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## **DETERMINANTS OF PURCHASE INTENTION TOWARDS COUNTERFEIT PRODUCTS AMONG SELECTED CONSUMER IN MALAYSIA**

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**Abstract:** According to Piotr Strykowski, a senior economist of public governance and territorial development directorate at the Organization for Economic Co-operation and Development (OECD), stated that counterfeiting has reached an alarming level, causing huge revenue losses to governments across Southeast Asia including Malaysia. The purpose for this study is to investigate the factors influencing selected Malaysian to purchase counterfeit products. There are three independent variables chosen for this study which are brand image, price and social influence. This study focuses on selected Malaysian in Kuala Lumpur. A total number of 384 questionnaires were distributed to the respondents around Kuala Lumpur area. The data analysis such as correlation and multiple regression was conducted using Statistics Packages for Social Science (SPSS) software version 24 to prove the relationship between the variables. Based on the result, it shows that all the independent variables have significant relationship with the purchase intention towards counterfeit products.

**Keywords:** Purchase Intention, Brand Image, Price, Social Influence, Counterfeit Product

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### **OVERVIEW**

The business world in the 21<sup>st</sup> century becomes more competitive and challenging as people's demands are converging, and they tend to buy or use the products that follow the trends during that time. Many popular brands have introduced various products with unique features with expensive prices such as branded handbags, shoes, watches, clothes and many more. With this the rapid changes in lifestyle, some manufacturers take these opportunities to capture the market and come out with the ideas to produce the counterfeit products that will look similar with the original products but offer them at affordable prices. Counterfeiting can be defined as the act of selling or producing the products with some intentions and reproduction the visual appearance of a genuine product (McCarthy, 2014). With the phenomenon of counterfeit activities has reached a critical level, it can give the big impact to the business sector as well as the economy. Counterfeit products are familiar among the low-income consumers, however, some consumers from the high income also tend to purchase counterfeit products. A report from Organization for Economic Cooperation and Development in 2016, China is one

of the developing countries that actively supply and market the counterfeit products (Muncaster, 2011). In Malaysia, counterfeit activities have contributed almost RM464 to the Malaysian market which the rate has reached the critical level based on the report from Havocscope Global Market Indexes in 2011. In order to combat the counterfeit activities in Malaysia, Domestic Trade and Consumers Affairs Ministry has taken some steps by increasing the awareness regarding the counterfeit issues among the public. For instance, in 2002, National Anti-Piracy Campaign has been launched in a way to create some awareness regarding the counterfeiting in Malaysia among the traders, end-users and consumers from both the government and the private sector. However, these actions seem not be effective as the demand for the counterfeit products are increasing.

With the advancement of technology, authentic products can be easily imitated, and it is hard to distinguish between the counterfeit products from the original ones. The cheaper price offered by the counterfeiters to the consumers become the most obvious reason why consumers tend to purchase counterfeit products since the price for genuine products are quite expensive. According to the Star Online, an investigation made by the Perak Domestic Trade found out that almost RM500, 000 worth comes from the counterfeit goods seized (Yeap, 2016). It shows that the counterfeit activities are reaching a critical level and it can bring the biggest fear to the manufacturing firms. The arising of counterfeit products will become the threats to the manufacturer of genuine products as their efforts to invest huge amount of money to design, manufacture and market their products to become popular, while the counterfeiters without hesitation use their brand names to gain some profits. Based on the report by the Organization for Economic Co-Operation and Development (OECD) in 2016, China has dominated the market of counterfeit goods with 63.2% and the top country that actively supply the counterfeit goods. Surprisingly, based on report, Malaysia is in the top 10 of the countries that actively sell and supply the counterfeit goods.

**Figure 1.1: Ranking of countries based on seizures of counterfeit and pirated good in 2016**

China	<b>63.2%</b>
Hong Kong	<b>21.3%</b>
Turkey	<b>3.3%</b>
Singapore	<b>1.9%</b>
Germany	<b>1.8%</b>
India	<b>1.6%</b>
Macedonia	<b>1.6%</b>
Thailand	<b>1.4%</b>
Malaysia	<b>1.2%</b>
Mexico	<b>0.5%</b>
United States	<b>0.5%</b>
UAE	<b>0.4%</b>

Source: The Organisation for Economic Co-Operation and Development (OECD)

There are several consequences of counterfeiting towards the economy and social. For instance, counterfeiting will reduce the potential of foreign investment in Malaysia as the investors are uncertain to invest due the widespread of the counterfeit activities. The existing of counterfeiting will tarnish reputation of Malaysia in the eyes of tourists. In terms of social, counterfeiