan pembelajaran interaktif dan pemantauan prestasi yang lebih sistematik. Elemen penting dalam coaching termasuklah kejelasan matlamat, bimbingan berterusan oleh coach yang berpengalaman, skop kumpulan yang kecil, dan latihan yang konsisten. Walau bagaimanapun, kajian ini juga mendapati beberapa cabaran besar seperti kurangnya kesedaran pelajar, hubungan interpersonal yang lemah, dan kekangan dalam bimbingan berterusan daripada guru atau coach. Cadangan kajian ini adalah untuk membangunkan modul Peer Coaching yang lebih sistematik dan disokong oleh teknologi pendidikan. Selain itu, intervensi sokongan berstruktur dari institusi juga diperlukan untuk memastikan keberkesanan kaedah ini. Diharapkan hasil kajian ini dapat memberi panduan berguna kepada pihak institusi dalam merangka strategi pembelajaran yang lebih inklusif dan berkesan, seterusnya menyumbang kepada peningkatan tahap profesionalisme guru tahfiz dan mutu pendidikan tahfiz secara keseluruhan.*

Kata Kunci: *Peer coaching, pendidikan tahfiz, hafazan al-Quran, bimbingan rakan sebaya, teknologi pendidikan.*

1.0 Pengenalan

Dalam era pendidikan moden yang sentiasa berkembang pesat, penggunaan kaedah pembelajaran yang berkesan dan inovatif adalah sangat penting untuk memastikan pelajar mencapai prestasi akademik yang optimum. Salah satu kaedah yang semakin mendapat perhatian dalam dunia pendidikan ialah Peer Coaching, iaitu pendekatan pembelajaran di mana pelajar bertindak sebagai mentor atau pembimbing kepada rakan sebaya mereka.

Kaedah ini membolehkan pelajar saling berkongsi ilmu, memberi maklum balas yang membina, dan berinteraksi secara aktif dalam proses pembelajaran, sekaligus meningkatkan kefahaman konsep secara mendalam serta kemahiran insaniah seperti komunikasi, kepimpinan, dan keyakinan diri.

Dalam konteks pendidikan tahfiz, di mana penekanan tradisional adalah kepada hafazan secara individu, pelaksanaan Peer Coaching menawarkan pendekatan alternatif yang berpotensi untuk memperkasa pembelajaran pelajar. Namun begitu, pelaksanaan kaedah ini tidak terlepas daripada cabaran yang signifikan. Antara cabaran utama yang dihadapi adalah kekangan masa akibat jadual hafazan yang padat, motivasi pelajar yang berbeza-beza, dan komitmen yang tidak sekata dalam kalangan pelajar tahfiz itu sendiri. Situasi ini menyebabkan pelaksanaan Peer Coaching secara berkesan menjadi satu isu penting yang perlu ditangani.

Pelajar tahfiz di Universiti Tenaga Nasional (Uniten) menghadapi situasi yang unik di mana mereka perlu menyesuaikan diri dengan sistem pendidikan tinggi yang memerlukan pembelajaran kolaboratif dan interaksi aktif, berbeza dengan pendekatan hafazan yang lebih berpusatkan individu. Oleh itu, kajian ini bertujuan untuk menilai tahap kesediaan pelajar tahfiz dalam mengaplikasikan kaedah Peer Coaching dalam pembelajaran mereka, serta mengenal pasti faktor-faktor yang mempengaruhi keberkesanan pelaksanaan kaedah ini di peringkat universiti.

Sejumlah kajian terdahulu telah menunjukkan bahawa Peer Coaching dapat meningkatkan prestasi akademik pelajar sehingga 20%-30%, dan ia juga membantu membina kemahiran komunikasi serta kepimpinan yang penting dalam perkembangan pelajar secara menyeluruh. Namun, kajian berkaitan keberkesanan dan cabaran pelaksanaan Peer Coaching khususnya dalam konteks pelajar tahfiz masih kurang diterokai secara menyeluruh. Justeru, kajian ini berperanan mengisi jurang tersebut dengan memberikan pemahaman yang lebih mendalam mengenai keperluan dan potensi kaedah Peer Coaching untuk memperbaiki mutu pembelajaran pelajar tahfiz.

Selain itu, perkembangan teknologi pendidikan turut membuka peluang baru untuk menyokong pelaksanaan Peer Coaching dengan menyediakan akses kepada bahan pembelajaran interaktif dan sistem pemantauan prestasi yang lebih berkesan. Penggunaan teknologi ini dijangka dapat mengatasi sebahagian cabaran yang dihadapi, seperti kekangan masa dan jarak antara pelajar, sekali gus memperkukuh keberkesanan kaedah pembelajaran rakan sebaya.

Secara keseluruhannya, kajian ini amat penting untuk menyediakan strategi pembelajaran yang lebih inklusif dan efektif bagi pelajar tahfiz di Uniten. Dengan memahami tahap kesediaan mereka dan faktor-faktor yang mempengaruhi, institusi pendidikan dapat merangka intervensi dan modul Peer Coaching yang sesuai dan berdaya guna, sekaligus menyumbang kepada peningkatan mutu pendidikan tahfiz secara keseluruhan.

Pernyataan Masalah

Pelajar tahfiz di institusi pengajian tinggi seperti Universiti Tenaga Nasional (Uniten) menghadapi cabaran yang kompleks apabila perlu menyesuaikan diri dengan kaedah pembelajaran yang menuntut interaksi aktif dan kolaborasi, seperti kaedah Peer Coaching. Latar belakang pendidikan mereka yang lebih menekankan hafazan secara individu

menyebabkan mereka kurang bersedia dari segi mental, emosi, dan kemahiran sosial untuk mengaplikasikan pendekatan pembelajaran yang memerlukan kerjasama rapat dan komunikasi berterusan dengan rakan sebaya.

Salah satu masalah utama ialah kekangan masa yang signifikan dalam jadual harian pelajar tahfiz, di mana mereka perlu mengimbangi antara tuntutan hafazan al-Quran dan keperluan pembelajaran akademik yang lain. Kekangan ini menyukarkan pelajar untuk melibatkan diri secara aktif dalam sesi Peer Coaching yang memerlukan perancangan dan komitmen masa yang konsisten. Selain itu, motivasi dan tahap komitmen pelajar terhadap kaedah ini juga berbeza-beza, yang boleh menjejaskan keberkesanan pelaksanaan kaedah tersebut secara menyeluruh.

Di samping itu, terdapat kekurangan kesedaran dan kefahaman yang mendalam mengenai konsep Peer Coaching dalam kalangan pelajar tahfiz sendiri. Mereka sering kurang yakin dan kurang berkemahiran dalam memberi dan menerima maklum balas secara konstruktif, yang merupakan elemen penting dalam kaedah pembelajaran rakan sebaya. Hal ini diperburuk lagi oleh hubungan interpersonal yang kurang kukuh antara pelajar, di mana sesetengah pelajar berasa kurang selesa atau ragu-ragu untuk berinteraksi secara terbuka dengan rakan sebaya, terutamanya dalam konteks pengajaran dan pembelajaran.

Tambahan pula, bimbingan dan sokongan berterusan daripada guru atau fasilitator Peer Coaching juga dilaporkan tidak mencukupi. Tanpa panduan dan pemantauan yang efektif, pelaksanaan kaedah ini cenderung menjadi kurang sistematik dan kurang memberi impak positif yang signifikan kepada pencapaian akademik dan hafazan pelajar.

Kombinasi faktor-faktor ini menimbulkan keperluan mendesak untuk mengkaji tahap kesediaan pelajar tahfiz dalam mengaplikasikan Peer Coaching, mengenal pasti cabaran-cabaran yang menghalang pelaksanaan kaedah tersebut, dan mencari penyelesaian yang praktikal serta berkesan. Kajian ini diharap dapat memberikan gambaran menyeluruh tentang isu-isu ini dan menyediakan asas untuk merangka modul dan strategi pembelajaran yang lebih sesuai dan inklusif bagi pelajar tahfiz di Uniten.

Tujuan Kajian

Kertas konsep ini disediakan dengan tujuan utama untuk memperincikan dan memberikan gambaran menyeluruh mengenai kajian yang akan dijalankan berkaitan kesediaan pelajar tahfiz dalam mengaplikasikan kaedah bimbingan rakan sebaya (Peer Coaching) dalam proses pembelajaran di Universiti Tenaga Nasional (Uniten).

Melalui kertas konsep ini, fokus kajian akan dirangka dengan jelas untuk menganalisis tahap kesediaan pelajar tahfiz dalam menerima dan mengamalkan kaedah Peer Coaching, serta mengenal pasti faktor-faktor yang mempengaruhi kesediaan tersebut. Di samping itu, kajian ini akan meneroka implikasi dan cabaran yang berkaitan dengan pelaksanaan kaedah Peer Coaching, khususnya berdasarkan sorotan literatur yang relevan dan terkini.

Selain berfungsi sebagai panduan awal dalam proses penyelidikan, kertas konsep ini juga bertujuan untuk menyediakan kerangka kajian yang sistematik, merangkumi objektif, persoalan kajian, metodologi, serta jangkaan hasil kajian. Dengan itu, kertas konsep ini akan menjadi asas penting dalam memastikan pelaksanaan kajian dijalankan secara terancang

dan berkesan, sekali gus dapat menyumbang kepada pembangunan strategi pembelajaran yang lebih inklusif dan berdaya saing dalam kalangan pelajar tahfiz di peringkat institusi pengajian tinggi.

Akhir sekali, kertas konsep ini diharap dapat memberikan gambaran awal kepada pihak berkepentingan seperti pensyarah, penyelidik, dan pembuat dasar tentang kepentingan kajian ini serta potensi impaknya dalam mempertingkatkan mutu pendidikan tahfiz melalui pendekatan Peer Coaching.

Objektif Kajian

Menganalisis tahap kesediaan pelajar tahfiz dalam mengaplikasikan kaedah bimbingan rakan sebaya (Peer Coaching) dalam pembelajaran di Uniten.
Mengenal pasti faktor-faktor yang mempengaruhi kesediaan pelajar tahfiz dalam mengaplikasikan kaedah Peer Coaching dalam pembelajaran.
Meneroka implikasi dan cabaran dalam pelaksanaan kaedah Peer Coaching bagi pelajar tahfiz di Uniten berdasarkan sorotan literatur.

Persoalan Kajian

Apakah tahap kesediaan pelajar tahfiz dalam mengaplikasikan kaedah Peer Coaching dalam pembelajaran di Uniten berdasarkan kajian terdahulu?
Apakah faktor-faktor yang mempengaruhi kesediaan pelajar tahfiz dalam mengamalkan kaedah Peer Coaching dalam pembelajaran?
Bagaimanakah keberkesanan kaedah Peer Coaching dalam meningkatkan pemahaman dan prestasi akademik pelajar tahfiz berdasarkan sorotan literatur?

2.0 Sorotan Literatur

2.1 Definisi dan Konsep Peer Coaching

Peer Coaching merupakan satu pendekatan pembelajaran berasaskan interaksi antara rakan sebaya, di mana dua atau lebih individu saling membimbing untuk memahami dan menguasai sesuatu ilmu atau kemahiran. Menurut Showers dan Joyce (1996), Peer Coaching bukan sekadar teknik pembelajaran biasa, tetapi satu kaedah yang membina hubungan akademik yang saling menyokong, di mana pelajar membantu satu sama lain memperdalam pemahaman mereka terhadap sesuatu konsep.

Dalam pendidikan moden, pendekatan ini telah digunakan dalam pelbagai bidang seperti pendidikan umum, latihan profesional, dan institusi agama. Teori Pembelajaran Sosial oleh Vygotsky (1978) menekankan bahawa manusia belajar dengan lebih berkesan melalui interaksi dengan orang lain, terutama dalam persekitaran yang membolehkan komunikasi, maklum balas, dan penyesuaian pemahaman bersama rakan sebaya.

Dalam konteks pendidikan Islam, khususnya sistem tahfiz, konsep Peer Coaching sebenarnya sudah lama diamalkan melalui sistem halaqah tahfiz. Dalam halaqah, pelajar menghafaz al-Quran secara berkumpulan dan saling menyemak bacaan antara satu sama lain. Pendekatan ini bukan sahaja memantapkan hafazan, malah membantu pelajar memahami makna ayat-ayat al-Quran, hukum tajwid, dan tafsirnya. Kajian oleh Zakaria et al. (2018) mendapati pelajar yang terlibat dalam halaqah yang mengamalkan bimbingan

rakan sebaya menunjukkan peningkatan kecekapan hafazan berbanding mereka yang menghafaz secara individu.

Pelaksanaan Peer Coaching adalah berdasarkan beberapa prinsip penting. Pertama, kolaborasi aktif di mana pelajar saling membantu memahami konsep secara bersama, bukan hanya belajar secara pasif. Kedua, maklum balas konstruktif yang membolehkan pelajar memberi dan menerima kritikan yang membina, memperbaiki pembelajaran mereka. Ketiga, pembelajaran berasaskan refleksi, di mana pelajar menilai dan memperbaiki pemahaman diri melalui pengalaman membimbing rakan sebaya. Keempat, interaksi dua hala di mana pelajar bergilir menjadi pembimbing dan pembelajar, yang membantu memperkukuh pemahaman mereka. Akhir sekali, persekitaran pembelajaran yang positif dan menyokong memastikan pelajar berasa selesa untuk bertanya dan menerima maklum balas tanpa rasa takut atau malu. Prinsip-prinsip ini menjadikan Peer Coaching strategi yang berkesan dalam meningkatkan pembelajaran dan kemahiran insaniah pelajar.

Secara keseluruhannya, Peer Coaching bukan sahaja meningkatkan pemahaman akademik, tetapi juga membentuk kemahiran insaniah seperti komunikasi, kepimpinan, dan kerja berpasukan. Dalam pendidikan tahfiz, kaedah ini terbukti berkesan meningkatkan kecekapan hafazan, pemahaman ayat al-Quran, dan memperkukuh interaksi sosial antara pelajar. Dengan penerapan prinsip-prinsip seperti kolaborasi aktif, maklum balas konstruktif, refleksi, interaksi dua hala, dan persekitaran positif, Peer Coaching berpotensi menjadi strategi pembelajaran inovatif yang sesuai diaplikasikan dalam pendidikan moden dan tradisional. Oleh itu, pelaksanaan yang lebih sistematik dan kajian lanjut bagi menyesuaikan Peer Coaching dengan kurikulum tahfiz adalah penting untuk memastikan manfaatnya dapat dimaksimumkan dalam dunia pendidikan.

2.2 Tahap Kesediaan Pelajar dalam Mengaplikasikan Peer Coaching

Tahap kesediaan pelajar merupakan faktor penting yang mempengaruhi keberhasilan pelaksanaan kaedah Peer Coaching dalam pembelajaran. Kesediaan ini merangkumi aspek mental, emosi, dan kemahiran sosial yang diperlukan untuk menerima dan melaksanakan pendekatan pembelajaran rakan sebaya secara efektif.

Menurut Bandura (1997), keyakinan diri atau *self-efficacy* memainkan peranan utama dalam menentukan sejauh mana seseorang pelajar bersedia untuk mengambil bahagian dalam aktiviti pembelajaran yang melibatkan interaksi sosial. Pelajar yang mempunyai tahap keyakinan yang tinggi lebih cenderung untuk aktif berkomunikasi, memberi maklum balas, dan terlibat secara konstruktif dalam sesi Peer Coaching.

Kajian oleh O'Donnell dan King (1999) menunjukkan bahawa tahap kesediaan pelajar dipengaruhi oleh pengalaman pembelajaran sebelumnya, di mana pelajar yang pernah terlibat dalam pembelajaran kolaboratif lebih mudah menyesuaikan diri dengan kaedah Peer Coaching. Sebaliknya, pelajar yang kurang berpengalaman dalam interaksi rakan sebaya mungkin mengalami kekangan dari segi kemahiran komunikasi dan kepercayaan diri.

Dalam konteks pendidikan tahfiz, kesediaan pelajar turut dipengaruhi oleh budaya pembelajaran tradisional yang lebih menekankan hafazan secara individu. Kajian oleh Ahmad dan Ismail (2015) melaporkan bahawa pelajar tahfiz memerlukan bimbingan dan sokongan khusus untuk menyesuaikan diri dengan pembelajaran berasaskan kolaborasi

seperti Peer Coaching. Hal ini kerana mereka perlu membina kemahiran interpersonal dan membuang rasa segan dalam berinteraksi dengan rakan sebaya secara terbuka.

Tambahan pula, faktor motivasi juga mempengaruhi tahap kesediaan pelajar. Pelajar yang mempunyai motivasi intrinsik yang tinggi biasanya lebih bersedia untuk melibatkan diri secara aktif dalam Peer Coaching, manakala pelajar yang kurang bermotivasi memerlukan galakan dan sokongan tambahan daripada tenaga pengajar dan institusi (Ryan & Deci, 2000).
Penting juga untuk mengambil kira peranan persekitaran pembelajaran dalam memupuk kesediaan pelajar. Suasana yang selamat, menyokong, dan bebas tekanan dapat meningkatkan keberanian pelajar untuk berinteraksi dan mengambil risiko dalam pembelajaran kolaboratif (Johnson & Johnson, 1999). Dalam pendidikan tahfiz, suasana halaqah yang santai dan berstruktur memberikan ruang kepada pelajar untuk membina keyakinan dan kesediaan dalam mengaplikasikan Peer Coaching.

Secara keseluruhannya, kajian-kajian terdahulu menegaskan bahawa tahap kesediaan pelajar adalah aspek kritikal dalam kejayaan Peer Coaching. Oleh itu, usaha untuk mengenal pasti dan meningkatkan kesediaan pelajar melalui latihan kemahiran komunikasi, pembangunan keyakinan diri, dan penyediaan persekitaran pembelajaran yang kondusif adalah sangat penting untuk memastikan keberkesanan kaedah ini dalam konteks pendidikan tahfiz.

2.3 Faktor-faktor yang Mempengaruhi Kesediaan Pelajar

Kesediaan pelajar untuk mengaplikasikan kaedah pembelajaran seperti Peer Coaching dipengaruhi oleh pelbagai faktor yang melibatkan aspek individu, akademik, dan sosial. Faktor individu merangkumi motivasi, keyakinan diri, dan kemahiran komunikasi. Menurut Deci dan Ryan (1985) dalam teori motivasi kendiri, pelajar yang mempunyai motivasi intrinsik lebih cenderung untuk melibatkan diri secara aktif dalam proses pembelajaran yang memerlukan kerjasama seperti Peer Coaching. Selain itu, keyakinan diri yang tinggi memberi kesan positif terhadap keberanian pelajar untuk memberi dan menerima maklum balas serta berinteraksi dengan rakan sebaya (Bandura, 1997).

Dalam konteks pendidikan tahfiz, Zakaria et al. (2018) menekankan bahawa bimbingan rakan sebaya membantu meningkatkan kecekapan hafazan dan kefahaman konsep yang mendalam, yang juga berkait rapat dengan tahap kesediaan pelajar untuk melibatkan diri secara aktif dalam pembelajaran kolaboratif. Kajian oleh Nur Afiqah Ab Latif et al. (2020) pula menunjukkan bahawa suasana pembelajaran yang positif dan menyokong meningkatkan keberanian pelajar untuk berinteraksi dan berkongsi idea, sekaligus meningkatkan kesediaan mereka untuk Peer Coaching.

Dari sudut akademik, kefahaman pelajar mengenai kaedah Peer Coaching dan kesesuaian kaedah tersebut dengan gaya pembelajaran individu turut mempengaruhi kesediaan mereka. Kajian oleh Zimmerman (2002) menekankan bahawa pelajar yang memahami manfaat dan teknik pembelajaran kolaboratif lebih bersedia untuk mengamalkannya. Sebaliknya, kekurangan pengetahuan tentang kaedah tersebut boleh menimbulkan rasa kurang yakin dan keengganan untuk terlibat. Parker et al. (2008) turut menegaskan bahawa interaksi aktif dan refleksi selepas sesi pembelajaran membantu pelajar meningkatkan pemahaman diri dan motivasi untuk belajar.

Faktor sosial juga memainkan peranan penting dalam menentukan kesediaan pelajar. Hubungan yang baik antara rakan sebaya, sokongan daripada tenaga pengajar, dan budaya institusi yang menggalakkan pembelajaran berpasukan meningkatkan motivasi dan kesediaan pelajar untuk Peer Coaching (Johnson & Johnson, 1999; Topping, 2005). Dalam pendidikan tahfiz, interaksi dua hala dan peranan bergilir sebagai pembimbing dan pembelajar memperkukuh kefahaman pelajar (Topping, 2005).

Selain itu, cabaran seperti kekangan masa dan komitmen pelajar juga menjejaskan tahap kesediaan mereka. Pelajar dengan jadual padat mungkin menghadapi kesukaran untuk melibatkan diri secara konsisten dalam sesi Peer Coaching, sekaligus mengurangkan keberkesanan kaedah tersebut (Smith et al., 2017). Dalam konteks pendidikan tahfiz, kekangan ini diperkuatkan dengan komitmen hafazan dan aktiviti keagamaan yang padat (Zakaria et al., 2018).

Secara keseluruhannya, faktor-faktor ini saling berkaitan dan memberi kesan besar terhadap kejayaan Peer Coaching. Oleh itu, memahami dan menangani cabaran serta memperkukuh faktor penyokong adalah penting untuk meningkatkan kesediaan pelajar tahfiz mengaplikasikan kaedah ini secara efektif.

2.4 Cabaran dan Implikasi Pelaksanaan Peer Coaching

Pelaksanaan Peer Coaching dalam konteks pendidikan sering menghadapi pelbagai cabaran yang perlu ditangani untuk memastikan keberkesanan kaedah ini. Salah satu cabaran utama ialah kekangan masa, di mana pelajar sukar menyediakan masa yang cukup untuk sesi bimbingan kerana jadual akademik yang padat dan komitmen lain (Smith & Jones, 2019; Brown & Taylor, 2020). Hal ini sering menyebabkan ketidakkonsistenan dalam pelaksanaan Peer Coaching yang akhirnya memberi kesan negatif kepada hasil pembelajaran.

Selain itu, tahap motivasi dan komitmen pelajar juga menjadi faktor penting. Kajian oleh Lee dan Kim (2020) mendapati bahawa rendahnya motivasi pelajar untuk berperanan sebagai coach atau coachee boleh melemahkan keberkesanan sesi Peer Coaching. Keengganan untuk aktif dalam bimbingan rakan sebaya ini boleh berpunca daripada kekurangan kefahaman tentang manfaat kaedah tersebut atau kurangnya sokongan daripada pihak institusi (Martin & Rose, 2018).

Selain cabaran berkaitan motivasi, kajian oleh Rahim et al. (2021) mengenal pasti kurangnya kesedaran dan komitmen pelajar terhadap peranan mereka dalam sesi Peer Coaching sebagai salah satu halangan utama. Pelajar yang tidak mempunyai kemahiran komunikasi yang baik atau sikap proaktif cenderung kurang mengambil bahagian secara efektif dalam sesi bimbingan rakan sebaya. Hal ini menunjukkan bahawa aspek kemahiran interpersonal dan kesedaran diri amat kritikal dalam kejayaan Peer Coaching (Goh & Tan, 2019).

Faktor persekitaran pembelajaran juga memainkan peranan penting dalam keberkesanan Peer Coaching. Kajian oleh Zainuddin dan Ismail (2022) menunjukkan bahawa persekitaran yang kurang kondusif—seperti tiada ruang belajar yang selesa atau gangguan luar—boleh menjejaskan kualiti sesi bimbingan. Oleh itu, Ismail et al. (2023) mencadangkan agar institusi tahfiz menyediakan modul latihan khusus bagi membentuk kemahiran kepimpinan

dan bimbingan dalam kalangan pelajar supaya pelaksanaan Peer Coaching dapat menjadi lebih berkesan (Rahman & Abdullah, 2020).

Selain itu, hubungan interpersonal antara pelajar menjadi faktor penentu kejayaan Peer Coaching. Kamisah et al. (2024) menekankan bahawa jika hubungan pelajar tidak mesra atau terdapat perasaan tidak selesa untuk berkongsi ilmu, maka kaedah ini sukar mencapai objektifnya secara optimum. Oleh itu, institusi tahfiz perlu mewujudkan suasana pembelajaran yang menyokong interaksi positif, menggalakkan budaya saling membantu serta menyediakan program bagi membina kemahiran komunikasi dan kepimpinan di kalangan pelajar (Rahim et al., 2021; Ahmad & Yusuf, 2019).

Tambahan pula, kekurangan bimbingan dan pemantauan berterusan daripada tenaga pengajar atau fasilitator turut menyumbang kepada pelaksanaan Peer Coaching yang kurang berkesan (Nguyen & Tran, 2017; Lee et al., 2021). Tanpa panduan sistematik dan sokongan berterusan, pelajar mungkin menghadapi kesukaran mengatasi masalah dalam sesi bimbingan mereka.

Implikasi daripada cabaran-cabaran ini menuntut strategi yang lebih holistik bagi memastikan Peer Coaching dijalankan dengan lancar dan berkesan. Penggunaan teknologi pendidikan sebagai alat sokongan, seperti platform pembelajaran dalam talian dan aplikasi pemantauan, telah dibuktikan dapat membantu mengatasi masalah masa dan meningkatkan komunikasi antara pelajar (Wang et al., 2021; Chen & Liu, 2022). Di samping itu, pembangunan modul latihan yang sistematik serta sokongan daripada pihak institusi amat penting untuk meningkatkan motivasi dan kefahaman pelajar terhadap kaedah ini (Ali & Hassan, 2019; Omar & Salleh, 2020).

Secara keseluruhannya, memahami cabaran dan implikasi pelaksanaan Peer Coaching membantu pihak institusi merangka intervensi yang lebih efektif demi memaksimumkan manfaat kaedah ini dalam meningkatkan prestasi dan kemahiran pelajar (Smith et al., 2023).

3.0 Metodologi Kajian

Kajian ini menggunakan pendekatan kualitatif bagi meneliti tahap kesediaan pelajar tahfiz dalam mengaplikasikan kaedah Peer Coaching dalam pembelajaran di Universiti Tenaga Nasional (Uniten). Pendekatan kualitatif dipilih kerana ia membolehkan pengkaji mendapatkan pemahaman yang lebih mendalam dan terperinci mengenai pengalaman, pandangan, serta cabaran yang dihadapi oleh pelajar dalam pelaksanaan kaedah tersebut.

Data utama bagi kajian ini diperoleh melalui temu bual separa berstruktur bersama pelajar tahfiz yang dipilih secara bertujuan (purposive sampling). Temu bual ini dirancang untuk mengumpul maklumat tentang persepsi pelajar terhadap kaedah Peer Coaching, faktor-faktor yang mempengaruhi kesediaan mereka, serta pengalaman praktikal dan cabaran yang mereka hadapi ketika mengamalkan kaedah tersebut. Jumlah responden dijangka antara 2 atau 3 orang bagi memastikan data yang diperoleh mencukupi untuk dianalisis secara menyeluruh dan dapat mewakili pelbagai perspektif dalam kalangan pelajar tahfiz.

Selain pengumpulan data lapangan, kajian ini turut menggunakan sorotan literatur yang melibatkan analisis dokumen dan kajian-kajian terdahulu berkaitan Peer Coaching dalam pendidikan tahfiz dan bidang pendidikan lain. Sorotan literatur ini bertujuan untuk

mengukuhkan kerangka teori kajian dan menyediakan konteks bagi membandingkan dapatan kajian lapangan dengan penemuan sedia ada.

Data yang dikumpulkan daripada temu bual akan dianalisis menggunakan teknik triangulasi untuk meningkatkan ketepatan dan keabsahan maklumat. Analisis tema (thematic analysis) akan digunakan untuk mengenal pasti tema-tema utama yang berkaitan dengan kesediaan pelajar, cabaran pelaksanaan Peer Coaching, serta elemen-elemen penting yang menyumbang kepada kejayaan kaedah tersebut. Dapatan daripada sorotan literatur akan digabungkan dengan hasil analisis data lapangan untuk menghasilkan gambaran yang lebih komprehensif mengenai pelaksanaan Peer Coaching dalam konteks pendidikan tahfiz.

Proses pengumpulan data akan dijalankan selepas mendapatkan kelulusan etika penyelidikan daripada pihak universiti dan institusi berkaitan. Temu bual dijalankan secara bersemuka atau menggunakan platform digital bergantung kepada keadaan dan keselesaan responden. Semua sesi temu bual akan dirakam dan disalin bagi memudahkan proses analisis data.

Kajian ini dijangka akan mengambil masa antara empat hingga enam bulan, meliputi fasa penyediaan instrumen, pengumpulan data, analisis data, dan penulisan laporan akhir. Dengan metodologi ini, kajian diharapkan dapat memberikan pandangan yang mendalam dan bernas mengenai kesediaan pelajar tahfiz dalam mengaplikasikan Peer Coaching serta menyediakan asas yang kukuh bagi pembangunan modul dan strategi pembelajaran yang lebih berkesan di masa hadapan.

4.0 Jangkaan Hasil Kajian

Kajian ini dijangka dapat memberikan pemahaman yang lebih mendalam mengenai tahap kesediaan pelajar tahfiz dalam mengaplikasikan kaedah Peer Coaching dalam pembelajaran di Universiti Tenaga Nasional (Uniten). Melalui kajian kualitatif ini, diharapkan akan dikenal pasti faktor-faktor utama yang mempengaruhi kesediaan pelajar serta cabaran-cabaran yang mereka hadapi dalam melaksanakan kaedah tersebut secara berkesan.

Selain itu, hasil kajian juga dijangka dapat menonjolkan peranan teknologi pendidikan sebagai pemangkin yang membantu meningkatkan keberkesanan Peer Coaching, terutama dalam menyediakan bahan pembelajaran interaktif dan sistem pemantauan prestasi yang lebih teratur. Kajian ini turut diharapkan dapat mengenal pasti elemen-elemen penting dalam pelaksanaan Peer Coaching seperti kejelasan matlamat, bimbingan berterusan daripada coach yang berpengalaman, saiz kumpulan yang kecil, dan latihan yang konsisten.

Dapatan kajian ini diharapkan dapat menjadi panduan berguna kepada pihak institusi pendidikan dalam merangka modul Peer Coaching yang lebih sistematik dan disokong oleh teknologi pendidikan. Selain itu, ia juga akan membantu institusi menyediakan intervensi sokongan berstruktur untuk memastikan keberkesanan kaedah Peer Coaching dapat dicapai secara optimum.

Secara keseluruhannya, hasil kajian ini dijangka menyumbang kepada peningkatan mutu pendidikan tahfiz melalui pendekatan pembelajaran yang lebih inklusif, berkesan, dan dapat memperkukuh kemahiran insaniah pelajar seperti komunikasi, kepimpinan, dan keyakinan diri.

5.0 Kesimpulan

Kertas konsep ini telah membincangkan secara menyeluruh tentang kesediaan pelajar tahfiz dalam mengaplikasikan kaedah Peer Coaching dalam pembelajaran di Universiti Tenaga Nasional (Uniten). Peer Coaching merupakan pendekatan pembelajaran yang berpotensi besar dalam meningkatkan kefahaman akademik dan kemahiran insaniah pelajar seperti komunikasi, kepimpinan, dan keyakinan diri. Namun, pelaksanaannya menghadapi pelbagai cabaran seperti kekangan masa, motivasi yang tidak konsisten, serta hubungan interpersonal yang perlu diberi perhatian.

Kajian ini bertujuan untuk meneliti tahap kesediaan pelajar, mengenal pasti faktor-faktor yang mempengaruhi pelaksanaan kaedah tersebut, serta meneroka cabaran dan implikasi yang dihadapi dalam konteks pendidikan tahfiz. Melalui pendekatan kualitatif dengan sorotan literatur dan temu bual separa berstruktur, kajian ini dijangka dapat memberikan gambaran yang mendalam dan menyeluruh bagi merangka modul Peer Coaching yang lebih sistematik dan berkesan.

Diharapkan hasil kajian ini dapat menjadi panduan berguna kepada pihak institusi dalam memperbaiki dan memperkukuh strategi pembelajaran, sekaligus menyumbang kepada peningkatan mutu pendidikan tahfiz secara keseluruhan. Oleh itu, pelaksanaan kajian ini adalah penting bagi memastikan pendekatan Peer Coaching dapat dimanfaatkan sepenuhnya bagi membina pelajar tahfiz yang berkualiti dan berdaya saing di masa hadapan.

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PENDIDIKAN DI GONTOR: IMPLIKASI TERHADAP PEMBELAJARAN BAHASA ARAB

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Abstrak: *Pondok Modern Darussalam Gontor (PMDG) adalah merupakan sebuah institusi pendidikan Islam yang cukup terkenal dengan sistem pembelajarannya yang ketat dan berdisiplin tinggi. Institusi ini juga menawarkan pelbagai subjek pengajian Islam dan subjek yang paling ditekankan adalah merupakan subjek bahasa Arab kerana ianya merupakan antara bahasa pengantar yang digunakan bagi setiap mata pelajaran. Maka, artikel ini ingin membincangkan tentang sistem pendidikan bahasa Arab yang dilaksanakan di PMDG termasuklah dari sudut sistem pembelajaran, disiplin harian, kaedah pembelajaran bahasa Arab serta cabaran dan manfaat yang akan diperoleh oleh para pelajarnya. Melalui metodologi pendidikan yang dimiliki, PMDG berjaya melahirkan pelajar yang berdisiplin, berdikari, dan fasih dalam bahasa Arab. Selain itu, aspek kepimpinan, interaksi sosial, dan penggunaan bahasa Arab secara langsung dalam kehidupan seharian turut memainkan peranan penting dalam membentuk peribadi pelajar. Kajian ini juga menyoroti peranan tenaga pengajar dalam menerapkan pendekatan pembelajaran yang efektif serta kepentingan suasana bahasa dalam meningkatkan penguasaan bahasa Arab dalam kalangan pelajar. Hasil kajian ini diharapkan dapat memberi gambaran yang lebih jelas mengenai keunikan sistem pendidikan di PMDG dan boleh dijadikan sebagai rujukan kepada institusi pendidikan Islam yang lain.*

Kata Kunci: *Pondok Modern Darussalam Gontor; Pendidikan Islam; pendidikan bahasa Arab; disiplin; kepimpinan*

Pendahuluan

Pondok Modern Darussalam Gontor (PMDG) merupakan salah satu institusi pendidikan Islam yang terkenal di Indonesia dengan sistem pembelajaran yang unik dan berstuktur. Institusi ini menggabungkan pendidikan agama dan akademik dengan pendekatan disiplin yang tinggi serta penggunaan bahasa Arab dan bahasa Inggeris sebagai bahasa pengantar dalam pembelajaran (Rahman, 2022). Keunikan sistem pendidikan di PMDG adalah terletak pada kaedah pengajaran yang menekankan kepada aspek kepimpinan, disiplin dan kemahiran komunikasi dalam kalangan pelajar. Selain itu, suasana asrama yang kondusif serta peraturan yang ketat membantu pelajar membentuk keperibadian yang lebih bertanggungjawab dan berdikari (Suryadi & Hidayat, 2023). Dalam konteks pembelajaran bahasa Arab, PMDG menerapkan pendekatan komunikatif dengan mewajibkan penggunaan bahasa Arab sebagai bahasa interaksi harian, yang seterusnya meningkatkan penguasaan bahasa pelajar dalam persekitaran yang kondusif (Ismail, 2021).

Selain itu, tenaga pengajar di PMDG juga memainkan peranan yang penting dalam membimbing pelajar dengan melaksanakan pendekatan pengajaran yang berasaskan disiplin dan keterlibatan aktif dalam aktiviti akademik dan kokurikulum (Hassan & Widodo, 2023). Dengan adanya bimbingan yang berterusan pelajar tidak hanya memahami ilmu agama dan akademik akan tetapi mereka juga dibentuk sebagai individu yang memiliki daya kepimpinan tinggi dan kemahiran berfikir secara kritis (Mahmud, 2024). Kajian-kajian lepas menunjukkan bahawa sistem pembelajaran seperti yang diamalkan di PMDG berkesan dalam membentuk pelajar yang lebih berdisiplin dan berdikari, berbanding dengan sistem pendidikan konvensional yang lain (Fauzi, 2023). Oleh itu, artikel ini bertujuan untuk meneliti lebih lanjut tentang sistem pembelajaran di PMDG serta bagaimana pendekatan ini boleh menjadi model bagi institusi pendidikan Islam lain dalam meningkatkan kualiti pengajaran dan penguasaan bahasa Arab dalam kalangan pelajar.

Sorotan Kajian

Pendidikan di pesantren seperti PMDG memainkan peranan penting dalam membentuk karakter pelajar melalui pendekatan holistik yang menggabungkan dari aspek akademik, keagamaan dan sosial. Menurut Zamakhsyari Dhofier (2021), sistem pendidikan pesantren berbeza dengan sekolah formal kerana menekankan pembelajaran berasrama yang membentuk disiplin, kepimpinan dan keupayaan kendiri pelajar. PMDG mengadaptasi model pendidikan yang menggabungkan kurikulum Islam klasik dan moden, membolehkan pelajar menguasai pelbagai ilmu serta kemahiran bahasa asing seperti bahasa Arab dan bahasa Inggeris (Azra, 2022). Keunikan ini menjadikan PMDG sebagai institusi pendidikan yang berperanan dalam melahirkan individu yang berilmu, berakhlak, dan bersedia dalam menghadapi pelbagai cabaran global.

Tambahan lagi, keberkesanan kaedah pembelajaran di PMDG dapat dilihat melalui konsep “pendidikan sepanjang hayat” yang diterapkan dalam kehidupan harian pelajarnya. Menurut Hidayat (2023), interaksi antara pelajar dan guru tidak terbatas hanya di dalam kelas sahaja, tetapi juga dalam aktiviti harian seperti solat berjemaah, perbincangan ilmiah, dan kerja secara berkumpulan yang mana mampu membentuk suasan pembelajaran yang berterusan.

Kaedah ini sejajar dengan teori pembelajaran sosial Bandura yang menekankan kepada kepentingan pemerhatian dan interaksi sosial dalam membentuk tingkah laku dan nilai individu (Bandura, 2020). Dengan adanya pendekatan ini, pelajar di PMDG bukan sahaja memperoleh ilmu, tetapi juga kemahiran sosial dan kepimpinan yang kukuh.

Oleh itu, kajian mengenai implikasi terhadap pembelajaran bahasa Arab di PMDG ini dapat melihat impak yang positif kepada diri pelajar melalui sistem pendidikan yang dilaksanakan di PMDG. Kajian oleh Rahman dan Fauzi (2023) mendapati bahawa pelajar yang melalui sistem pendidikan berasrama cenderung mempunyai tahap tanggungjawab yang lebih tinggi dan kemahiran penyelesaian masalah yang lebih baik. di PMDG, konsep "keupayaan kendiri" diterapkan melalui pengurusan masa yang ketat, kewajipan menguruskan keperluan harian sendiri serta penyertaan dalam aktiviti yang menguji daya tahan mental dan fizikal (Syamsuddin, 2023). Oleh itu, sistem pendidikan di PMDG bukan sahaja mencetak pelajar berprestasi akademik, akan tetapi mampu membentuk individu yang bersedia menjadi pemimpin kepada masyarakat.

Metodologi Kajian

Kajian ini menggunakan kaedah kualitatif dengan pendekatan temu bual separa berstruktur bagi mendapatkan maklumat mendalam mengenai strategi pengajaran bahasa Arab di PMDG. Kaedah ini dipilih kerana ia membolehkan penyelidik memahami perspektif guru secara langsung serta meneroka pengalaman dan cabaran yang dihadapi dalam membentuk persekitaran pembelajaran bahasa Arab yang berkesan. Temu bual dilaksanakan kepada tiga orang guru bahasa Arab yang berpengalaman di PMDG yang mana mereka dipilih secara perposif berdasarkan kepakaran dan peranan mereka dalam sistem pendidikan di PMDG.

Proses pengumpulan data dilakukan melalui sesi temu bual secara bersemuka dan dalam talian, bergantung kepada kesesuaian responden. Soalan temu bual adalah berkaitan dengan pendekatan pengajaran, cabaran dalam pelaksanaan pengajaran, kewujudan model persekitaran bahasa Arab serta impak persekitaran bahasa terhadap keberkesanan pembelajaran. Sesi temu bual berlangsung selama lebih kurang 45 minit dan direkodkan dengan kebenaran informan bagi memastikan ketepatan analisis data. Transkripsi data dibuat dan dianalisis menggunakan perisian ATLAS.ti bagi mengenal pasti tema-tema utama yang muncul melalui perbualan.

Bagi memastikan kesahihan dan kebolehpercayaan data, kaedah triangulasi digunakan dengan membandingkan dapatan daripada tiga orang guru serta merujuk kepada dokumen berkaitan seperti kurikulum dan garis panduan pengajaran di PMDG. Data yang diperoleh kemudian dikategorikan mengikut tema dan dianalisis secara deskriptif bagi mendapatkan gambaran menyeluruh tentang strategi pembelajaran bahasa Arab di PMDG. Dengan pendekatan ini, kajian dapat memberikan gambaran yang lebih jelas mengenai keberkesanan kaedah pengajaran bahasa Arab yang diterapkan serta implikasinya terhadap pendidikan bahasa Arab di Malaysia.

Analisis dan Dapatan Kajian

Bahagian ini menerangkan tentang dapatan kajian yang diperoleh daripada hasil temu bual yang telah dijalankan.

Jadual 1: Demografi

Informan	Umur	Pencapaian Pendidikan	Kepakaran	Pengalaman Kerja
Informan 1	53 tahun	S1/ Ijazah Sarjana Muda	Tafsir, Bahasa Arab	>10 tahun
Informan 2	39 tahun	S3/ Doktor Falsafah (PhD)	Tarbiyah Islam, Bahasa Arab	<10 tahuun
Informan 3	23 tahun	S1/ Ijazah Sarjana Muda	Perbandingan Mazhab, Bahasa Arab	<10 tahun

Sumber: Temu bual Guru Bahasa Arab Pondok Modern Darussalam Gontor (PMDG)

Jadual 1 menunjukkan latarbelakang informan yang terdiri daripada guru-guru bahasa Arab yang terpilih di PMDG. Berdasarkan kepada jadual di atas, purata umur bagi keseluruhan informan adalah diantara 20 hingga 50 tahun. Manakala bagi pencapaian pendidikan pula, informan 1 dan 3 memperoleh pencapaian pendidikan tertinggi di peringkat S1 ataupun setaraf dengan Ijazah Sarjana Muda kecuali bagi informan 2 memperoleh pencapaian pendidikan tertinggi di peringkat S3 ataupun setaraf dengan Doktor Falsafah (PhD). Dari sudut kepakaran, keseluruhan mereka mempunyai kepakaran dalam Bahasa Arab dan juga mempunyai kepakaran pada bidang lain yang lain berbeza-beza seperti ilmu tafsir, ilmu tarbiyah Islam serta ilmu perbandingan mazhab. Walau bagaimanapun, bahasa pengantar yang digunakan oleh bidang-bidang tersebut menggunakan bahasa Arab dan secara tidak langsung menunjukkan mereka mampu menguasa bahasa Arab dengan baik. Selain itu, tempoh perkhidmatan bagi informan 1 adalah melebihi 10 tahun perkhidmatan manakala bagi informan 2 dan 3 masih di bawah 10 tahun perkhidmatan.

Berdasarkan hasi temu bual di PMDG dan analisis menggunakan perisian ATLAS.ti, lima tema utama telah dikenal pasti. Tema-tema ini disusun mengikut lima soalan utama yang dibincangkan dalam sesi temu bual. Setiap tema dianalisis dan dibincangkan berdasarkan dapatan kajian yang diperoleh.

Model Persekitaran Bahasa Arab di PMDG

Dapatan kajian menunjukkan bahawa sistem pendidikan di PMDG telah berjaya melahirkan persekitaran bahasa Arab yang kondusif serta melahirkan pelajar yang mampu bertutur dalam bahasa Arab dengan baik. Selain itu, PMDG juga berjaya melahirkan ramai pemimpin dalam pelbagai bidang seperti pendidikan, dakwah dan pentadbiran. Berdasarkan temu bual daripada informan 1, 2 dan 3 mendapati bahawa alumni daripada PMDG keseluruhannya mempunyai kemahiran komunikasi yang tinggi, keyakinan diri, dan keupayaan untuk mengurus organisasi dengan baik. Faktor ini didorong oleh penekanan terhadap kemahiran komunikatif di dalam bahasa asing iaitu bahasa Arab dan bahasa Inggeris yang giat dilaksanakan dan menjadi bahasa interaksi diantara mereka. Pelbagai kaedah yang dilaksanakan untuk membentuk persekitaran bahasa Arab dalam kalangan pelajar antaranya ialah, setiap minggu para pelajar diwajibkan mengikuti sistem pergiliran bahasa. Minggu pertama adalah pelaksanaan minggu bahasa Arab dan diikuti dengan minggu berikutnya adalah dengan melaksanakan minggu bahasa Inggeris diikuti dengan minggu berikutnya diulangi dengan minggu bahasa Arab. Peraturan ini dilaksanakan dengan ketat tanpa membenarkan penggunaan bahasa ibunda agar para pelajar dibiasakan untuk berkomunikasi dalam bahasa selain daripada bahasa asli mereka. Hal ini dapat disimpulkan bahawa penekanan terhadap kemahiran komunikatif dan suasana

persekitaran bahasa Arab yang jitu mampu melahirkan impak yang positif terutamanya dalam memupuk motivasi dan keberanian di dalam diri pelajar serta mampu menjadi model persekitaran pembelajaran bahasa yang boleh dicontohi oleh institusi yang lain.

Inisiatif PMDG dalam Mengekalkan Persekitaran Bahasa Arab

PMDG mengamalkan sistem pendidikan yang menggabungkan pendekatan tradisional dan moden. Kaedah pembelajaran yang diterapkan tidak hanya menekankan hafalan dan pemahaman kitab klasik, tetapi juga melaksanakan pembelajaran secara interaktif. Bagi pendidikan bahasa Arab, berdasarkan daripada maklumat yang diberikan oleh informan 1, 2 dan 3 yang mana pelbagai langkah yang diambil oleh pentadbiran PMDG dalam memastikan para pelajar dapat menggunakan bahasa Arab dalam komunikasi harian mereka.

Langkah pertama ialah, sebelum waktu subuh para pelajar akan diberikan tiga hingga lima *mufradat* (perkataan) dan mereka perlu menghafal perkataan-perkataan tersebut untuk digunakan dalam pertuturan harian mereka.

Langkah kedua pula ialah ketika di dalam kelas, bagi semua mata pelajaran yang menggunakan bahasa Arab sebagai bahasa pengantar perlu diajarkan sepenuhnya dalam bahasa tersebut dan dilarang menggunakan bahasa ibunda.

Langkah ketiga pula ialah ketika di luar kelas, pelajar diwajibkan untuk bertutur dalam bahasa yang sedang berjalan pada minggu tersebut.

Langkah keempat pula ialah pada waktu malam, para pelajar perlu mengikuti program *muhadatsah* (perbualan) yang akan diawasi oleh ketua kelas. Program *muhadatsah* ini dilaksanakan untuk memberi peluang kepada pelajar untuk berlatih berbual dalam bahasa Arab Bersama dengan rakan-rakan serta dapat meningkatkan kefasihan mereka dalam bertutur dan memperbaiki sebutan dan tatabahasa. Dalam masa yang sama, program ini akan diawasi oleh ketua kelas untuk memastikan mereka menggunakan bahasa yang betul.

Terdapat juga latihan lain yang dilaksanakan oleh PMDG dalam meningkatkan kemahiran bahasa Arab dalam kalangan pelajar antaranya ialah latihan *insya'* (menulis). Latihan *insya'* dilaksanakan secara mingguan untuk membantu meningkatkan kemahiran menulis dalam bahasa Arab. Selain itu juga, menerusi latihan ini, pelajar dapat mempraktikkan penggunaan *mufradat, nahu* dan *sarf* dalam penulisan mereka.

Selain itu, terdapat aktiviti lain yang menyokong pembelajaran bahasa Arab yang melibatkan aktiviti ekstrakurikular yang dijalankan dalam bahasa Arab. Antara aktiviti yang kerap dilaksanakan adalah seperti drama, pidato, debat dan program bahasa yang mana menggunakan bahasa Arab dengan sepenuhnya. Hal ini secara tidak langsung dapat membantu para pelajar melatih kemahiran bertutur mereka dan seterusnya dapat mewujudkan suasana pembelajaran yang lebih menarik dan menyeronokkan.

Peranan Guru

Di PMDG, guru bukan sahaja berperanan sebagai pendidik semata-mata akan tetapi mereka juga bertindak sebagai mentor dan pembimbing dalam kehidupan seharian pelajar. Hasil temu

bual daripada informan 1, 2 dan 3 mendapati bahawa hubungan antara guru dan pelajar di PMDG bersifat kekeluargaan dan penuh disiplin. Guru tidak hanya mengajar di dalam kelas, tetapi juga memberikan bimbingan di luar waktu pembelajaran rasmi termasuklah dalam aktiviti kokurikulum dan program keagamaan. Kajian oleh Hidayat (2023) menunjukkan bahawa model pendidikan berasrama yang menekankan bimbingan langsung daripada guru dapat meningkatkan motivasi pelajar dan membentuk sikap proaktif dalam pembelajaran.

Pembentukan Karakter dan Keupayaan Kendiri Pelajar

Salah satu aspek penting dalam pendidikan di PMDG adalah pembentukan karakter pelajar. Informan 1, 2 dan 3 menyatakan bahawa pelajar dididik untuk berdikari dalam menguruskan kehidupan harian mereka seperti kebersihan diri, disiplin waktu dan pengurusan kewangan peribadi. Pelajar juga dilatih untuk mengurus masa dengan baik dan bertanggungjawab terhadap diri sendiri yang mana ianya merupakan elemen penting dalam pendidikan berasrama. Ini sejajar dengan kajian oleh Dhofier (2021) yang menyatakan bahawa sistem pesantren mengutamakan nilai-nilai disiplin dan kepimpinan sebgai sebahagian daripada pembentukan karakter pelajar. Menurut Rahman dan Fauzi (2023), pendidikan berasrama yang menerapkan elemen kendiri dan disiplin dapat meningkatkan keupayaan pelajar untuk menjadi lebih bertanggungjawab dan bersedia menghadapi cabaran dunia luar.

Cabaran dan Penyelesaian dalam Sistem Pendidikan PMDG

Meskipun sistem pendidikan di PMDG memberikan banyak kelebihan, terdapat beberapa cabaran yang dihadapi oleh pelajar dan guru. Antaranya termasuklah kesukaran menyesuaikan diri dengan jadual yang padat dan tekanan akademik yang tinggi. Informan 1, 2 dan 3 menyatakan bahawa pelajar yang baru memasuki PMDG memerlukan masa menyesuaikan diri dengan sistem yang ketat dan disiplin yang tinggi. Bagi menangani cabaran ini, pihak pentadbiran PMDG menyediakan program orientasi dan bimbingan untuk membantu pelajar menyesuaikan diri. Kajian oleh Syamsuddin (2023) juga menegaskan bahawa sistem pendidikan berasrama memerlukan pendekatan yang fleksibel dan strategi bimbingan yang berkesan untuk memastikan kesejahteraan mental dan emosi pelajar.

Analisis dapatan kajian berdasarkan tema-tema utama ini menunjukkan bahawa sistem pendidikan di PMDG memberikan kesan yang signifikan dalam membentuk karakter, kepimpinan dan keupayaan diri pelajar. Walaupun terdapat cabaran dalam pelaksanaan sistem ini, strategi bimbingan langkah-langkah, aktiviti, latihan dan pendekatan yang digunakan oleh pihak pentadbiran telah membantu pelajar untuk menyesuaikan diri serta berkembang dengan baik. Oleh itu, model pendidikan PMDG ini boleh dijadikan rujukan dalam merangka sistem pendidikan yang bukan sahaja berfokus kepada pencapaian akademik tetapi juga pembinaan karakter dan kepimpinan yang kukuh serta pembentukan persekitaran pembelajaran yang kondusif dan menyeronokkan.

Kesimpulan

Berdasarkan analisis temu bual di PMDG dapat disimpulkan bahawa sistem pendidikan di PMDG mampu memberikan impak yang bersar terhadap pembentukan karakter, kepimpinan, keupayaan kendiri pelajar yang mana mampu melahirkan suasana dan persekitaran pembelajaran yang menarik. Model pendidikan PMDG menggabungkan pendekatan tradisonal

dan moden, menekankan disiplin yang tinggi serta menerapkan kaedah pengajaran yang aktif dan interaktif. Peranan guru bukan sahaja pendidik, bahkan sebagai pembimbing kepada para pelajar untuk menjadi individu yang lebih bertanggungjawan dan berdikari. Walaupun terdapat cabaran seperti tekanan akademik dan keperluan menyesuaikan diri dengan sistem yang ketat, pendekatan sistematik PMDG dalam membimbing pelajar berjaya melahirkan individu yang berani, berdaya saing dan mempunyai kemahiran kepimpinan yang tinggi.

Hasil kajian ini boleh menyumbang kepada pendidikan bahasa Arab di Malaysia dengan beberapa cadangan yang relevan. Pertama, konsep persekitaran berbahasa Arab sepenuhnya di PMDG boleh dijadikan rujukan dalam memperkasakan penggunaan bahasa Arab di sekolah-sekolah agama di Malaysia. Penggunaan kaedah pembelajaran yang interaktif dan komunikasi langsung dalam bahasa Arab dapat meningkatkan kemahiran lisan pelajar. Kedua, model bimbingan guru yang lebih bersifat kekeluargaan dan mentor boleh diaplikasikan untuk meningkatkan motivasi pelajar dalam mempelajari bahasa Arab. Akhirnya, penerapan sistem disiplin dan latihan kepimpinan seperti yang diamalkan di PMDG boleh membantu membentuk pelajar yang lebih yakin dan berkemahiran tinggi dalam berkomunikasi bahasa Arab. Secara keseluruhannya, sistem pendidikan di PMDG dapat menjadi sumber inspirasi dalam memerbaiki dan memperkukuh kaedah pembelajaran bahasa Arab di Malaysia.

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ISU SINDIR BADAN *('BODY SHAMING')* DI MALAYSIA: SUATU PENILAIAN SEMULA

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Abstract: *Isu 'body shaming' atau sindiran terhadap bentuk badan bukanlah perkara baharu dalam kalangan masyarakat kita pada masa kini. Pelbagai modus operandi digunakan oleh individu yang tidak bertanggungjawab untuk melakukan perbuatan ini, khususnya melalui platform media sosial yang semakin meluas, tanpa rasa bersalah. Mangsa sering mengalami kesan negatif dari segi kesihatan mental dan emosi, termasuk kemurungan, perasaan berdendam, mudah marah, hilang keyakinan diri, gangguan pemakanan, serta pelbagai masalah lain yang boleh membawa kepada kejadian tragis seperti bunuh diri. Kajian ini menggunakan kaedah penyelidikan perundangan (legal research method) dan analisis kandungan (content analysis) terhadap peruntukan undang-undang, keputusan mahkamah, serta dokumen berkaitan. Oleh itu, kajian ini memberi tumpuan kepada isu 'body shaming' dari perspektif kerangka perundangan sedia ada di Malaysia, sebagai usaha untuk membendung penularan fenomena yang tidak sihat ini, memandangkan masih ramai dalam kalangan masyarakat yang kurang memahami aspek undang-undang berkaitan perbuatan buli ini.*

Keywords: *'Body shaming'; Jenayah; Buli; Perundangan*

Pengenalan

Isu 'body shaming' dalam kalangan masyarakat di negara ini bukanlah suatu perkara yang baharu atau asing pada masa kini. Menerusi jawapan bertulis dalam sidang Dewan Rakyat bertarikh 21 Mac 2021, Menteri Dalam Negeri ketika itu, YB Datuk Seri Hamzah Zainudin, memaklumkan bahawa sebanyak 17 kes penghinaan terhadap fizikal individu (body shaming) telah dilaporkan di Malaysia dalam tempoh lima tahun, iaitu dari tahun 2017 hingga 2021.

Dalam perkembangan berkaitan, media tempatan melaporkan bahawa Mahkamah Rayuan telah mengekalkan keputusan Mahkamah Tinggi terhadap seorang pempengaruh media sosial, setelah rayuannya untuk mengetepikan arahan membayar ganti rugi sebanyak RM100,000 ditolak. Hukuman tersebut dikenakan berikutan perbuatannya mengeluarkan

kata-kata kesat dan melakukan *'body shaming'* terhadap individu lain melalui platform media sosial. Panel tiga hakim Mahkamah Rayuan secara sebulat suara memutuskan bahawa hakim Mahkamah Tinggi tidak terkhilaf dalam keputusannya, kerana kenyataan yang dikeluarkan oleh perayu dianggap sebagai fitnah. Ekoran perbuatan tersebut, reputasi plaintif telah tercemar dan beliau turut mengalami tekanan perasaan, trauma, kemurungan, serta hilang keyakinan diri.

Modus operandi dalam perbuatan *'body shaming'* boleh wujud dalam pelbagai bentuk, sama ada secara fizikal mahupun melalui media sosial. Antara kaedah yang lazim digunakan oleh pelaku termasuk intimidasi secara terbuka *(overt bullying)* seperti penghinaan, sindiran, komen negatif, dan ancaman yang bertujuan menyakiti mangsa secara langsung. Selain itu, intimidasi secara tidak langsung *(indirect bullying)* juga berlaku melalui penyebaran khabar angin atau gosip yang mencemar reputasi serta maruah mangsa. Tambahan pula, bentuk perbuatan ini turut merangkumi elemen buli siber *(cyberbullying)*, iaitu penghinaan dan intimidasi yang disebarkan menerusi platform media sosial dan aplikasi teknologi seperti Facebook, Twitter, dan Instagram dan sebagainya.

Antara contoh eks kes berkaitan yang pernah dilaporkan termasuklah seorang pelakon wanita tanah air telah membuat laporan polis terhadap seorang individu berikutan unsur penghinaan dan buli siber yang ditujukan kepada anak angkat beliau melalui media sosial (Sinar Harian, 16 Mac 2020). Selain itu, media turut melaporkan baawa terdapat seorang lelaki telah membuat ciapan di media sosial yang bersifat menghina rupa fizikal seorang remaja berkulit Albino, dengan menyatakan bahawa remaja tersebut wajar "diburu dan dikerat bagi tujuan ritual sihir" (Astro Awani, 20 Oktober 2019). Di samping itu, seorang personaliti media sosial, atau lebih dikenali sebagai influencer, telah melakukan siaran langsung (*live streaming*) dan mengeluarkan kata-kata kesat terhadap seorang wanita, termasuk menyamakan bentuk tubuh wanita tersebut dengan haiwan. Video tersebut turut memaparkan gambar wanita itu bersama anaknya sebelum menjadi tular. Insiden berlaku selepas wanita terbabit meninggalkan komen di ruang siaran influencer tersebut. Akibat video yang menghina bentuk fizikalnya itu, mangsa mengalami tekanan perasaan, trauma, kemurungan dan gangguan emosi, hingga dinasihati oleh peguam untuk mengambil tindakan sivil di mahkamah. Walau bagaimanapun, influencer tersebut kemudian membuat permohonan maaf secara terbuka melalui laman Facebook, dengan menyatakan kegagalannya mengawal emosi ketika mengeluarkan kata-kata tersebut (Sinar Harian, 18 Ogos 2020). Media tanah air turut melaporkan bahawa seorang penyanyi yang juga peserta program Big Stage telah membuat permohonan maaf secara terbuka kepada pengacara program berkenaan selepas membuat gurauan yang menyentuh bentuk fizikal pengacara tersebut sejurus selesai persembahan pusingan pertama (Berita Harian, 5 Oktober 2020). Lagi menyedihkan, seorang wanita telah bertindak menamatkan riwayat hidupnya dengan menggantung diri akibat tidak tahan lagi menerima ejekan dan kecaman yang berunsur penghinaan daripada 'netizen'. Tindakan ini berpunca daripada penularan satu video TikTok yang memperlihatkan seolah-olah beliau dan rakan sekerjanya mempunyai hubungan istimewa, sekaligus mengundang pelbagai kecaman jelik (Harian Metro, 19 Mei 2020). Dunia hiburan tanah air turut digegarkan di mana seorang pelakon wanita turut membuat laporan polis selepas menerima kecaman dan penghinaan terhadap anak angkatnya menerusi media sosial. Beliau telah menyerahkan senarai lebih 15 individu untuk diambil tindakan oleh pihak berkuasa. Namun, kes tersebut akhirnya diselesaikan secara baik apabila salah seorang individu terlibat membuat permohonan maaf secara terbuka dan bersetuju untuk membayar ganti rugi kepada mangsa (Harian Metro, 13 Mac 2019). Di

peringkat antarabangsa pula, seorang bintang K-Pop terkenal, Sulli, ditemui mati di kediamannya akibat membunuh diri. Punca kematian dikaitkan dengan tekanan perasaan melampau akibat buli siber, di mana beliau sering menjadi sasaran komen melampau dan serangan siber yang berterusan (Berita Harian, 14 Oktober 2019).

Kaedah Penyelidikan

Kaedah kajian perundangan *(legal research method)* digunakan bagi meneliti dan menganalisis peruntukan undang-undang, keputusan mahkamah, serta dokumen berkaitan untuk menilai tahap keberkesanan undang-undang sedia ada dalam menangani isu seperti *'body shaming'*. Di samping itu, kaedah analisis kandungan *(content analysis)* turut digunakan dengan menumpukan kepada pemerhatian secara sistematik terhadap bahan seperti laporan media dan komen di media sosial bagi mengenal pasti tema dan pola yang berkaitan dengan isu tersebut. Gabungan kedua-dua kaedah ini membolehkan penyelidik memperoleh pemahaman yang komprehensif terhadap aspek perundangan dan juga persepsi masyarakat secara menyeluruh.

Rujukan Perundangan di Malaysia berkaitan *'Body Shaming'*

Secara asasnya, antara kerangka legislatif yang boleh digunapakai sebagai sumber kuasa ialah Akta Komunikasi dan Multimedia 1998, Akta Jenayah Komputer 1997, serta Kanun Keseksaan 1950.

Seksyen 211 Akta Komunikasi dan Multimedia 1998 (Akta 588) antara lain menyatakan:
(a) tiada mana-mana orang yang menggunakan perkhidmatan aplikasi kandungan, boleh memberikan kandungan yang sumbang, lucah, palsu, mengancam atau jelik sifatnya dengan niat untuk mengacau, mendera, mengugut atau mengganggu mana-mana orang lain.
(b) Seseorang yang melanggar peruntukan di atas adalah melakukan suatu kesalahan dan apabila disabitkan boleh didenda tidak melebihi RM50,000 atau dipenjarakan selama tempoh tidak melebihi satu tahun atau kedua-duanya dan juga boleh didenda selanjutnya RM1,000 bagi setiap hari atau sebahagian daripada sehari kesalahan diteruskan selepas pensabitan.

Selain daripada itu Seksyen 233 Akta yang sama turut menyatakan:
(1) Seseorang yang –
(a) dengan menggunakan mana-mana kemudahan rangkaian atau perkhidmatan rangkaian atau perkhidmatan aplikasi secara sedar –
(i) membuat, mewujudkan atau meminta-minta; dan
(ii) memulakan penghantaran, apa-apa komen, permintaan, cadangan atau komunikasi lain yang lucah, sumbang, palsu, mengancam atau jelik sifatnya dengan niat untuk menyakitkan hati, menganiayai, mengugut atau menggangu orang lain; atau
(b) memulakan suatu komunikasi dengan menggunakan mana-mana perkhidmatan aplikasi, sama ada secara berterusan, berulang kali atau selainnya, dan dalam masa itu komunikasi mungkin atau tidak mungkin berlaku, dengan atau tanpa mendedahkan identitinya dan dengan niat untuk menyakitkan hati, menganiayai, mengugut atau menggangu mana-mana orang di mana-mana nombor atau alamat elektronik, -adalah melakukan suatu kesalahan.
(2) Seseorang yang secara sedar –

(a) Dengan menggunakan suatu perkhidmatan rangkaian atau perkhidmatan aplikasi memberikan apa-apa komunikasi lucah bagi maksud komersial kepada mana-mana orang; atau
(b) Membenarkan suatu perkhidmatan rangkaian atau perkhidmatan aplikasi rangkaian di bawah kawalan orang itu untuk digunakan bagi suatu aktiviti yang diperihalkan dalam perenggan (a), adalah melakukan suatu kesalahan.
(3) Seseorang yang melakukan suatu kesalahan di bawah seksyen ini apabila disabitkan boleh didenda tidak melebihi RM50,000 atau dipenjarakan selama tempoh tidak melebihi satu tahun atau kedua-duanya dan hendaklah juga boleh didenda selanjutnya RM1,000 bagi setiap hari atau sebahagian daripada sehari kesalahan diteruskan selepas pensabitan.

Selain itu perbuatan menghina rupa fizikal seseorang menerusi aplikasi teknologi turut boleh didakwa di bawah Seksyen 233 (1) (a) & (b) Akta Komunikasi dan Multimedia 1998 (Akta 588) yang menyatakan bahawa:
(1) Seseorang yang—
(a) dengan menggunakan mana-mana kemudahan rangkaian atau perkhidmatan rangkaian atau perkhidmatan aplikasi secara sedar—
(i) membuat, mewujudkan atau meminta-minta; dan
(ii) memulakan penghantaran,
apa-apa komen, permintaan, cadangan atau komunikasi lain yang lucah, sumbang, palsu, mengancam atau jelik sifatnya dengan niat untuk menyakitkan hati, menganiayai, mengugut atau mengganggu orang lain; atau
(b) memulakan suatu komunikasi dengan menggunakan mana-mana perkhidmatan aplikasi, sama ada secara berterusan, berulang kali atau selainnya, dan dalam masa itu komunikasi mungkin atau tidak mungkin berlaku, dengan atau tanpa mendedahkan identitinya dan dengan niat untuk menyakitkan hati, menganiayai, mengugut atau mengganggu mana-mana orang di mana-mana nombor atau alamat elektronik, melakukan suatu kesalahan. Jika didapati bersalah, pelaku yang telah disabitkan kesalahannya boleh dihukum iaitu denda tidak melebihi RM50, 000.00 atau penjara tidak melebihi setahun atau kedua – duanya sekali.

Sekiranya si mangsa mempunyai merit atau asas yang kukuh untuk dipertimbangkan bagi tujuan pendakwaan di mahkamah, maka pesalah boleh disabitkan hukuman apabila didapati bersalah. Namun demikian, ia turut tertakluk kepada budi bicara oleh pihak mahkamah bagi menentukan samada kes tersebut tersebut memenuhi kriteria yang telah ditetapkan atau sebaliknya.

Sementara itu, Seksyen 14 Akta Kesalahan-Kesalahan Kecil 1955 (Akta 336) pula memperuntukkan denda yang tidak melebihi RM100 bagi setiap kesalahan.

Seksyen 509 Kanun Keseksaan 1950 pula memperuntukkan bahawa:
Perkataan atau isyarat yang dimaksudkan mengaibkan kehormatan seseorang.
Barang siapa dengan maksud hendak mengaibkan kehormatan seseorang, menyebut apa-apa perkataan, membuat apa-apa bunyi atau isyarat, atau menunjukkan apa-apa benda, dengan maksud supaya perkataan atau bunyi itu didengar, atau supaya isyarat atau benda itu dilihat oleh seseorang itu, atau mengganggu kesantunan seseorang itu, hendaklah diseksa dengan penjara selama tempoh yang boleh sampai lima tahun, atau dengan denda, atau dengan kedua-duanya.

Seksyen 499 Kanun Keseksaan menyatakan jika mana-mana individu ada membuat atau menerbitkan sebarang kenyataan tidak benar yang akan atau boleh merosakkan reputasi orang lain, serta ditulis atau disebarkan dengan niat jahat, adalah melakukan satu kesalahan jenayah fitnah. Jika didapati bersalah tertuduh boleh dihukum penjara maksimum dua tahun atau denda atau kedua-duanya.

Selain itu, Pengerusi Suruhanjaya Komunikasi dan Multimedia Malaysia (SKMM), Dr. Fadhlullah Suhaimi bin Abdul Malek menyatakan bahawa mangsa 'body shaming' perlu membuat laporan polis terlebih dahulu sebelum SKMM akan menyediakan bantuan teknikal untuk tindakan lanjut terhadap bukti yang perlu disahkan oleh pihak polis terlebih dahulu.

Bagi tujuan pembuktian *(onus of proof)* pula, mangsa boleh menggunakan kaedah tangkap layar skrin *(screenshot)* mesej digital yang menjelikkan itu boleh berfungsi sebagai bukti. Apa yang penting, mangsa perlu mengumpul bukti yang relevan, seperti latar belakang pendera dan komen jelik mereka untuk tindakan selanjutnya.

Selain itu, rujukan perundangan lain yang berkaitan adalah Akta Fitnah 1957. Secara dasarnya, Akta Fitnah 1957 merupakan satu akta induk (*Parent Act*) yang digubal khusus oleh Parlimen bagi tujuan menyelesaikan segala isu berkaitan dengan undang – undang *libel* dan *slander* serta kepalsuan berniat jahat yang lain. Terdapat 2 jenis kesalahan fitnah iaitu fitnah jenayah dan fitnah sivil. Bagi fitnah jenayah, rujukan boleh dibuat terhadap Seksyen 499 Kanun Keseksaan 1950 manakala hukuman bagi pesalah yang disabitkan kesalahannya adalah di bawah peruntukan Seksyen 500 Kanun Keseksaan 1950. Bagi memahami isi kandungan sekyen 499 tersebut, klausa tersebut memperincikan bahawa adalah fitnah boleh berlaku sekiranya sesuatu pernyataan yang dinyatakan oleh seseorang itu akan menyebabkan reputasi si mati terjejas atau rosak (sekiranya dia masih hidup; selain daripada mempunyai niat untuk menyakiti hati ahli keluarga atau saudara yang mempunyai pertalian persaudaraan dengan si mati). Hukuman yang diperuntukkan terhadap si pesalah (jika disabitkan kesalahan) adalah penjara sehingga dua tahun atau denda.

Bagi fitnah sivil pula, ia adalah berdasarkan kepada Undang – undang tort *(tortious liability)* yang merujuk kepada libel dan slander. Dalam konteks ini, ia merujuk kepada sebarang kenyataan yang dizahirkan kepada orang lain; samada yang bersifat kekal atau sementara. Natijahnya, fitnah tersebut akan merosakkan reputasi dan nama baik seseorang di mata masyarakat umum (Salleh Buang, 1992). Fitnah tersebut juga akan menimbulkan kecenderungan dalam kalangan warga masyarakat untuk merendah – rendahkan maruah seseorang yang akhirnya akan menyebabkan si mangsa lebih suka untuk memncilkan diri daripada bersosial (Mohd Safar Hashim, 2002). Dalam kata lain, ia merujuk kepada penerbitan kenyataan (lisan atau tulisan) yang mengakibatkan reputasi seseorang itu jatuh di mata masyarakat.

Dari sisi yang lain pula, kita sering mendengar bahawa antara hujah atau alasan yang digunakan untuk 'menghalalkan' atau 'mengabsahkan' tindakan tersebut adalah atas dasar Malaysia mengamalkan kebebasan bersuara di negara ini. Oleh yang demikian, dengan merujuk kepada Fasal 10 Perlembagaan Persekutuan, ada yang beranggapan bahawa tindakan mereka itu betul dan tidak bercanggah dengan keluhuran lunas – lunas perlembagaan yang kita sedia hormati.

Secara asasnya, kebebasan bersuara tidak hanya merujuk kepada hak untuk menyatakan pendapat atau idea peribadi tanpa rasa takut atau bimbang terhadap sebarang kemungkinan tindakan atau hukuman; sama ada secara lisan mahupun bertulis. Sebaliknya, kebebasan ini turut merangkumi aspek penerbitan, termasuk penulisan, penyiaran, pengedaran rakaman, serta penyampaian idea secara lisan kepada khalayak. Dalam konteks ini, perlu diakui bahawa tiada kebebasan yang bersifat mutlak di dunia ini, termasuk kebebasan bersuara, memandangkan batasannya telah ditetapkan menerusi kerangka perundangan yang sedia ada, sebagaimana yang diperuntukkan dalam Perlembagaan Persekutuan, khususnya di bawah Fasal 10.

Ini sejajar dengan Perkara 19 Pengisytiharan Hak Asasi Manusia Sejagat (UDHR 1948) yang menyatakan bahawa:
"Setiap orang adalah berhak kepada kebebasan pendapat dan mengeluarkan fikiran; hak ini termasuklah kebebasan memegang pendapat tanpa gangguan dan menuntut, menerima dan menyebarkan maklumat dan buah fikiran melalui sebarang media dan tanpa mengira sempadan".

Di samping itu, mukadimah Deklarasi Kaherah tentang Hak Asasi Manusia dalam Islam (Cairo Declaration on Human Rights in Islam) antara lain, menyatakan bahawa:
"Percaya bahawa hak-hak asasi dan kebebasan sejagat dalam Islam merupakan sebahagian daripada teras Islam dan bahawa tiada seorangpun secara prinsip berhak menghapuskannya secara keseluruhan dan sebahagiannya atau mencabuli atau mengabaikannya memandangkan ianya suatu perintah suci yang terkandung dalam Kitab-kitab wahyu Tuhan dan dihantar melalui Nabi terakhir-Nya untuk menyempurnakan mesej suci terdahulu sehingga menjadikan pematuhan terhadapnya suatu pengabdian dan pengabaian atau pencabulannya suatu dosa yang amat dibenci, dan kerana itu setiap orang bertanggungjawab secara individu dan ummah bertanggungjawab secara kolektif – untuk mempertahankannya."

Hakikatnya, hak dan kebebasan bersuara merupakan salah satu elemen terpenting dalam amalan sesebuah negara yang mengamalkan sistem demokrasi; termasuklah Malaysia yang berpegang kepada prinsip demokrasi berparlimen. Kebebasan ini turut mencerminkan penghormatan terhadap hak asasi setiap individu sebagaimana yang dijamin di bawah kerangka perundangan negara. Ini bermaksud, setiap individu bebas untuk menyuarakan pandangan dan pendapat selagi mana ia tidak menyentuh isu-isu sensitif yang telah dikenal pasti dan ditetapkan oleh Parlimen.

Kesimpulan

Isu body shaming atau sindiran terhadap bentuk fizikal seseorang, khususnya melalui media sosial, tidak seharusnya dipandang remeh oleh masyarakat pada masa kini, apatah lagi dijadikan bahan gurauan. Hal ini demikian kerana perbuatan tersebut boleh diklasifikasikan sebagai satu bentuk jenayah, memandangkan kesan negatifnya yang serius, termasuk insiden di mana mangsa bertindak menamatkan riwayat hidup akibat tekanan emosi yang berpanjangan. Dalam konteks kehidupan bermasyarakat, hubungan yang harmoni, saling menghormati dan berempati antara satu sama lain merupakan asas penting bagi menjamin kesejahteraan bersama. Oleh itu, setiap individu disarankan agar sentiasa menjaga tutur kata dan penulisan — sama ada secara lisan mahupun dalam talian — dengan penuh cermat dan beretika. Seperti yang diungkapkan dalam pepatah Melayu, "Pantang kutu dicukur, pantang

manusia dihinakan," maruah dan harga diri setiap insan perlu sentiasa dipelihara dan dihormati. Tambahan pula, menjadi tanggungjawab bersama setiap anggota masyarakat untuk memelihara hak serta melaksanakan kewajipan masing-masing selaras dengan kerangka perundangan yang sedia ada demi kemaslahatan sejagat. Usaha ini secara tidak langsung menyumbang ke arah pencapaian Matlamat Pembangunan Mampan (*Sustainable Development Goals,* SDG), khususnya Matlamat ke-3: Kesihatan Baik dan Kesejahteraan, serta Matlamat ke-16: Keamanan, Keadilan dan Institusi yang Kukuh — berlandaskan kepada prinsip pemerkasaan sebuah masyarakat madani.

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KEPENTINGAN KONSEP KEADILAN DALAM PEMBENTUKAN UNDANG-UNDANG DI MALAYSIA

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Abstrak: *Prinsip keadilan merupakan elemen teras dalam sistem perundangan moden, termasuk di Malaysia, dan memainkan peranan penting dalam menjamin keseimbangan antara hak individu dan kepentingan masyarakat. Walau bagaimanapun, pelaksanaan keadilan dalam penggubalan undang-undang sering kali menghadapi cabaran seperti kekaburan definisi keadilan, pengaruh politik dalam dasar awam, serta ketiadaan garis panduan yang berteraskan prinsip keadilan secara jelas. Kertas kerja ini bertujuan untuk meneliti peranan konsep keadilan dalam pembentukan undang-undang di Malaysia dengan menilai penggunaannya dalam proses legislatif dan implikasinya terhadap pembentukan undang-undang di Malaysia. Melalui pendekatan kualitatif berasaskan kajian kepustakaan, termasuk analisis dokumen perundangan, jurnal akademik, dan laporan institusi, kajian ini mendapati bahawa meskipun keadilan sering dijadikan rujukan dalam perbahasan dasar, tafsiran subjektif terhadap konsep ini boleh menjejaskan keabsahan undang-undang. Kajian ini turut menjelaskan lima teori terpilih dalam aspek konsep keadilan bagi tujuan pembentukan undang-undang di Malaysia, iaitu teori utilitarianisme, teori keadilan sosial, teori keadilan retributif dan distributif, teori hukum semula jadi, dan teori feminis dan kritikal. Dengan langkah ini, undang-undang yang dihasilkan bukan sahaja mematuhi aspek perundangan tetapi juga memastikan keadilan substantif kepada semua pihak. Dapatan kajian ini diharap dapat menjadi panduan kepada penggubal dasar, ahli perundangan, dan pengamal undang-undang dalam memastikan keadilan kekal sebagai prinsip utama sistem perundangan negara.*

Kata kunci*: keadilan, undang-undang, perundangan Malaysia, dasar awam.*

Pengenalan

Konsep keadilan memainkan peranan penting dalam pembangunan undang-undang di Malaysia. Ia mempengaruhi rangka kerja perundangan, struktur institusi, dan norma masyarakat. Ia berfungsi sebagai prinsip dan panduan dalam penggubalan undang-undang yang memastikan keadilan, kesaksamaan, dan perlindungan hak diberi penekanan. Walau bagaimanapun, pelaksanaan keadilan dalam penggubalan undang-undang sering kali menghadapi cabaran seperti kekaburan definisi keadilan, pengaruh politik dalam dasar awam, serta ketiadaan garis panduan yang berteraskan prinsip keadilan secara jelas. Justeru, melalui pendekatan kualitatif berasaskan kajian kepustakaan, kertas kerja ini bertujuan untuk meneliti peranan konsep keadilan dalam pembentukan undang-undang di Malaysia dengan menilai penggunaannya dalam proses legislatif dan implikasinya terhadap pembentukan undang-undang di Malaysia. Ini kerana, penyepaduan prinsip keadilan dalam sistem perundangan adalah penting untuk menangani keperluan pelbagai lapisan masyarakat, terutamanya dalam masyarakat majmuk seperti Malaysia.

Konsep Keadilan

Masih tiada satu takrifan yang tepat mengenai maksud keadilan walaupun konsep keadilan ini telah dibincangkan oleh para ilmuan undang-undang dan ahli falsafah sejak berkurun dahulu. Ini terjadi kerana konsep keadilan itu adalah kompleks dan takrifan yang tepat sukar diperolehi dan ada ketika terdapat maksud keadilan yang berbeza dan bertentangan di antara para juris mengenainya (Badariah, 2005). Untuk memahami konsep keadilan, maka pandangan yang berbeza mengenai konsep keadilan oleh para juris ini harus diteliti dan difahami bagi mengaitkan konsep keadilan dengan pembentukan undang-undang di Malaysia.

Menurut Aristotle terdapat perbezaan di antara keadilan sejagat (*universal justice*) dan keadilan terperinci (*particular justice*). Keadilan sejagat merupakan satu konsep menyeluruh yang meliputi pematuhan kepada undang-undang. Manakala keadilan terperinci ialah satu sifat kebaikan (*virtue*) yang mempunyai ciri kesamarataan dan keadilan.

Keadilan terperinci terbahagi kepada dua iaitu keadilan beragihan (*distributive justice*) di mana konsep ini meliputi kesamarataan bersekadar (*proportionate equality*) iaitu kes yang sama hendaklah diperlakukan dengan sama dan kes berbeza diperlakukan dengan berbeza, sekadar perbandingan langsung di antara mereka. Pertama, keadilan boleh ditakrif sebagai memberi kepada seseorang apa yang sepatutnya menjadi haknya. Kedua, keadilan pembetulan atau pemulihan (*corrective or restitutive justice*) iaitu keadilan yang bertujuan untuk memulihkan keadaan bagi mengembalikan keadaan asal (*status quo*) yang akan terpakai jika terdapat sesuatu yang harus dipulihkan atau dikembalikan kepada keadaan asal.

Seterusnya Plato dalam bukunya *The Republic*, menyatakan keadilan bermaksud mengekalkan keadaan yang sedia wujud (*status quo*) dan menganggap ketaksamarataan juga sebagai sifat keadilan. Keadilan adalah sifat kebaikan utama (*principle virtues*) dan yang lainnya adalah sifat kesederhanaan, kebijaksanaan dan keberanian. Seseorang yang adil mematuhi undang-undang dan mempunyai disiplin yang dikuasai akal, seseorang yang tidak adil akan mengingkarinya (Younesie, 2009).

Keadilan, bagi Plato, mempunyai kandungan moral dan bukannya undang-undang. Ia mempunyai aspek individu dan aspek sosial. Keadilan adalah prinsip tanpa campur tangan, yang mengekalkan dalam batasan yang sewajarnya keatas pelbagai kumpulan atau peringkat masyarakat, pelbagai individu setiap kumpulan dan pelbagai elemen dalam jiwa seseorang individu. Ia adalah prinsip pengkhususan kepada kemahiran dan berusaha menggerakkan semua orang untuk membuat sumbangan khusus kepada masyarakat. Pengkhususan ini akan membawa kepada kecekapan (Hamedi, 2014). Menurut Plato lagi, konsep keadilan terbahagi kepada tiga prinsip iaitu pertama, ada sesetengah undang-undang yang tidak adil, kedua undang-undang perlu dipatuhi dengan tegas dan terakhir seseorang tidak boleh melakukan sesuatu yang tidak adil (Keyt, 2011).

Menurut Hobbes pula, setiap individu ialah tuan kepada dirinya sendiri dan hanya kuasa peribadi yang dapat menetukan kedudukannya disisi masyarakat. Perasaan ketakutan sering mencengkam setiap individu kerana hidup diselubungi bahaya, kekejaman dan singkat. Sebagai perubahan, manusia bersetuju melepaskan hak-hak individu dan tunduk kepada satu kuasa yang berdaulat yang disebut ‘Leviathan’ (Mohd Akram, 2004). Hobes berpandangan, keadilan adalah sebahagian daripada kontrak sosial dan perlu patuh kepada

undang-undang. Menurut *Encyclopedia of Philosophy*, keadilan jenis ini tidak menjamin keadilan substantif sekiranya undang-undang itu sendiri bersifat tidak adil atau menindas. Teori Kontrak Sosial dikaitkan dengan teori moral dan politik moden dan diberikan penjelasan dan pembelaan oleh beliau. Menurut hujahan beliau, selepas kontrak sosial ini diwujudkan, masyarakt boleh diharapkan untuk menepati janji mereka dan bekerjasama antara satu sama lain. Kontrak sosial adalah sumber paling asas dari semua sumber baik yang ada dan yang kita boleh bersandar dengannya. Masyarakat boleh memilih sama ada untuk mematuhi syarat kontrak sosial, atau kembali kepada Keadaan Alam (*state of nature*), yang mana Hobbes berpendapat tiada orang yang munasabah akan menyukainya (Laskar, 2013).

Teori Keadilan - John Rawl's

John Rawls dalam bukunya yang berjudul *Theory of Justice*, menyatakan bahawa keadilan merupakan nilai kebaikan atau kejujuran yang pertama bagi sesebuah institusi sosial, ini kerana kebenaran merupakan satu sistem pemikiran (*system of thought*) (John Rawls, 1999). Tumpuan beliau lebih kepada keadilan sosial (*social justice*). Rawls menetapkan lima syarat asas di mana prinsip keadilan boleh diasaskan. Syarat asas tersebut ialah pertama: umum (*generality*): bermaksud prinsip-prinsip keadilan perlu bersifat umum; kedua: universal atau sejagat (*universality*): prinsip-prinsip keadilan perlu universal pemakaiannya; ketiga: publisiti (*publicity*):prinsip-prinsip keadilan perlu kepada publisiti atau perhatian umum; keempat: menghukum (*adjudicatory)*:prinsip-prinsip keadilan mesti mengadili pelbagai persaingan dalam tuntutan; kelima ialah muktamad (*finality):* bermaksud prinsip-prinsip undang-undang perlu bersifat muktamad dan menyeluruh dalam erti kata bahawa tiada piawaian yang lebih tinggi yang membolehkan hujahan sokongan terhadap tuntutan boleh ditangani (John Rawls, 1999).

Secara spesifik, Rawls mengembangkan teori mengenai prinsip-prinsip keadilan dengan menggunakan sepenuhnya konsep ciptaannya yang dikenal dengan "posisi asal" (*original position*) dan "tabir kejahilan" (*veil of ignorance*). "Original position" ini merujuk kepada kedudukan sebelum wujudnya apa-apa struktur asas masyarakat seperti undang-undang atau perlembagaan. "Posisi asal" tertumpu kepada pengertian 'ekulibrium reflektif' dengan didasari oleh ciri rasionalisasi (*rationality*), kebebasan (*freedom*), dan persamaan (*equality*) yang digunakan untuk mengatur struktur dasar masyarakat (*basic structure of society*) (Faiz, 2009). Ahli masyarakat perlu menentukan prinsip-prinsip organisasi mereka seperti menggubal perlembagaan dengan memastikan apa-apa prinsip yang digubal akan mengikat setiap masyarakat serta generasi seterusnya. Tindakan yang diambil oleh ahli masyarakat adalah disebalik suatu tabir kejahilan (*veil of ignorance*) kerana mereka jahil tentang diri dan kemampuan mereka. Tujuan tabir kejahilan adalah untuk mengelakkan mereka daripada memilih prinsip-prinsip yang akan memihak kepada kepentingan diri sendiri atau kepentingan tertentu (Badariah, 2005). Mereka perlu membuat pilihan terbaik supaya ia tidak menjejaskan kepentingan-kepentingan tadi. Rawls memberi petunjuk melalui '*principles of priority'* di mana dalam keadaan ini pilihan akan dibuat berdasarkan prinsip '*maximin*' atau ' *the best of the worst outcome*', iaitu mereka akan memilih pilihan yang terbaik di dalam keadaan yang paling buruk, di atas kesedaran bahawa ada kemungkinan bahawa pilihan tersebut akan mengikat diri mereka sendiri (Hari Chand, 2001).

Menurut Rawls, banyak perkara boleh dianggap sebagai adil atau tidak adil termasuk undang-undang, sistem-sistem sosial atau keputusan mahkamah dan sebagainya. Rawls

lebih memberi tumpuan kepada keadilan sosial (*social justice*) yang berkait dengan struktur asas sebuah masyarakat seperti cara bagaimana institusi-institusi sosial yang utama membahagikan hak-hak dan kewajipan dan kriteria yang menentukan pengagihan tersebut kerana struktur asas ini adalah lebih penting dan memberi kesan yang menyeluruh. Institusi yang dimaksudkan adalah seperti perlembagaan, sistem politik, rancangan dan peraturan-peraturan ekonomi dan sosial yang terpakai dalam sesebuah masyarakat (Badariah, 2005).

Prinsip keadilan sosial ini amat penting dan perlu untuk membuat pilihan yang rasional. Cara bagaimana konsep keadilan membentuk undang-undang dan tanggungjawab akan mempengaruhi masalah kecekapan, penyelarasan dan kestabilan. Oleh kerana itu dalam menentukan sama ada pilihan yang dibuat adalah rasional atau tidak, terdapat tiga aspek *practical rationality* yang perlu diberi perhatian oleh masyarakat iaitu; nilai (*value*), hak dan nilai moral (*right and moral worth*) dan terakhir ialah perlu berkaitan dengan sistem sosial dan institusi (Hari Chand, 2001).

Rawls berpandangan bahawa keadilan adalah kesamarataan (*justice as fairness)*. Dalam buku terkininya "Justice as Fairness: A Restatement", Rawls membahagikan prinsip keadilan kepada dua jenis iaitu (Rawls, 2001):

Prinsip pertama: setiap orang mempunyai hak yang sama rata terhadap sistem kebebasan asas sama rata yang terluas, selaras dengan kebebasan untuk semua. Kebebasan disini bermaksud kebebasan sivil seperti kebebasan bercakap, kebebasan diri, kebasan beragama dan sebagainya. Kebebasan ini amat penting dan hanya boleh dihadkan bagi melindungi hak dan kebebasan orang lain yang terjejas.

Prinsip kedua: ketaksamarataan sosial dan ekonomi mestilah disusun atur dengan dua kaedah iaitu:

a) Memanfaatkan golongan yang kurang bernasib baik (*least advantaged*) selaras dengan prinsip ("*just saving*") yang bermaksud keperihatinan untuk generasi akan datang di mana setiap generasi bukan sahaja mesti memelihara budaya dan tamadun tetapi mengekalkan institusi-institusi adil yang telah ditubuhkan dan;
b) Berhubung dengan jawatan dan kedudukan yang terbuka kepada semua atas dasar peluang kesamarataan. (*fair equality of opportunity*) iaitu semua pekerjaan perlu di buka untuk semua. Jika sebaliknya berlaku, akan ada masyarakat yang akan menerima layanan yang tidak sama rata dan akan kehilangan beberapa kelebihan atau keistimewaan, harta, pendapatan dan akan hilang juga peluang untuk memajukan diri masing-masing (Hari Chand, 2001).

Pada Rawls, prinsip pertama adalah lebih penting berbanding dengan prinsip kedua kerana kebebasan harus diutamakan dan hanya boleh dibataskan sekiranya perlu untuk melindungi kebebasan masyarakat umum seperti menghadkan kebebasan penjenayah untuk melindungi kebebasan masyarakat umum. Tidak dinafikan teori keadilan Rawls telah memperkukuhkan kedudukan kebebasan dan hak individu dalam sesebuah masyarakat adil walaupun terdapat kritikan terhadap teori ini (Badariah, 2005).

Bagaimana Keadilan Membentuk Undang-undang di Malaysia

Undang-undang adalah sinonim dengan keadilan. Keadilan tanpa undang-undang boleh mengakibatkan pelanggaran undang-undang dan pelaksanaan kuasa arbitrari (Hari Chand,

2001). Sistem perundangan adalah sistem yang menerapkan keadilan terhadap sebarang konflik yang terjadi kepada manusia. Dengan kata lain, mahkamah tidak boleh hanya menggunakan "keadilan" tanpa undang-undang kerana undang-undang mengandungi peraturan, statut dan keputusan-keputusan kes terdahulu yang melibatkan sebahagian daripada fakta situasi kes pihak-pihak yang terlibat dalam kes berkenaan. Tiada keputusan boleh berdasarkan keadilan jika fakta yang berkaitan tidak diketahui oleh pembuat keputusan. Memandangkan undang-undang adalah sebahagian daripada fakta mana-mana kes, maka undang-undang mesti dimaklumkan kepada pembuat keputusan. Justeru, hakim hendaklah memutuskan kes mengikut keadilan. Undang-undang adalah fakta yang relevan seperti mana-mana fakta material lain dalam menentukan apakah perkara yang adil dalam situasi berkaitan (Anthony D'Amato, 1992-93). Ringkasan kepada perkara ini ada ditunjukkan dalam rajah 1.



Rajah 1. Bagaimana keadilan membentuk undang-undang.

Menurut Mohd Akram (2004), undang-undang dengan keadilan sering disamaertikan. Terdapat perkaitan antara idea undang-undang dengan konsep keadilan kerana umum sedia maklum 'undang-undang seharusnya bersifat adil'. Dowrick dalam kajiannya mengkritik mana-mana pihak yang meletakkan perbezaan di antara 'keadilan di dalam undang-undang' (*justice in the law*) dan 'keadilan menurut undang-undang' (*justice according to the law*) kerana tanpa disedari, mereka memberi kepentingan ke atas kepastian dalam undang-undang dan mendapat manfaat ekoran dari kepastian, kestabilan dalam peraturan tersebut dan mewujudkan kebebasan peribadi dan kebebasan dalam memberi hukuman yang adil dan seragam (Dowrick, 1962).

Seterusnya Professor Allan berpandangan, walaupun tidak ada pertalian yang diwajibkan antara undang-undang dengan nilai moral tetapi keadilan ialah syarat mutlak di dalam pentadbiran dan pelaksanaan undang-undang. Kandungan undang-undang melibatkan tafsiran dan bergantung kepada pemahaman terhadap amalan yang dapat mewujudkan konsep kesamarataan (*equality*) dan keadilan (TRS Allan, 2020).

Hubungan istimewa antara konsep keadilan dengan undang-undang mula terserlah jika diperhatikan bahawa kebanyakan kritikan yang dibuat dari segi undang-undang adalah sama

ada ‘adil’ atau ‘tidak adil’ atau kadang-kadang disampaikan melalui perkataan ‘wajar’ atau ‘tidak wajar’ (H.L.A Hart, 1961).

Secara khusus terdapat beberapa teori keadilan yang membentuk undang-undang di Malaysia seperti yang dikemukakan dalam Rajah 2.



Rajah 2. Teori keadilan yang membentuk undang-undang.

Dari aspek pembentukan undang-undang di Malaysia, teori utilitarianisme menekankan bahawa undang-undang harus digubal untuk membawa manfaat terbesar kepada bilangan orang yang paling ramai (Malek, Lim & Palutturi, 2021). Dalam konteks ini, keutamaan diberikan kepada kesejahteraan kolektif berbanding kepentingan individu. Sebagai contoh, pelaksanaan Akta Kawalan Harga dan Antipencatutan 2011 di Malaysia bertujuan memastikan harga barang keperluan asas kekal mampu milik, terutamanya semasa krisis ekonomi, demi kepentingan majoriti rakyat.

Teori keadilan sosial oleh John Rawls pula menekankan bahawa undang-undang harus melindungi kebebasan asas setiap individu dan pada masa yang sama memberi keutamaan kepada golongan yang kurang bernasib baik (Shamsuddin, Long & Ramli, 2021). Ini bermakna undang-undang perlu memastikan peluang yang adil dan saksama untuk semua. Contohnya, Akta Orang Kurang Upaya 2008 di Malaysia diwujudkan untuk menjamin hak dan akses yang sama kepada golongan OKU dalam pendidikan, pekerjaan dan kemudahan awam.

Teori keadilan retributif dan distributif menampilkan dua pendekatan berbeza terhadap keadilan. Keadilan retributif menekankan bahawa hukuman harus setimpal dengan kesalahan yang dilakukan, manakala keadilan distributif memberi tumpuan kepada pembahagian sumber dan peluang secara adil dalam masyarakat (Herman, Rissi & Ramadhea, 2023). Di Malaysia, hukuman mandatori bagi kesalahan jenayah berat seperti pembunuhan mencerminkan prinsip retributif, manakala program bantuan seperti Bantuan Sara Hidup (BSH) mencerminkan prinsip distributif.

Teori hukum semula jadi *(natural law)* menyatakan bahawa undang-undang yang adil mestilah selari dengan prinsip moral sejagat seperti kejujuran, kesaksamaan dan maruah manusia. Undang-undang yang bercanggah dengan nilai moral ini dianggap tidak sah secara etika (Mahmud, 2023). Sebagai contoh, Malaysia telah menggubal Akta Antipemerdagangan Orang dan Antipenyeludupan Migran 2007 bagi melindungi hak asasi manusia dan menentang eksploitasi, selaras dengan prinsip moral sejagat.

Teori feminis dan kritikal menyeru kepada reformasi undang-undang agar lebih peka terhadap ketidaksamaan gender, kelas, dan kaum. Teori ini mengkritik sistem undang-undang tradisional yang sering mengabaikan suara golongan terpinggir dan menuntut perubahan yang lebih inklusif dan setaraf antara jantina lelaki dan wanita (Haciyakupoglu, 2016). Di Malaysia, pindaan terhadap undang-undang keganasan rumah tangga melalui Akta Keganasan Rumah Tangga 1994, dan usaha memperjuangkan hak kewarganegaraan yang sama rata untuk wanita melalui Perlembagaan Persekutuan mencerminkan pengaruh teori ini dalam memperbaiki ketidakseimbangan struktur undang-undang sedia ada.

Justeru, teori keadilan menyediakan rangka moral dan falsafah untuk pembentukan undang-undang dengan menentukan tujuan dan kesahihan undang-undang sebagai alat keadilan dan ketenteraman sosial (Artemenkov, 2023), membimbing pembuat undang-undang untuk mengimbangi hak individu dan kepentingan kolektif (Akbar, 2025), mempengaruhi reformasi undang-undang agar mencerminkan nilai dan standard etika masyarakat semasa (Harahap, 2025) dan membentuk tafsiran dan penguatkuasaan kehakiman untuk menegakkan kesaksamaan dan keadilan (Yandy, 2025).

Secara keseluruhannya, dapatan kajian ini mengemukakan satu hujah yang kukuh bahawa prinsip keadilan harus diinstitusikan dalam kerangka undang-undang Malaysia secara lebih sistematik dan inklusif. Melalui kombinasi pendekatan normatif dan praktikal, kajian ini menyerlahkan keperluan untuk menyeimbangkan antara keperluan majoriti dan hak minoriti, serta memastikan bahawa undang-undang bukan sekadar instrumen kawalan sosial, tetapi juga mekanisme pembebasan dan pengiktirafan maruah insan. Dalam era reformasi undang-undang dan tuntutan terhadap tadbir urus yang adil, kajian ini memberi sumbangan signifikan kepada wacana perundangan dan dasar awam di Malaysia.

Kesimpulan

Kesimpulannya, undang-undang dan keadilan saling melengkapi dan tidak boleh dipisahkan. Undang-undang berperanan memastikan keadilan dilaksanakan secara tersusun, manakala keadilan memberikan legitimasi moral kepada undang-undang. Mahkamah dan hakim harus mentafsir dan melaksanakan undang-undang secara adil, berasaskan prinsip kesamarataan dan pertimbangan yang objektif. Persepsi masyarakat terhadap ketidakadilan undang-undang sering menjadi punca kritikan, sekali gus mencerminkan tuntutan terhadap sistem perundangan yang bukan sahaja sah dari segi prosedur, tetapi juga adil dari segi substantif. Oleh itu, penggubalan dan pentafsiran undang-undang perlu menjadikan keadilan sebagai asas utama bagi membina sistem perundangan yang inklusif, beretika dan responsif terhadap realiti masyarakat majmuk. Kajian ini penting kerana ia menyumbang bukan sahaja kepada pengayaan literatur akademik, tetapi juga kepada amalan perundangan dan dasar awam yang lebih adil, progresif dan berpaksikan prinsip keadilan dalam kerangka demokrasi Malaysia.

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INTEGRASI TEKNOLOGI *DIGITAL TWIN* DALAM PEMULIHARAAN BANGUNAN WARISAN

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Abstrak: *Pengaplikasian teknologi digital dalam pendokumentasian dan pemuliharaan bangunan warisan ini telah menjadi bidang kajian yang amat penting, didorong oleh keperluan untuk mengekalkan dan melindungi warisan budaya di tengah-tengah tekanan urbanisasi ini. Walaupun begitu, usaha pemuliharaan bangunan warisan ini masih menghadapi cabaran kompleks seperti kemerosotan fizikal, kekangan dokumentasi, dan ketidaktentuan perubahan persekitaran. Kajian ini bertujuan untuk meneroka potensi pengintegrasian teknologi digital twin dalam penambahbaikan amalan pemuliharaan bangunan warisan sedia ada, khususnya sebagai alat sokongan strategik dalam proses dokumentasi, pemantauan, perancangan dan pengurusan warisan. Kajian mengambil pendekatan tinjauan literatur yang komprehensif terhadap artikel akademik, laporan teknikal, garis panduan dan dokumen berkaitan pemuliharaan bangunan warisan dan penggunaan teknologi digital twin. Berdasarkan analisis literatur, didapati bahawa digital twin berperanan bukan sahaja sebagai alat visualisasi dan penyimpanan data, malah berupaya membentuk ekosistem digital yang menyokong simulasi, analisis ramalan, serta pemantauan masa nyata terhadap keadaan struktur bangunan warisan. Kajian ini membentangkan sintesis dan perbincangan tentang penemuan daripada kajian literatur, menawarkan pandangan dan cadangan untuk hala tuju penyelidikan masa depan dalam sektor pemuliharaan bangunan warisan dengan bantuan teknologi digital twin. Dengan pendekatan yang menyeluruh dan lestari, teknologi digital twin ini berpotensi menjadi pemangkin transformasi dalam pemeliharaan warisan budaya, selaras dengan agenda pemuliharaan yang berorientasikan masa depan.*

Keywords: *Digital Twin, Pemuliharaan, Pendokumentasian, Bangunan Warisan*

Pengenalan

Warisan binaan memainkan peranan yang sangat penting dalam mengekalkan nilai seni bina, konteks sejarah dan identiti sesebuah masyarakat. Walau bagaimanapun, bangunan warisan ini semakin terancam oleh faktor semula jadi, pembangunan pesat, dan kekangan dalam pengurusan serta dokumentasi. Akta Warisan Kebangsaan 2005 (Akta 645) menyatakan, warisan didefinisikan sebagai sesuatu yang bernilai yang diwariskan daripada satu generasi ke satu generasi yang baru. Ia merangkumi adat resam, kebudayaan, kawasan, bangunan, bahan arkib dan cetakan termasuk penulisan buku dan makalah. Warisan kebudayaan merupakan aset yang bernilai kerana ia mempunyai nilai estetika, arkeologi, seni bina, budaya, sejarah, saintifik, sosial, spiritual, linguistik atau teknologi. Warisan kebudayaan ini meliputi semua pewarisan artifak yang berbentuk fizikal dan tidak ketara, iaitu yang tidak boleh disentuh dengan pancaindera. Seterusnya, bangunan warisan pula

membawa tafsiran kepada suatu bangunan atau kumpulan bangunan yang berasingan atau bersambungan yang disebabkan seni binanya, kehomogenan atau tempatnya dalam landskap, mempunyai nilai sejagat yang menonjol dari pandangan sejarah, seni atau sains garis (Negara, 2023). Bangunan warisan ini termasuk dalam kategori budaya ketara yang terdiri daripada beberapa jenis tipologi bangunan seperti kediaman, bangunan kolonial, bangunan keagamaan, rumah kedai dan bangunan awam. Menerusi kajian yang dijalankan oleh Mohd. Umazarulazijo (2015) mengenai pengurusan strategik dalam pemuliharaan bangunan warisan di George Town, telah dinyatakan bahawa ketidakberkesanan pelan pengurusan dan perancangan strategik yang menyeluruh bagi tujuan pemuliharaan bangunan dan kawasan warisan menjadi punca kepada kurangnya pendokumentasian dan pemuliharaan bangunan warisan. Maka, bagi melindungi bangunan-bangunan warisan ini daripada terus dimamah usia, kerja-kerja pemuliharaan dan pendokumentasian perlu dilaksanakan bagi memastikan reka bentuk dan ciri-ciri seni binanya terpelihara dan disimpan sebagai rujukan pada masa akan datang.

Kaedah pemuliharaan tradisional seringkali tidak mencukupi dalam menangani cabaran moden seperti perubahan iklim yang tidak menentu dan tekanan pembangunan yang pesat. Oleh itu, pendekatan teknologi yang mampu menyokong pemantauan, perancangan dan simulasi intervensi secara efisien sangat diperlukan untuk meningkatkan keberkesanan dalam usaha pemeliharaan bangunan warisan. Berlakunya perkembangan teknologi digital pada masa kini telah membuka ruang baharu dalam bidang pemuliharaan warisan, terutamanya melalui pendekatan inovatif seperti pengaplikasian teknologi digital twin. Digital twin, juga dikenali sebagai kembar digital, berasal daripada sektor kejuruteraan dan pembuatan. Ia merujuk kepada penciptaan model digital yang mencerminkan keadaan fizikal dan fungsional objek sebenar secara dinamik. Dalam konteks pemuliharaan warisan, teknologi ini berfungsi sebagai salinan digital yang sentiasa dikemas kini berdasarkan data masa nyata, membolehkan pihak berkepentingan membuat pemantauan secara berterusan terhadap bangunan, simulasi intervensi dan pengurusan maklumat secara bersepadu. Hal ini dapat membantu dalam membuat keputusan bagi kerja-kerja pemuliharaan berdasarkan maklumat yang tepat dan komprehensif. Makanya, pendokumentasian dan pemuliharaan bangunan warisan semestinya perlu mengadaptasikan teknik dan cara yang lebih inovatif supaya kerja pengumpulan data bangunan dapat diuruskan dengan baik bagi memastikan sebarang perubahan, pembaikan, penambahan atau perobohan bahagian aset dicatat dengan betul dalam usaha mengekalkan kesahihan aset (Mohd-Nor, Suhaimi, Usman, & Bukhori, 2022).

Oleh itu, kajian ini bertujuan untuk membentangkan suatu inisiatif awal untuk meneroka potensi pengintegrasian teknologi digital twin sebagai alat bantuan strategik dalam penambahbaikan amalan pemuliharaan bangunan warisan sedia ada. Tumpuan diberikan kepada konsep, prinsip dan proses pemuliharaan bangunan warisan, serta konsep, komponen, dan kelebihan digital twin dalam konteks pemuliharaan bangunan warisan. Melalui kajian ini juga, adalah menjadi harapan penyelidik agar ia dapat mencetuskan idea serta menjadi rujukan yang bermakna dalam usaha memulihara bangunan warisan negara dengan merujuk kepada kesinambungan norma yang telah dibentuk oleh masyarakat terdahulu. Ia kemudiannya diadaptasi oleh masyarakat kini mengikut garis masa dan konteks setempat.

Objektif Kajian

Oleh itu, untuk mencapai matlamat di atas, objektif berikut diketengahkan:

i. *Untuk memahami konsep, prinsip dan proses pemuliharaan bangunan warisan.*
ii. *Untuk mengenal pasti konsep, komponen, dan kelebihan digital twin dalam konteks pemuliharaan bangunan warisan.*
iii. *Untuk meneroka potensi pengintegrasian teknologi digital twin sebagai alat bantuan strategik dalam penambahbaikan amalan pemuliharaan bangunan warisan sedia ada.*

Metodologi

Kajian mengambil pendekatan tinjauan literatur yang komprehensif terhadap artikel akademik, laporan teknikal, garis panduan dan dokumen berkaitan pemuliharaan bangunan warisan dan penggunaan teknologi *digital twin*. Terdapat dua (2) tema utama bagi kajian ini. Tema yang pertama adalah pendokumentasian dan pemuliharaan bangunan warisan di mana aspek yang diberi tumpuan adalah konsep, prinsip dan proses dalam pemuliharaan bangunan warisan. Tema yang kedua ialah *digital twin,* merangkumi definisi, konsep, ciri-cirinya serta kelebihan pengaplikasian *digital twin* dalam pemuliharaan bangunan warisan. Kajian literatur merupakan satu kaedah kualitatif yang bertujuan untuk mengumpul, menganalisis dan mensintesis maklumat bagi mendapatkan pemahaman yang menyeluruh terhadap tema kajian. Sumber-sumber yang digunakan dalam kajian ini diperoleh daripada pelbagai pangkalan data akademik seperti *Scopus, Web of Science, Google Scholar* dan *Science Direct*. Pemilihan sumber dibuat berdasarkan kriteria seperti:

- Menggunakan kata kunci yang relevan dengan tajuk kajian seperti pemuliharaan, pendokumentasian, bangunan warisan, *digital twin*, teknologi, pemuliharaan digital.
- Tempoh masa penerbitan antara 2017 hingga 2025
- Bahasa penerbitan tidak terhad kepada Bahasa Melayu sahaja.
- Kebolehsahan akademik, iaitu artikel jurnal, prosiding persidangan, laporan teknikal, buku ilmiah dan garis panduan.

Kajian Literatur
Pendokumentasian dan Pemuliharaan Bangunan Warisan

Pendokumentasian dan pemuliharaan warisan seni bina biasanya datang dalam bentuk fizikal, yang memerlukan komitmen yang tinggi dari aspek masa, kos dan tenaga. Pendokumentasian dan pemuliharaan sesebuah bangunan warisan yang mempunyai nilai sejarah dan keaslian yang tinggi mestilah dikendalikan dengan sangat berhati-hati dan cermat supaya tiada sebarang kerosakan sepanjang prosedur tersebut dijalankan. Oleh itu, usaha untuk mendokumentasi dan memulihara warisan seni bina secara praktikal dianggap amat penting demi mengekalkan, melindungi dan menafsirkan warisan budaya dan bangunan (Noh, Sunar, & Pan, 2009). Dalam kebanyakan negara yang maju dan membangun, kesedaran untuk mengekalkan atau memelihara bangunan bersejarah ini terbentuk seiring dengan perkembangan penggunaan teknologi dalam pendokumentasian seni bina bangunan warisan.

Seperti yang dinyatakan oleh garis panduan Historic American Buildings Survey (HABS), metodologi dan proses untuk mendokumentasikan, sama ada struktur atau bangunan bersejarah, sudah ditakrif dalam garis panduan tersebut dan perlu dipatuhi. Ia telah menjadi sumber rujukan utama sejak tahun 1933. Bahagian yang sangat dititikberatkan dalam menghasilkan laporan lukisan terukur seni bina adalah untuk menganalisis dan "membaca" bentuk, profil bangunan serta struktur terperinci untuk didokumentasikan. Mereka percaya bahawa tiga komponen utama adalah contoh lengkap dan ideal untuk menghasilkan laporan HABS yang berkualiti, iaitu:

i. Set lukisan terukur
ii. Laporan sejarah bertulis
iii. Laporan fotografi dan video berformat besar

Konsep dan Prinsip Pemuliharaan Bangunan Warisan

Keunikan warisan Malaysia terdiri daripada koleksi yang kaya dengan kepelbagaian kaum, budaya dan alam semula jadi menerusi perjalanan peredaran masa yang sangat panjang dan luar biasa. Kerajaan Malaysia melalui Kementerian Pelancongan, Seni dan Budaya Malaysia (MOTAC) amat komited untuk melindungi, memulihara dan memelihara khazanah Warisan Negara. Melalui Akta Warisan Kebangsaan 2005, Jabatan Warisan Negara berupaya melindungi, memelihara dan mempromosikan warisan secara meluas, rekod masa lalu dan masa kini, demi memenuhi keperluan dan aspirasi generasi kini dan akan datang.

Berdasarkan Akta Warisan Kebangsaan 2005, pemuliharaan termasuklah dalam pemeliharaan, pembaikpulihan, pembinaan semula, pemulihan dan penyesuaian mana-mana gabungannya. Lanjutan daripada itu, Akta 645 menerangkan pada Bahagian II berkaitan dasar berhubung pemuliharaan dan pemeliharaan warisan iaitu Seksyen 3(1), Menteri mestilah memainkan peranan dalam mengeluarkan dasar, penyataan atau arahan mengenai apa-apa perkara, urusan, strategi atau pengendalian pemuliharaan dan pemeliharaan warisan. Manakala, Seksyen 3(2) menjelaskan Menteri tidak boleh menyediakan atau mengeluarkan apa-apa dasar, penyataan atau arahan di bawah subseksyen (1) jika perkara, urusan, strategi atau pengendalian pemuliharaan dan pemeliharaan warisan melibatkan kuasa atau bidang kuasa Negeri melainkan jika Pihak Berkuasa Negeri yang berkaitan telah dirunding. Maka, jelaslah bahawa penjagaan bangunan warisan di Malaysia ini amat dititikberatkan oleh pihak kuasa tempatan yang telah dipertanggungjawabkan seperti Jabatan Warisan Negara dan dilindungi oleh akta-akta dan peraturan yang tidak boleh dilanggar oleh sesiapa pun. Mana-mana pihak yang melanggar akta yang telah ditetapkan akan dikenakan tindakan yang sewajarnya mengikut undang-undang.

Paiman Keromo (2006), berpegang kepada prinsip yang sama digunapakai oleh Jabatan Warisan Negara seperti yang telah dinyatakan di dalam Akta Warisan Kebangsaan 2005. Konsep pemuliharaan yang diterapkan dan diaplikasikan sejagat ini ialah "Keaslian dalam Pemuliharaan Warisan" (Authenticity in Heritage Conservation), di mana keaslian merupakan nilai estetika sesebuah bangunan manakala etika adalah proses untuk memulihkan kembali pada keadaan asalnya. Dalam perspektif pemuliharaan bangunan warisan, etika lebih dititikberatkan berbanding estetikanya kerana tujuan utama bagi proses ini lebih kepada usaha pengembalian bangunan seperti sedia kala, oleh itu keindahan dan rupa paras bukanlah kayu ukurnya. Di peringkat kebangsaan, kebanyakan badan bukan

kerajaan (NGO) yang giat melakukan aktiviti pendokumentasian dan pemuliharaan bangunan warisan di Malaysia teguh berpegang kepada prinsip bahawa keaslian telah dikategorikan kepada empat elemen utama, iaitu:

i. Keaslian dari segi seni bina (design).
ii. Keaslian bahan-bahan binaan (material).
iii. Keaslian pembinaan dan penciptaan (workmanship).
iv. Keaslian teknik sama ada pemasangan atau pembuatannya (setting).

Dalam nada yang berbeza, A. Ghafar Ahmad (2006), berpendapat bahawa kerja pemuliharaan bangunan warisan yang berkesan bergantung kepada pengertian terhadap prinsip asas pemuliharaan dan beliau menggariskan empat prinsip asas yang mesti dituruti, iaitu:

i. Prinsip meminimumkan gangguan seperti membaik pulih hanya struktur dan fabrik bangunan warisan yang mengalami kerosakan sahaja dan tidak mengganggu bahagian yang masih dalam keadaan baik supaya dapat dipelihara keasliannya.
ii. Prinsip menjalankan kajian saintifik dan ujian makmal untuk menganalisis sifat dan bahan binaan serta tahap kerosakannya. Keputusan kajian saintifik dan ujian makmal dapat dijadikan bukti sokongan dalam membuat apa-apa keputusan mengenai kerja-kerja pemuliharaan bangunan warisan pada masa akan datang.
iii. Prinsip mendokumentasikan kerja pemuliharaan yang menjadi amalan penting kerja pemuliharaan kerana data dapat digunakan sebagai bahan rujukan bagi kerja pemuliharaan dan penyelenggaraan kelak.
iv. Prinsip mengaplikasikan kaedah pemuliharaan yang terbukti berkesan bagi memastikan setiap pendekatan pemuliharaan yang dilakukan tidak menjejaskan fizikal bangunan warisan yang sedang dipulihara.

Proses Pemuliharaan Bangunan Warisan

Berdasarkan Garis Panduan Pemuliharaan Warisan, proses pendokumentasian lukisan terukur dan pemuliharaan bangunan warisan akan menjalani 7 peringkat utama, iaitu: (i) Operasi bangunan warisan; (ii) Kajian awalan dan dokumentasi; (iii) Tinjauan dan kajian dilapidasi; (iv) Kerja pemuliharaan awalan; (v) Pelaksanaan kerja pemuliharaan; (vi) Penyeliaan dan pemantauan; dan (vii) Penyelenggaraan berterusan (Negara, 2023) (Yusoff & Brahim, 2021).

Peringkat pertama proses pemuliharaan adalah menjalankan operasi bangunan warisan, di mana bangunan warisan perlu didaftarkan secara rasmi dengan Jabatan Warisan Negara di bawah Akta Warisan Kebangsaan 2005 (Akta 645). Bangunan yang tersenarai ini akan diiktiraf sebagai aset warisan negara dan tertakluk kepada perlindungan khas. Peringkat kedua pula ialah kajian awalan dan dokumentasi yang melibatkan kerja-kerja penyelidikan dan penyiasatan bangunan dan tapak warisan dari segi sejarah, perkembangan bangunan dan kepentingan tapak. Menerusi aktiviti ini, kepentingan budaya bangunan yang diukur dan didokumentasi dapat dikenal pasti. Penilaian akan dibuat berdasarkan kepentingan budaya dengan merujuk seksyen 67(2), Akta Warisan Kebangsaan 2005. Setelah dikenal pasti tahap kepentingan bangunan, peringkat ketiga ialah melakukan kajian dilapidasi, iaitu

mengumpul maklumat mengenai faktor-faktor yang mempengaruhi masa depan bangunan dan tapak. Kajian ini bertujuan untuk menganalisis keadaan fizikal bangunan dan keperluan pemuliharaan, merujuk kepada bahagian tiga (3), Garis Panduan Dokumentasi (Negara, 2023).

Seterusnya, peringkat keempat ialah kerja pemuliharaan awalan di mana penyediaan pelan tindakan dilakukan. Setelah dikenal pasti tahap kerosakan dan cadangan kerja pemuliharaan, pelan tindakan yang mengandungi skop kerja dan kaedah pemuliharaan bangunan warisan disediakan mengikut spesifikasi terperinci bahannya. Spesifikasi terperinci bermaksud pendekatan dan prinsip kerja yang mesti dipatuhi dan diambil kira dalam pemuliharaan bangunan. Setelah skop kerja ditentukan dan dipersetujui, peringkat kelima adalah pelaksanaan kerja pemuliharaan oleh kontraktor B03 yang berdaftar dan terpilih. Kerja-kerja pemuliharaan di tapak dilaksanakan dengan dua (2) metodologi iaitu secara fizikal berpandukan kaedah kerja dan melalui dokumentasi bangunan tiga peringkat (lihat bahagian 3: Garis panduan Dokumentasi). Semua kerja-kerja fizikal sebagaimana dikehendaki dalam skop kerja mestilah diperincikan melalui tatacara (method statement) pemuliharaan dan mesti mendapat kelulusan pegawai penguasa JWN. Peringkat seterusnya adalah penyeliaan dan pemantauan, di mana kerja pemuliharaan akan diselia oleh JWN dan konservator untuk memastikan kualiti dan pematuhan kepada prinsip pemuliharaan. Akhir sekali, peringkat yang ketujuh adalah penyelenggaraan berterusan secara berkala oleh kontraktor yang dipilih dan akan dipantau oleh JWN. Penyelenggaraan berterusan adalah penting untuk memastikan bangunan warisan kekal dalam keadaan baik.



Rajah 1: Proses Pemuliharaan Bangunan Warisan di Malaysia
Sumber: Interpritasi daripada Garis Panduan Pemuliharaan Warisan (2023), Yusoff dan Brahim (2021)

Digital Twin

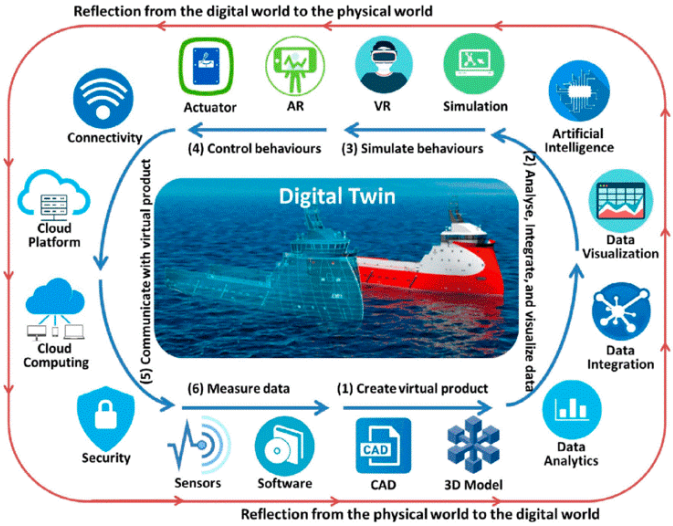
Konsep "kembar" ini telah diperkenalkan di bawah 'Program Angkasa Apollo' oleh *National Aeronautics and Space Administration* (NASA) pada tahun 1970-an (Chen, Videiro, & Guedes Soares, 2022). Istilah kembar digital atau *digital twin* ini digunakan pertama kali pada tahun 1997 merujuk kepada pengubahsuaian interaktif reka bentuk bandar menggunakan rangkaian jalan raya (Hernández & Hernandez, 1997). *Digital twin* merupakan perwakilan maya yang dinamik bagi objek atau sistem fizikal merentas kitaran hayatnya, menggunakan data masa nyata untuk membolehkan pemahaman, pembelajaran

dan pertimbangan (Eleftheriou & Anagnostopoulos, 2022). *Digital twin* telah diaplikasikan dalam pelbagai bidang seperti perubatan dan penjagaan kesihatan (Eleftheriou & Anagnostopoulos, 2022; Martinez-Velazquez, Gamez, & El Saddik, 2019), perancangan dan pengurusan bandar (Fan, Zhang, Yahja, & Mostafavi, 2021), pertanian (Monteiro, Barata, Veloso, Veloso, & Nunes, 2018), kejuruteraan bangunan (Khajavi, Motlagh, Jaribion, Werner, & Holmström, 2019), kejuruteraan automotif (Tao et al., 2019), kejuruteraan perlombongan dan tenaga (Lee, 2019) dan industri lain. Model *digital twin* ini digunakan secara asasnya untuk menganggarkan dan menyesuaikan tingkah laku objek sebenar dengan lebih baik melalui pengukuhan hubungan antara reka bentuk dan pelaksanaan. Pendekatan ini membolehkan ramalan serta pelarasan prestasi sebenar dilakukan melalui pemerolehan data, analisis dan simulasi.

Konsep dan Ciri-ciri Digital Twin

Digital twin menyepadukan beberapa teknologi dan sistem lain seperti *Internet of Things* (IoT), *Artificial Intelligence* (AI), dan *Big Data Analytics,* untuk mencipta replika aset fizikal yang tepat dan interaktif (Lucchi, 2023). Pelaksanaan *digital twin* merupakan suatu sistem yang kompleks dan memerlukan masa, kerana ia melibatkan pelbagai teknologi dan peralatan yang berfungsi secara bersepadu. Rajah di bawah menunjukkan kaedah pembinaan *digital twin* dengan menggunAkan pelbagai teknologi pemudah cara (Tao et al., 2019). Pada versi awalnya, model digital dibangunkan berdasarkan maklumat yang dimasukkan secara manual. Sebagai contoh, dalam model bangunan berasaskan Revit, tiada aliran data automatik antara objek fizikal dengan model digital. Dalam versi percubaan, bayangan digital (*digital shadow),* set data automatik diperkenalkan bagi menggambarkan secara intuitif keadaan semasa sistem fizikal, seperti penggunaan imej terma inframerah. Dalam versi tahap tertinggi *digital* twin, hubungan dinamik dua hala antara sistem fizikal dan model digital diwujudkan. Sebagai contoh, sistem amaran bencana boleh mengumpulkan data geologi dan meteorologi serta memberikan ramalan atau amaran berdasarkan analisis tersebut (Dang, Liu, Hong, Wang, & Chen, 2023). Dalam keadaan *digital twin* digunakan untuk menjejak, menganalisis dan meningkatkan prototaip fizikal, ia boleh dipecahkan kepada tiga peringkat (Ćosović & Maksimović, 2022):

- Lihat (see): Pelbagai pengesan dan peranti mengumpulkan data untuk menggambarkan keadaannya.
- Fikir (think): perisian pintar menilai data yang dikumpul dan jika masalah wujud, ia akan mengenal pasti pelbagai kemungkinan solusi bagi setiapnya.
- Lakukan (do): algoritma pintar memilih dan melaksanakan penyelesaian yang paling sesuai mengikut keadaan dan masalah yang dihadapinya.



Rajah 2: Kaedah Pembinaan *Digital Twin* dengan Menggunkan Pergabungan Pelbagai Teknologi

Sumber: Fei Tao, Fangyuan Sui, Ang Liu, Qinglin Qi, Meng Zhang, Boyang Song, Zirong Guo, Stephen C.-Y. Lu dan A. Y. C. Nee (2019)

Walaupun setiap jenis *digital twin* mempunyai fungsi khusus dan keupayaan mengikut tahap kecanggihan teknologi tersendiri, namun antara semuanya berkongsi ciri-ciri asas yang sama, seperti (Singh et al., 2021):

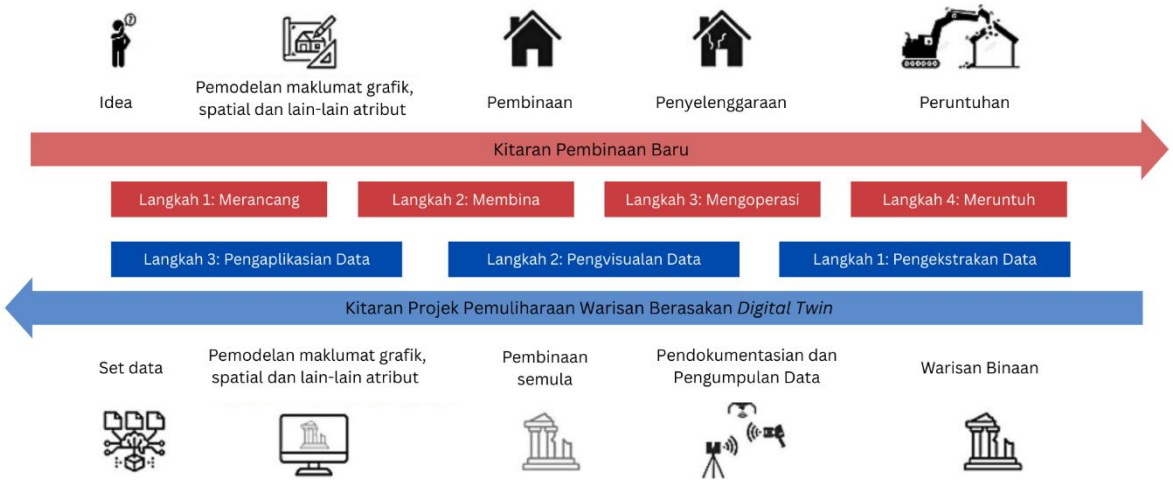
- Berketepatan tinggi: Perwakilan yang sangat tepat terhadap entiti fizikal, termasuk bentuk geometri, sifat fizikal, sistem serta peraturan operasi. Hal ini untuk memastikan model digital mencerminkan keadaan sebenar objek atau sistem fizikal.
- Dinamik: Dikemas kini secara berterusan selaras dengan perubahan pada sistem fizikal. Ini bermaksud terdapat hubungan dua hala yang aktif antara dunia nyata dan dunia maya.
- Penyesuaian dan pengoptimuman kendiri: Berupaya untuk menyesuaikan dirinya secara automatik berdasarkan data daripada pelbagai sumber, seperti mempelajari corak operasi, menyesuaikan parameter, dan mengoptimumkan prestasi sistem.
- Multiskala dan multifizikal: Mampu mewakili ciri-ciri objek fizikal pada pelbagai skala serta merangkumi pelbagai sifat fizikal. Ini membolehkan analisis menyeluruh dilakukan terhadap sistem kompleks yang melibatkan interaksi pelbagai domain kejuruteraan.
- Multidisiplin: Merupakan asas kepada pembangunan teknologi industri 4.0 kerana ia menggabungkan pelbagai bidang ilmu, termasuk teknologi maklumat dan komunikasi, sains komputer, kejuruteraan, pertanian dan sebagainya. Pendekatan ini membolehkan pembinaan sistem pintar yang integratif dan saling melengkapi.
- Bersifat hierarki: Setiap komponen atau bahagian dalam sesuatu produk akhir mempunyai model *digital twin* tersendiri membolehkan pemantauan dan analisis dilakukan dari peringkat mikro hingga makro.

Digital Twin dalam Pemuliharaan Warisan

Pengintegrasian teknologi dalam pemuliharaan bangunan warisan telah menjadi semakin penting, terutamanya di Malaysia, di mana mengekalkan struktur sejarah adalah amat dititikberatkan bagi memelihara identiti budaya. Antara teknologi baharu yang diilhamkan oleh sambungan tanpa wayar 6G pada masa kini ialah 'Replika Digital', juga dikenali sebagai *digital twin.* Dalam konteks pemuliharaan warisan, *digital twin* digunakan untuk mewakili tapak, bangunan, artifak warisan secara maya melalui gabungan teknologi seperti imbasan laser 3D, fotogrametri, pemodelan maklumat bangunan (BIM), dan sensor jarak jauh. *Digital twin* merupakan pengintegrasian pelbagai teknologi lain bagi membolehkan replika digital untuk memahami masa lalu, meramal masa hadapan dan memerhati keadaan masa nyata yang sedang berlaku (Correia, dos Santos Bartholo, Brufato, & Thomé Sanchez, 2023). Maka, *digital twin* boleh mereplikasikan atau meniru bangunan bersejarah, monumen dan tapak dalam bentuk digital bagi tujuan pemantauan jarak jauh pemuliharaan warisan. Dari aspek seni bina, *digital twin* terdiri daripada lima (5) komponen utama, iaitu:

i. **Model geometrik 3D**: Model digital yang dihasilkan melalui kaedah seperti imbasan laser 3D, fotogrametri, atau teknik pemodelan parametrik yang menggambarkan morfologi dan struktur fizikal entiti warisan secara tepat.
ii. **Pangkalan data sejarah dan material**: Mengandungi maklumat tentang latar belakang sejarah bangunan, bahan binaan asal, kaedah pembinaan tradisional, serta dokumentasi intervensi pemeliharaan terdahulu.
iii. **Data masa nyata**: Dikumpul melalui sensor atau sumber lain seperti pemantauan iklim mikro, pergerakan struktur, kelembapan, suhu, dan getaran, bagi tujuan pemantauan berterusan.
iv. **Sistem pemprosesan dan analisis data**: Termasuk algoritma simulasi dan ramalan, yang membolehkan penilaian terhadap impak perubahan persekitaran atau campur tangan pemuliharaan terhadap kestabilan struktur.
v. **Muka interaktif dan visualisasi**: Platform atau perisian yang membolehkan interaksi pelbagai pihak berkepentingan—termasuk penyelidik, konservator, dan pihak berkuasa—dalam meninjau, mengemas kini, dan menilai maklumat struktur secara maya.

Seperti yang dinyatakan dalam rajah di bawah, biasanya kitaran pembinaan baru bermula dengan dapatan idea dan perancangan, seterusnya pemodelan maklumat grafik, spatial dan lain-lain atribut yang direka bentuk oleh arkitek. Kemudian, kitaran diteruskan dengan pelaksanaan operasi pembinaan, penyelenggaraan dan diakhiri dengan peruntuhan apabila bangunan tidak selamat lagi untuk diduduki. Walau bagaimanapun, projek pemuliharaan bangunan warisan yang berorientasikan teknologi *digital twin*, bergerak dalam prosedur terbalik atau dikenali sebagai kejuruteraan terbalik, di mana tidak melalui fasa peruntuhan (Dang et al., 2023). Maka, proses ini dimulakan dengan pengekstrakan data melalui kaedah pengimbasan laser atau fotogrametri untuk mendapatkan model 3D ruang dan atribut lain yang diperlukan untuk mengesan sama ada berlakunya pengubahsuaian atau pembinaan semula yang tidak diketahui. Selepas itu, pengvisualan data dilakukan membolehkan interaksi pelbagai pihak berkepentingan, termasuk penyelidik, konservator, dan pihak berkuasa, dalam meninjau, mengemas kini, dan menilai maklumat struktur secara maya. Akhir sekali, barulah pengaplikasian data ke dalam sistem *digital twin* ini dilakukan.



Rajah 3: Perbezaan antara Kitaran Pembinaan Baru dan Kitaran Projek Pemuliharaan Bangunan Warisan Berasakan *Digital Twin*
Sumber: Tafsiran dari Xinyuan Dang, Wanqin Liu, Qingyuan Hong, Yibo Wang, Xuemin Chen (2023)

Kelebihan Digital Twin

Pengaplikasian sistem *digital twin* telah meningkat secara mendadak pada tahun-tahun lalu dalam industri serta akademik. Sistem *digital twin* ini boleh menggunakan banyak teknologi untuk membolehkan replika digital memahami masa lalu, meramalkan masa depan dan memerhati masa nyata (Correia et al., 2023). Penyepaduan *Digital Twin* dalam pemuliharaan warisan membawa pelbagai faedah kepada pihak berkepentingan dan masyarakat secara umumnya. Antaranya kepentingan penggunaan *digital twin* dalam konteks pemuliharaan bangunan adalah: (i) Pendokumentasian digital sebagai medium komunikasi multidisiplin (Rasheed, San, & Kvamsdal, 2020); (ii) Pemantauan dan penilaian masa nyata jarak jauh (Ćosović & Maksimović, 2022); (iii) Simulasi senario pemuliharaan dan pengurusan bencana (Gabellone, 2022); (iv) Peningkatan visualisasi dan penglibatan awam (Gabellone, 2022); dan (v) Pengurangan kos dan sisa (Singh et al., 2021).

i. Pendokumentasian digital sebagai medium komunikasi multidisiplin
Digital twin menawarkan kaedah yang paling canggih dan ke depan dalam penciptaan model digital bangunan warisan yang terperinci dan tepat sebagai satu usaha untuk memelihara maklumat dan seni binanya. *Digital twin* selalunya bermula dengan kerja-kerja pengumpulan data melalui kaedah pengimbasan laser 3D atau fotogrametri bagi mencipta perwakilan digital tepat sesebuah bangunan. Kaedah ini memastikan pendokumentasian bangunan yang tepat bagi butiran seperti ukiran, tekstur, bahan bangunan dan struktur geometri secara keseluruhan. Pembinaan *digital twin* memerlukan penyelerasan data merentasi beberapa perisian, pangkalan data, salinan fizikal dan sumber-sumber lain. Data yang disimpan secara digital ini menjadi sumber untuk pihak konservator, arkitek, ahli sejarah dan sebagainya untuk mengakses maklumat yang boleh dipercayai tanpa memerlukan sentuhan fizikal secara langsung dengan bangunan yang hendak dikaji. Oleh itu, ia boleh digunakan sebagai alat untuk pendokumentasian dan medium komunikasi kepada pihak berkepentingan yang merangkumi multidisiplin (Rasheed et al., 2020). Selain itu, *digital twin* boleh diperkaya dengan data sejarah

seperti pelan pembinaan asal, rekod pemuliharaan dan peristiwa bersejarah yang memberi kesan kepada bangunan. Data komprehensif ini memberikan pemahaman terperinci tentang evolusi bangunan dari semasa ke semasa.

ii. Pemantauan dan penilaian masa nyata jarak jauh

Digital twin membantu dalam pemantauan keadaan masa nyata atau secara langsung bangunan warisan, memberikan cerapan untuk pemuliharaan dalam bentuk pencegahan dan penyelenggaraan proaktif (Ćosović & Maksimović, 2022). *Digital twin* boleh menyepadukan data daripada pengesan IoT yang ditanamkan di dalam atau sekeliling bangunan. Pengesan ini mengukur pemboleh ubah seperti:

- Integriti struktur: Beban, getaran atau pergerakan yang mungkin menunjukkan kemerosotan struktur.
- Keadaan persekitaran: Kelembapan, suhu dan kualiti udara yang penting untuk memelihara bahan rapuh seperti kayu, cat atau batu.
- Pengesan retakan: Algoritma lanjutan boleh menjejaki perkembangan keretakan atau kelusuhan lain, memberikan amaran awal tentang potensi risiko struktur.

Dengan memantau keadaan ini secara langsung dan dari jarak jauh, pemuliharaan boleh bertindak balas terhadap isu yang berlaku sebelum ia menyebabkan kerosakan yang ketara dan susah untuk dibaiki semula. Selain itu, ia juga boleh menggunakan analisis ramalan untuk meramalkan kesan semula jadi keadaan persekitaran, bencana atau cuaca dari semasa ke semasa. Hal ini bermakna masalah yang berpotensi untuk berlaku dapat dikenal pasti dan ditangani terlebih dahulu sebelum ia menjadi lebih teruk. Oleh itu, langkah ini mampu memanjangkan hayat bangunan dan mengurangkan keperluan untuk pemulihan invasif.

iii. Simulasi senario pemuliharaan dan pengurusan bencana

Salah satu aspek yang paling berguna bagi *digital twin* dalam sektor pemuliharaan bangunan warisan adalah keupayaannya untuk menjalankan simulasi. Ia boleh menguji pelbagai strategi pemuliharaan yang dicadangkan bersesuaian dengan masalah yang dihadapi tanpa berinteraksi terus secara fizikal dengan bangunan (Gabellone, 2022). Ia juga memberi pemahaman tentang kesan bagi setiap pendekatan yang dicadangkan terhadap kerosakan atau penambahbaikan. Analisis perbandingan ini dapat meminimumkan kos dan mengurangkan risiko berlakunya kerosakan yang lebih teruk akibat pendekatan yang tidak sesuai dilakukan terhadap kerosakan mengikut sifat bahan asal bangunan yang hendak dibaik pulih.

Selain itu, *digital twin* berupaya untuk mensimulasikan cara bangunan tersebut akan bertindak balas terhadap perubahan dalam faktor persekitaran, cuaca atau bencana alam. Sebagai contoh, peningkatan paras laut, peningkatan kelembapan di kawasan pantai dan perubahan corak cuaca akibat perubahan iklim yang tidak menentu. Simulasi ini dapat membantu membangunkan pelan pemuliharaan jangka panjang yang lebih strategik bagi menghadapi cabaran dan ancaman alam sekitar pada masa akan datang.

iv. Peningkatan Visualasi dan Penglibatan Awam

Digital twin juga berfungsi sebagai medium pembelajaran bagi semua lapisan masyarakat, tidak kira orang awam atau pihak berkepentingan seperti penyelidik dan ahli konservator. Antaranya ialah (Gabellone, 2022):

- Lawatan maya (*visual tour)*: Tapak warisan boleh menawarkan lawatan maya yang interaktif dan menarik, membolehkan pelawat meneroka bangunan dari jauh, terutamanya bagi bangunan yang sudah tidak selamat untuk dikunjungi atau yang sedang menjalani proses pemulihan.
- Visualisasi Interaktif: Pakar, ahli sejarah dan arkitek boleh menggunakan *augmented reality* (AR) atau *virtual reality* (VR) untuk menggambarkan bangunan dalam konteks sejarah yang berbeza atau untuk mempamerkan pembinaan semula bahagian yang musnah atau diubah.
- Kolaborasi jarak jauh: Pakar di seluruh dunia boleh mengakses *digital twin* untuk tujuan mengkaji bangunan warisan dan bekerjasama dalam projek pemuliharaan tanpa hadir secara fizikal. Ia sangat berguna terutamanya bagi projek tapak warisan global yang diuruskan oleh organisasi antarabangsa.

Bangunan warisan boleh mengaplikasikan sistem *digital twin* ini bagi menawarkan pengalaman yang baharu dan lebih baik kepada pelawat melalui lawatan maya dan pameran interaktif ini. Hal ini bukan sahaja menjadikan warisan budaya lebih mudah diakses tetapi juga membantu dalam menarik minat lebih ramai orang awam terutamanya golongan muda. Ia dapat memastikan ilmu pengetahuan dan penghayatan sejarah dapat dikongsi bersama dan diteruskan kepada generasi akan datang.

v. Pengurangan kos dan sisa

Digital twin dibangunkan menggunakan sumber maya, maka kos prototaip dapat dikurangkan dalam jangka masa panjang (Singh et al., 2021). Dalam konteks pemuliharaan bangunan warisan, *digital twin* membolehkan simulasi dan ujian penyelenggaraan dalam sistem maya tanpa kos fizikal, termasuk simulasi kerosakan ekstrem seperti bencana alam atau degradasi bahan. Ia membolehkan pengenalpastian serta penghapusan secara maya terhadap semua risiko output yang berpotensi sebelum kerja pemuliharaan dilaksanakan. Hal ini dapat menjamin proses penyelenggaraan seperti yang dirancang tanpa sebarang gangguan atau kegagalan yang tidak dijangka. Pendekatan ini meminimumkan kos pembangunan dan mempercepatkan tempoh pelaksanaan, sekaligus memanjangkan jangka hayat struktur warisan serta mengurangkan pembaziran sumber dan bahan. Oleh itu, integrasi *digital twin* dalam pemuliharaan bangunan warisan bukan sahaja menjimatkan kos, malah menyokong kelestarian alam melalui pendekatan berasaskan data yang lebih tepat dan efisien.

Analisis dan Sintesis

Hasil daripada analisis literatur yang telah dibuat bagi kedua-dua tema, iaitu proses pendokumentasian dan pemuliharaan bangunan warisan serta pengintegrasian teknologi *digital twin* dalam pemuliharaan bangunan warisan, didapati bahawa teknologi *digital twin*

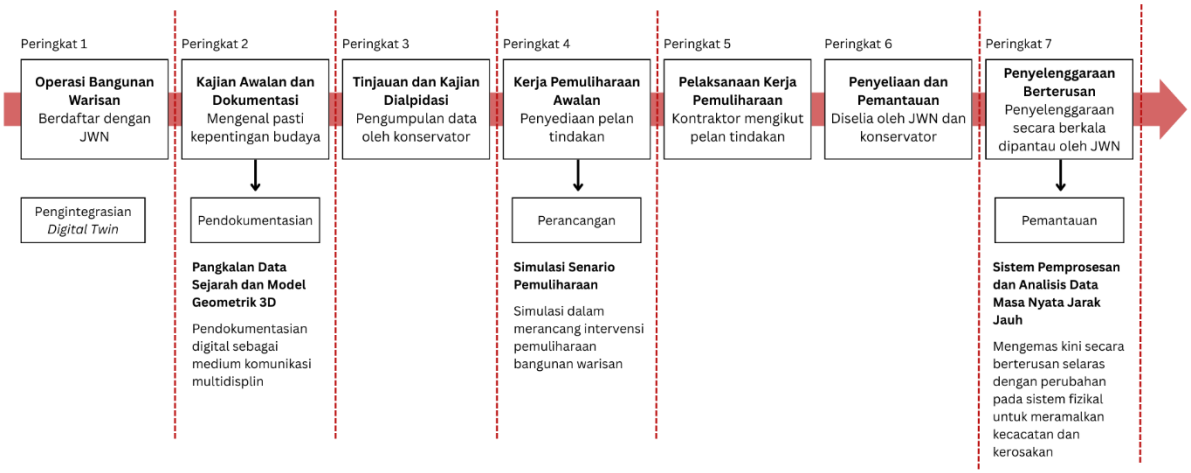
memainkan peranan yang signifikan dalam menambah baik pendekatan pemuliharaan bangunan warisan. Analisis menunjukkan bahawa, teknologi *digital twin* berpotensi untuk diaplikasikan semasa proses pemuliharaan bangunan warisan pada peringkat kedua, iaitu kajian awalan yang melibatkan aktiviti penyelidikan dan pendokumentasian bangunan warisan. *Digital twin* berfungsi sebagai repositori pintar yang menyepadukan data geometrik, latar belakang sejarah bangunan, bahan binaan asal, kaedah pembinaan tradisional, serta dokumentasi intervensi pemeliharaan terdahulu dalam satu sistem bersepadu untuk dijadikan sebagai rujukan pemuliharaan akan datang. Dokumentasi yang dihasilkan mampu menyokong kolaborasi multidisiplin, seperti konservator, jurutera, arkitek dan penyelidik, untuk mengakses serta menggunakannya dalam konteks pemuliharaan bangunan warisan kerana ciri teknologi *digital twin* yang multidisiplin dan berketepatan tinggi.

Selain itu, kebolehan teknologi *digital twin* dalam menjalankan simulasi dalam merancang intervensi pemuliharaan bangunan warisan yang lebih lestari dan tidak invasif dapat diaplikasikan pada peringkat keempat proses pemuliharaan bangunan warisan, iaitu kerja pemuliharaan awalan. Dalam proses ini, pelan tindakan akan disediakan, mengandungi skop kerja serta spesifikasi terperinci kaedah pemuliharaan yang akan dilaksanakan. Pemprosesan dan penganalisaan data bagi tujuan simulasi senario pemuliharaan serta ujian penyelenggaraan membolehkan penilaian terhadap impak perubahan persekitaran dan campur tangan pemuliharan sebelum tindakan itu dibuat pada struktur asal bangunan. Hal ini dapat mengurangkan kos, bahan binaan dan tenaga kerana ia mampu meminimumkan risiko daripada sebarang gangguan atau kegagalan yang tidak dijangka. Di samping itu, teknologi *digital twin* yang bersifat hierarki membolehkan pemantauan dan analisis dilakukan di peringkat mikro dan makro kerana setiap komponen atau bahagian dalam sesuatu produk akhir mempunyai model *digital twin* tersendiri.

Seterusnya, keupayaan teknologi *digital twin* dalam merekod data masa nyata dari jarak jauh memainkan peranan yang sangat besar sebagai alat sokongan strategik pada peringkat ketujuh proses pemuliharaan bangunan warisan, iaitu penyelenggaraan secara berterusan. Ketersediaan model digital yang berkait secara langsung dengan struktur fizikal membolehkan pemantauan berterusan terhadap kondisi bangunan, termasuk perubahan persekitaran yang boleh menjejaskan kestabilan dan integriti struktur bangunan warisan. Ciri dinamik yang ada pada *digital twin* berupaya untuk mengemas kini secara berterusan selaras dengan perubahan pada sistem fizikal. Ini bermaksud terdapat hubungan dua hala yang aktif antara dunia nyata dan dunia maya. Teknologi *digital twin* boleh meramalkan kecacatan dan kerosakan pada pelbagai fasa kitar hayat bangunan, sekali gus membolehkan penjadualan penyelenggaraan ramalan yang lebih tepat. Kerosakan dalam sistem dapat dikesan lebih awal hasil daripada analisis data masa nyata yang dikesan oleh sensor yang memantau keadaan fizikal bangunan. Tambahan lagi, ciri *digital twin* yang multiskala dan multifizikal mampu mewakili ciri-ciri objek fizikal pada pelbagai skala serta merangkumi pelbagai sifat fizikal. Ini membolehkan analisis menyeluruh dilakukan terhadap sistem kompleks yang melibatkan interaksi pelbagai domain kejuruteraan.

Akhir sekali, sintesis juga menunjukkan bahawa selain daripada membantu dalam proses pemuliharaan bangunan warisan, penggunaan *digital twin* juga berpotensi memperkukuhkan aspek pendidikan dan penglibatan umum melalui penciptaan model digital interaktif dan lawatan maya. Maklumat berkaitan struktur, sejarah, dan nilai warisan dapat disampaikan dengan lebih menarik dan mudah diakses oleh pelbagai lapisan

masyarakat, termasuk pelajar, pelancong dan komuniti setempat. Inisiatif ini tidak hanya berfungsi sebagai alat komunikasi visual, tetapi juga sebagai medium pendidikan yang membolehkan pengguna memahami proses pemuliharaan secara lebih mendalam, termasuk cabaran teknikal dan justifikasi intervensi konservasi yang dilakukan. Ini membuka ruang kepada kesedaran yang lebih luas tentang kepentingan pemuliharaan bangunan warisan dan memperkukuhkan hubungan masyarakat dengan sejarah mereka. Selain itu, interaktiviti dalam persekitaran maya juga membolehkan pelawat mengeksplorasi bangunan warisan dalam keadaan yang tidak membahayakan kelestarian fizikal tapak tersebut, sekaligus mengurangkan impak pelancongan massa terhadap integriti warisan.



Rajah 4: Pengintegrasian *Digital Twin* dalam Poses Pemuliharaan Bangunan Warisan

Sumber: Pengkaji (2025)

Kesimpulan

Teknologi *digital twin* menawarkan pendekatan revolusioner dalam pemuliharaan bangunan warisan dengan memperkukuhkan aspek dokumentasi, pemantauan, perancangan dan pengurusan warisan. Tahap kerosakan dan kecacatan bangunan bergantung kepada faktor umur, lokasi, ancaman alam sekitar, dan penyelenggaraan berkala yang memberi kesan secara langsung terhadap jangka hayat dan struktur bangunan. Oleh itu, kerja-kerja pemuliharaan bangunan warisan memerlukan pendekatan yang menyeluruh dan sistematik bagi memastikan tahap keaslian dan kepentingan bangunan warisan akan kekal dan terus dipelihara seterusnya memberi impak yang baik kepada masyarakat untuk diwarisi generasi akan datang. Penyelenggaraan secara berkala terhadap bangunan warisan ini, menyumbang kepada peningkatan terhadap kebolehan kolektif dan mengawal tindakan yang boleh menjejaskan harta pusaka. Dengan pendekatan yang komprehensif dan lestari, teknologi *digital twin* ini berpotensi menjadi pemangkin transformasi dalam pemeliharaan warisan budaya, selaras dengan agenda pemuliharaan yang berorientasikan masa depan.

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PENGAPLIKASIAN KECERDASAN BUATAN DALAM GURU PENDIDIKAN ISLAM

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Abstrak : Kajian ini dilakukan dengan bertujuan untuk mengkaji penggunaan aplikasi kecerdasan buatan (AI) dalam pengajaran guru Pendidikan Islam. Menurut trend perubahan dalam arena pendidikan global, penggunaan Kecerdasan Buatan (AI) semakin meluas. Ini bertujuan untuk meningkatkan proses pembelajaran dan pengajaran agar lebih efektif. Penggunaan AI dalam pengajaran juga membuka peluang-peluang untuk meningkatkan kualiti pendidikan, menjadikan pembelajaran lebih adaptif, dan menyediakan generasi muda untuk menghadapi cabaran-cabaran di masa depan. Di Malaysia, masih ramai guru mempunyai kesukaran dalam merancang pembelajaran yang menarik serta kekurangan dalam Kemahiran penggunaan AI. Selain itu, strategi pengajaran yang kurang berkesan dan tidak menyokong kaedah pembelajaran terbeza menyebabkan meningkatkan kadar pembelajaran murid. Kertas konsep ini menggunakan kajian kepustakaan melalui analisis daripada kajian-kajian lepas. Kertas konsep ini juga menjelaskan konsep elemen AI dalam membantu memudahkan pencarian maklumat dan cabaran guru Pendidikan Islam dalam penerapan penggunaan AI. Kertas konsep ini adalah salah satu usaha untuk meningkatkan mutu kualiti pengajaran dalam proses PdPc. Hasilnya mendapati guru perlu berusaha menambah kepakaran dalam kreativiti menghasikan PdPc yang berkesan. Oleh itu, perubahan yang berlaku dalam pendidikan mengikuti arus semasa.

Pengenalan

Penggunaan kecerdasan buatan (AI) dalam bidang pendidikan membuka peluang dan ruang yang luas kepada tenaga pengajar untuk menjadikan proses pembelajaran lebih lancar, interaktif, dan menarik. Menurut Pensyarah Kanan Fakulti Sains Data dan Komputeran, Universiti Malaysia Kelantan (UMK), Dr. Fakhitah Ridzuan, AI dapat membantu pensyarah dalam penyediaan bahan pengajaran yang lebih interaktif serta mencadangkan aktiviti sokongan yang boleh meningkatkan keberkesanan penyampaian (Astro Awani,2024). Selain mempermudah tugas pensyarah dalam penyusunan dan penyampaian kandungan, AI juga berperanan dalam membantu pelajar memahami pembelajaran dengan lebih baik melalui penyesuaian kaedah penyampaian mengikut keperluan individu mereka.

Perkembangan pesat teknologi, khususnya dalam bidang Kecerdasan Buatan (Artificial Intelligence, AI), telah membawa perubahan signifikan dalam pelbagai sektor, termasuk pendidikan. Dalam konteks pendidikan Islam, AI menawarkan peluang untuk meningkatkan kualiti pengajaran dan pembelajaran melalui pendekatan yang lebih interaktif, personalisasi, dan berkesan. Aplikasi kecerdasan buatan memberikan keupayaan berfikir seperti manusia (Iqzuan Samsudin et al. ,2021)

Penggunaan AI yang berkonsepkan teknologi yang mampu mewujudkan persekitaran secara simulasi berjaya dengan memberi pengalaman yang menyeronokkan dapat memberi peluang kepada pengguna menerokai sesuatu yang nyata(Gonz, 2020). Pernyataan ini menunjukkan penggunaan AI yang berkesan mampu memberikan pengalaman dengan

simulasi yang berkesan. Ini mewujudkan pembelajaran yang bermakna kepada semua murid serta sangat menyokong kepada pembelajaran terbeza. Dengan adanya AI, aplikasi ini boleh guru sebagai perancang, pengawal, pembimbing, pendorong serta penilai dengan lebih berkesan serta memanfaatkan semua murid.

Tambahan lagi, pendidikan masa kini semakin menekankan elemen kreativiti kerana kepentingannya sebagai aset utama dalam pembangunan modal insan. Seiring dengan perkembangan teknologi, kecerdasan buatan (AI) dapat dimanfaatkan dalam Pembelajaran dan Pemudahcaraan (PdPc) bagi menyokong pelaksanaan Pembelajaran Abad Ke-21 (PAK21) di peringkat sekolah. Guru, sebagai tunjang utama dalam sistem pendidikan, boleh menggunakan AI untuk merancang aktiviti pembelajaran yang lebih interaktif dan inovatif, sekaligus menggalakkan kreativiti dalam kalangan pelajar. Kesimpulannya, amalan kreativiti yang diterapkan oleh guru, dengan bantuan AI, perlu dihayati dan diaplikasikan bagi memastikan generasi alaf mendatang dibekalkan dengan pengetahuan, kemahiran, dan nilai-nilai yang relevan dengan cabaran serta keperluan abad ke-21 (Kementerian Pendidikan Malaysia, 2012).

Dalam era Revolusi Industri 4.0, teknologi kecerdasan buatan (AI) semakin memainkan peranan penting dalam pelbagai sektor, termasuk pendidikan. AI telah membuktikan keupayaannya untuk meningkatkan kualiti pengajaran dan pembelajaran melalui pendekatan yang lebih interaktif, personalisasi kandungan, dan pengurusan masa
yang lebih efisien. Walau bagaimanapun, dalam konteks pendidikan Islam, integrasi teknologi ini masih berada pada tahap permulaan dan menghadapi pelbagai cabaran. Di samping, AI berpotensi untuk membantu dalam perkembangan pelajar dan menjadikan pengajaran lebih memuaskan (Shamdi et al., 2022). Selain itu, guru juga boleh menggunakan AI untuk meningkatkan amalan pengajaran dan pengalaman profesional mereka (Muttaqin, 2023)

Sebagai pendidik yang berperanan membentuk sahsiah dan akhlak pelajar berdasarkan prinsip Islam, meskipun guru Pendidikan Islam menghadapi cabaran untuk mengekalkan keaslian nilai-nilai Islam sambil memanfaatkan teknologi modern. Selain itu, guru juga boleh menggunakan AI untuk meningkatkan amalan pengajaran dan pengalaman profesional mereka (Karim & Sugianto, 2023) Namun,terdapat kebimbangan sama ada penggunaan AI dalam pengajaran dapat disesuaikan dengan keperluan syariah, khususnya dalam menyampaikan nilai dan kefahaman Islam yang mendalam. Selain itu, tahap kesediaan guru Pendidikan Islam terhadap penggunaan AI juga menjadi isu, memandangkan keterbatasan kemahiran teknologi dalam kalangan sebahagian pendidik.

Justeru, kajian lepas menunjukkan potensi AI untuk menyokong tugas guru, namun terdapat jurang pengetahuan yang signifikan dalam memahami bagaimana teknologi ini dapat diintegrasikan secara efektif dalam pengajaran Pendidikan Islam. Kekurangan panduan yang jelas mengenai penggunaan AI dalam konteks Islam juga menyukarkan usaha untuk memastikan kesesuaian dan keberkesanan teknologi ini.

Oleh itu, kajian ini bertujuan untuk memahami bagaimana AI boleh digunakan oleh guru Pendidikan Islam dalam proses pengajaran dan pembelajaran, mengenal pasti cabaran yang dihadapi, serta mengusulkan pendekatan yang sesuai untuk mengintegrasikan teknologi ini dalam sistem pendidikan berlandaskan nilai Islam. Di samping itu juga, pengkaji ingin melihat peranan AI dapat meningkatkan keberkesanan pengajaran dalam subjek Pendidikan

Islam di sekolah-sekolah.

Konsep Kecerdasan Buatan Dalam Pendidikan Islam

Kecerdasan Buatan atau lebih dikenali sebagai Artificial Intelligence atau AI ini merujuk kepada kebolehan mesin atau sistem komputer yang dicipta untuk melaksanakan tugas-tugas yang biasanya dilakukan oleh manusia seperti menyelesaikan masalah dan mencari maklumat. AI merupakan satu teknologi pintar yang dicipta untuk meniru kepandaian manusia. (John McCarthy, 1956) (Vijay Kanade, 2022). AI juga dapat didefinisikan dengan kemampuan komputer dan robot untuk melakukan tugasan yang biasa dikaitkan dengan kebijaksanaan serta kecerdasan manusia seperti memberikan alasan, mendefinisikan sesuatu serta belajar dari pengalaman (B.J. Copeland, 2024). Keupayaan sesuatu mesin untuk menjadikan kebijaksanaan sebagai karakternya dan keupayaan ini dibahagikan kepada tiga kategori dan jenis kebijaksanaan. (Anirudh V K, 2022).

Berdasarkan definisi tersebut, kecerdasan buatan tidak terbatas pada kecerdasan manusia, tetapi juga diterapkan pada alat atau sistem. Oleh karena itu, kecerdasan buatan adalah kemampuan suatu alat atau sistem untuk beradaptasi dan mencapai tujuan tertentu dalam lingkungan yang dapat mempengaruhi perilaku sistem tersebut (Rozaq, 2019).

Para pakar terus mengembangkan teknologi kecerdasan buatan (AI) agar dapat mengalami kemajuan pesat. H. A. Simon berpendapat bahwa AI memungkinkan komputer melaksanakan tugas dengan lebih baik dibandingkan manusia. Knight dan Rich sejalan dengan pandangan tersebut, menyatakan bahwa AI merupakan cabang ilmu komputer yang memungkinkan mesin menyelesaikan tugas-tugas yang umumnya dilakukan manusia, bahkan dengan tingkat keunggulan lebih tinggi. Pengembangan AI bertujuan untuk menciptakan perangkat lunak atau robot yang dapat membantu manusia dalam aktivitas sehari-hari. Kehadiran teknologi ini diharapkan membuat mesin semakin cerdas, sehingga mampu menyelesaikan permasalahan kompleks, seperti pengembangan kalkulator pintar dengan kecepatan perhitungan yang tinggi (Kirana, Asbari, & Rusdita, 2024).

Artificial Intelligence (AI) adalah bidang ilmu yang berfokus pada pengembangan sistem dan komputer yang mampu menjalankan tugas-tugas yang sebelumnya lebih efektif dilakukan oleh manusia. Dalam AI, komputer dirancang agar memiliki kecerdasan yang menyerupai manusia, termasuk dalam memahami bahasa, berpikir, menganalisis informasi, bernalar, menyelesaikan masalah, dan mengambil keputusan (Manap & Abdullah, 2020). Sebagai salah satu cabang ilmu komputer, AI mempelajari bagaimana membangun sistem yang dapat meniru kecerdasan manusia dalam berbagai aspek. AI merupakan bidang penelitian yang terus berkembang dalam kajian ilmu komputer.

Dalam pendidikan Islam, AI juga boleh memberi impak positif yang ketara (Hotimah, 2024; Susanti et al., 2024). Dengan memanfaatkan teknologi ini, institusi pendidikan Islam dapat membangunkan kurikulum yang lebih responsif dan relevan dengan keperluan pelajar. Contohnya, aplikasi berasaskan AI boleh membantu dalam menyampaikan bahan pengajaran yang lebih menarik dan interaktif, seperti pengajaran melalui simulasi atau permainan pendidikan yang mengajar nilai-nilai Islam. Di samping itu, AI boleh digunakan untuk menyediakan sebagai panduan, yang memberi perhatian kepada aspek rohani dan akademik pelajar secara serentak. Ini selaras dengan matlamat pendidikan Islam yang bukan sahaja tertumpu kepada aspek kognitif tetapi juga kepada pembangunan sahsiah dan

akhlak pelajar. Oleh itu, integrasi AI dalam pendidikan Islam boleh menyediakan penyelesaian inovatif yang menyokong penyampaian pendidikan yang lebih berkesan dan inklusif ("Kecerdasan Buatan: Inisiatif Strategik Kebangsaan,"2020; Gómez-Caicedo et al., 2022). Oleh itu, kecerdasan buatan dalam pendidikan islam sangat membantu guru di dalam proses pembelajaran dan pembelajaran dengan lebih lancar.

Kecerdasan Buatan Menurut Perspektif Islam

Bagi pelajar yang mengambil jurusan yang melibatkan al-Quran dan Hadith, sumber rujukan al-Quran dan Hadith merupakan sumber utama yang akan menjadi rujukan dalam pengajaran dan pembelajaran. Sumber rujukan bagi al-Quran dan Hadith mestilah sumber-sumber yang shahih sahaja. Hal ini kerana, al-Quran dan Hadith merupakan sumber rujukan utama bagi umat Islam. Dalam era digital kini, penggunaan AI dalam mempelajari al-Quran dan Hadith banyak kelebihannya antaranya ialah, dapat menyemak bacaan, dapat mengetahui tafsiran ayat sama ada al-Quran mahupun Hadith, serta banyak lagi. (Dr. Zulkifli Mohamad al-Bakri, 2023). Sebagai contoh, sebelum adanya AI, untuk menyemak bacaan al-Quran kita perlu mengikuti kelas pengajian al-quran atau mengikuti program al-Quran yang dianjurkan sebagai contoh Tahsin Al-Quran dan tadabbur Al-Quran tetapi pada masa kini, kita hanya perlu menggunakan AI untuk menyemak bacaan kita.

AI akan memperbetulkan bacaan kita kepada bacaan yang betul dengan menggunakan perisian yang ada di dalam AI sebagai contoh aplikasi *Think Quran*. (Siti Noor Faezah Muda, 2024). Contoh lain pula, ketika kita menerima satu hadith daripada media sosial atau mana-mana platform digital, kita boleh menyemak kesahihan hadith tersebut sebelum menyebarkannya kepada orang lain dengan menggunakan aplikasi semakhadis.com. Semakan ini adalah secara percuma dan sesiapa sahaja boleh melakukannya. Namun, orang ramai masih memerlukan rujukan yang sebenarnya daripada para professional untuk mengelakkan berlaku khilaf serta kecacatan semasa membaca Al-Quran.

Selain itu, kemajuan AI telah mempercepat dan menyederhanakan proses pencarian informasi. Sebelum wujudnya aplikasi ini, seseorang yang ingin memperoleh informasi harus pergi ke perpustakaan dan menghabiskan waktu berjam-jam membaca berbagai buku untuk mendapatkan rujukan. Namun, dengan perkembangan teknologi yang semakin canggih, pencarian informasi kini menjadi jauh lebih efisien. Maka terhasil AI yang berperanan dalam membantu manusia.

Penggunaan AI juga sangat mudah dengan cara sesiapa yang hanya tinggal memberikan arahan tertentu. Setelah menerima perintah, sistem AI akan mulai mengolah data dan memberikan hasil yang diinginkan. AI melakukan pencarian dengan menggunakan algoritma canggih, analisis data, serta teknik pemrosesan informasi lainnya (Vijay Kanade, 2022). Proses ini berlangsung dengan sangat cepat, hanya membutuhkan sekitar 10 detik untuk menghasilkan informasi yang dibutuhkan.

Seterusnya, dalam bidang pengajian Al-Quran dan Hadis, AI menyediakan referensi yang luas, sehingga memudahkan pencarian berbagai informasi keislaman. Justeru, beberapa aplikasi berbasis AI yang dapat dimanfaatkan untuk mencari informasi terkait Al-Quran dan Hadis antara lain seperti Quran.com, semakhadis.com dan *The Noor*. Aplikasi ini percuma dan dapat mudah diakses oleh siapa saja tidak kira tempat dan walau berada di mana sahaja. Selain itu, AI juga berperanan dalam memberikan pemahaman yang lebih

mendalam serta membantu menjawab pertanyaan kompleks seputar al-Quran dan Hadis (Sandi Ferdy Yulianto, 2023). Maka, aplikasi ini mampu mengajar manusia untuk lebih memahami agama dan mudah dibawa kemana sahaja.

Peranan Kecerdasan Buatan Dalam Pendidikan Islam

Pada era digital ini, kecerdasan buatan (AI) telah menjadi salah satu teknologi yang semakin banyak dimanfaatkan, terutama dalam bidang pendidikan. Seiring dengan kemajuan teknologi, metode pengajaran dan pembelajaran turut mengalami perubahan. Pada waktu itu, proses pembelajaran lebih bersifat konvensional, di mana peranan guru lebih dominan dibandingkan pelajar (Nahzatul Akma, n.d.). Dalam sistem tradisional ini, guru menyampaikan pelajaran di depan kelas, sementara pelajar hanya mendengar dan menerima informasi hingga sesi pembelajaran selesai. Berbeza dengan sekarang guru hanya menjadi pembimbing atau fasilitator dan murid menjadi tumpuan utama di dalam kelas.

Kecerdasan buatan (AI) dalam pendidikan menawarkan pelbagai peranan, namun terdapat juga cabaran yang perlu diambil kira. Antara kelebihannya, AI dapat meningkatkan keberkesanan pembelajaran dengan menyesuaikan kandungan mengikut tahap keupayaan pelajar, selain memberikan maklum balas serta penilaian yang bersifat peribadi berdasarkan keperluan, keutamaan, dan perkembangan individu (Asiah, 2024). Penggunaan AI dalam pendidikan juga membolehkan pendidik memantau kemajuan pelajar secara lebih mendalam melalui analisis data, sekaligus menawarkan pengalaman pembelajaran yang lebih bersesuaian dengan keperluan mereka (Ahmad et al., 2021). Selain itu, AI berupaya meningkatkan kecekapan dan aksesibiliti pendidikan dengan mengutamakan tugas-tugas seperti penggredan, penjadualan, dan penjanaan bahan pembelajaran, membolehkan pelajar belajar pada bila-bila masa dan di mana sahaja tanpa batasan lokasi, zon waktu, atau jenis peranti yang digunakan. Tambahan pula, AI turut menyokong kepelbagaian dan inklusiviti dalam pendidikan dengan membantu pelajar berkeperluan khas, termasuk mereka yang mempunyai kecacatan, kesukaran pembelajaran, atau halangan bahasa, melalui penyediaan kandungan serta pendekatan pengajaran yang lebih mesra budaya dan linguistik.

Namun, penerapan AI dalam pendidikan turut membawa pelbagai cabaran yang perlu diberi perhatian, termasuk aspek etika, sosial, teknikal, dan pedagogi. Dari segi etika, timbul kebimbangan mengenai privasi, keselamatan, bias, dan akauntabiliti, memandangkan AI berfungsi dengan mengumpul, menyimpan, dan menganalisis data peribadi dalam jumlah yang besar. Ini berisiko terhadap pelanggaran data, penyalahgunaan, atau manipulasi, selain berpotensi mengukuhkan ketidaksamaan atau prasangka yang sedia ada. Dari sudut sosial, AI boleh mempengaruhi hubungan antara guru dan pelajar, serta memberi kesan kepada nilai, emosi, motivasi, dan kesejahteraan dalam persekitaran pembelajaran. Cabaran teknikal pula melibatkan isu kebolehpercayaan, ketepatan, dan kesahan sistem AI, kerana teknologi ini tidak terlepas daripada kesilapan atau keterbatasan tertentu, yang memerlukan pemantauan serta penyelenggaraan berterusan. Dari perspektif pedagogi, integrasi AI dalam pendidikan memerlukan keselarasan dengan kurikulum, objektif pembelajaran, serta kaedah penilaian yang sesuai (Dr.Asiah, 2024). Selain itu, pendidik dan pelajar perlu menguasai kemahiran serta literasi digital yang relevan bagi memastikan penggunaan AI dapat dimanfaatkan secara optimal dalam pembelajaran.

Justeru, dengan perkembangan teknologi, sistem pendidikan kini lebih berorientasikan

teknologi dan interaktif. Proses pengajaran dan pembelajaran semakin melibatkan komunikasi dua hala antara guru dan murid. Guru kini dapat memanfaatkan alat bantu pembelajaran berbasis teknologi seperti animasi, audio, serta permainan interaktif untuk menarik minat pelajar agar lebih aktif dalam kelas (Ani Omar, 2016).

Penerapan AI dalam pendidikan juga membawa perubahan signifikan dalam cara pelajar memperoleh pengetahuan (Norazlina Abdullah, et.al, 2020). AI memungkinkan pelajar untuk bertanya tanpa rasa malu, sehingga mereka dapat lebih mudah memahami materi yang diajarkan. Selain itu, AI dapat menyajikan berbagai informasi yang relevan berdasarkan pencarian yang dilakukan, sehingga memperkaya wawasan dan sudut pandang pelajar dalam memahami suatu topik.

Dalam konteks pengajaran al-Quran dan Hadis, AI turut memainkan peranan penting dalam meningkatkan interaksi antara guru dan pelajar. Pelajar dapat mengajukan lebih banyak pertanyaan mengenai al-Quran dan Hadis guna memastikan pemahaman mereka sesuai dengan ajaran yang benar dan tidak menyimpang. AI memudahkan pencarian maklumat berkaitan al-Quran dan Hadis, memperkayakan pengajaran dan pembelajaran, serta menyediakan suasana pembelajaran yang interaktif dan menarik. Melalui penggunaan teknologi AI, proses pengajaran dan pembelajaran menjadi lebih mudah, efisien, dan dapat diakses oleh lebih ramai individu tanpa mengira masa dan tempat. Hal ini membuka peluang baru dalam memperluas pengetahuan agama Islam dan meningkatkan pemahaman serta penghayatan terhadap teks al-Quran dan Hadis bagi pelajar dan masyarakat umum.

Cabaran Pengaplikasian Kecerdasan Buatan Dalam Pendidikan Islam

Kebolehgunaan aplikasi

Cabaran luaran ialah isu-isu yang terhasil daripada unsur-unsur luar yang menyukarkan guru untuk melaksanakan pembelajaran berunsurkan AI dalam PdP Pendidikan Islam. Hasilnya, guru-guru menghadapi masalah untuk mengubah kaedah pengajaran.Cabaran yang utama ialah dari sudut kebolehgunaan aplikasi bagi tujuan pengajaran dan pembelajaran. Pertama sekali, cabaran yang dihadapi oleh guru ialah dari sudut kebolehgunaan penaksiran. Walaupun dunia teknologi semakin canggih dengan kemunculan aplikasi AI, namun sistem penaksiran masih tidak dapat digunakan sepenuhnya bagi menaksir murid. Aplikasi-aplikasi tersebut masih terhad dalam membantu guru menilai murid bagi soalan-soalan yang diberikan. Pembelajaran berasaskan AI sahaja tidak mencukupi untuk membentuk murid secara menyeluruh. Peranan guru dalam memberikan bimbingan serta menerapkan nilai tetap diperlukan bagi memastikan perkembangan sahsiah dan keperibadian murid berlangsung dengan baik (Isman, 2024). Guru masih memainkan peranan penting dalam mendidik aspek moral dan nilai bagi mencapai objektif pembelajaran yang telah ditetapkan. Khususnya dalam mata pelajaran Pendidikan Islam, proses pentarbiyahan dan bimbingan secara langsung amat diperlukan, terutama dalam pengajaran al-Quran dan Jawi, yang memerlukan pendekatan berasaskan pemahaman mendalam serta amalan berterusan.

Di samping itu, kajian mengenai potensi dan aplikasi AI dalam pendidikan turut menimbulkan kebimbangan terhadap pelbagai isu etika, yang menjadi perhatian dalam kalangan pengkaji dan pengamal AI (Johnson & Verdicchio, 2019; Isman, 2024). Sebagai contoh, penggunaan aplikasi seperti Chat GPT oleh murid untuk tujuan rujukan boleh meningkatkan risiko berlakunya plagiat serta menyukarkan pengesahan sumber maklumat,

terutamanya dalam bidang Pendidikan Islam, yang memerlukan rujukan yang sahih dan berautoriti.

Jurang Digital

Selain itu, cabaran luaran seperti jurang digital turut menjadi isu utama yang dihadapi oleh Guru Pendidikan Islam (GPI) dalam melaksanakan Pengajaran dan Pembelajaran (PdP) berasaskan aplikasi AI. Salah satu faktor utama yang menyumbang kepada penggunaan pendidikan digital yang terhad adalah kekurangan infrastruktur yang lengkap di sekolah-sekolah luar bandar, yang menyukarkan pelaksanaan teknologi digital dalam pembelajaran. Jurang digital antara sekolah di Malaysia bukanlah perkara baharu, malah telah lama menjadi perbincangan hangat. Ketiadaan peranti yang mencukupi, masalah akses Internet, serta kekurangan sumber lain turut menjadi penghalang dalam usaha memperkasakan pendidikan digital (Noor Hadzlida et al., 2021).

Dari sudut lain, isu ini juga berpunca daripada kekangan kewangan pihak kerajaan, yang tidak mampu menyediakan LCD bagi setiap kelas di sekolah-sekolah di Malaysia (Subban et al., 2022). Tidak semua sekolah dilengkapi dengan Smart TV atau LCD di setiap bilik darjah, dan kebanyakannya hanya bergantung pada makmal komputer sebagai ruang utama untuk menjalankan pembelajaran digital. Selain itu, terdapat sekolah yang menyediakan bilik khas seperti bilik APD, SPA, dan ICT, namun penggunaannya terhad kerana perlu bergilir-gilir antara guru.

Jika sekolah-sekolah rendah terus berdepan dengan kekurangan infrastruktur digital, situasi ini akan berpanjangan dan menghalang penyebaran ilmu berkaitan teknologi serta AI dalam kalangan guru. Keterbatasan peralatan digital bukan sahaja menyukarkan proses pembelajaran, malah memaksa guru-guru yang ingin menggunakan aplikasi digital dan AI untuk mengeluarkan wang sendiri bagi mendapatkan peralatan yang diperlukan. Maka, guru juga perlu mahir dalam penggunaan kecerdasan buatan untuk memastikan pelajar lebih cakna terhadap teknologi yang semakin canggih.

Kesimpulan

Kesimpulannya, kajian ini cuba untuk melihat sejauh mana peranan AI dalam meningkatkan keberkesanan pengajaran dan cabaran serta langkah penyelesaian dalam penggunaan AI oleh guru Pendidikan Islam. Berdasarkan pada pandangan di atas, masih belum ada kajian khusus yang menunjukkan keberkesanan dan cabaran guru Pendidikan Islam dalam penggunaan AI. Kajian yang lepas hanya menunjukkan kepada penggunaan AI sahaja, tidak khusus kepada guru lebih secara umum. Penggunaan aplikasi AI amat berkait rapat dengan aplikasi digital yang biasa digunakan oleh para guru. Sedar atau tidak, mereka telah menggunakan fungsi Artificial Intelligence sejak sekian lama. Perbezaan aplikasi AI dalam pendidikan dengan AI yang umum ialah aplikasi AI dalam pendidikan ini bukan bertujuan untuk mempromosikan penggunaan AI tetapi untuk menyokong pelaksanaan sistem pendidikan (Samsudin et. al, 2023). Penerapan aplikasi AI dalam bidang pendidikan memberikan peluang yang lebih luas kepada guru untuk berkreativiti serta mempermudah proses pengajaran dan pembelajaran. Walau bagaimanapun, masih terdapat cabaran, sama ada dari segi dalaman atau luaran, yang boleh menjejaskan para pendidik dalam jangka panjang sekiranya tidak ditangani dengan berkesan. Jadi, kajian ini cuba untuk melihat pemahaman guru Pendidikan Islam tentang penggunaan AI dalam

bidang Pendidikan. Di samping itu, semua guru Pendidikan Islam mestilah berganding bahu dalam menerapkan elemen kreativiti dalam pembelajaran abad ke-21 di samping menyuburkan nilai-nilai murni dalam diri murid. Tambahan lagi, guru Pendidikan Islam juga perlu peka terhadap perubahan yang berlaku serta berusaha menambah kemahiran diri dalam pelbagai aspek. Maka, jelas sekali peri pentingnya peranan guru Pendidikan dalam usaha meningkatkan mutu kualiti pengajaran dalam proses PdPc di samping membentuk insan yang berilmu dan berakhlak terpuji.

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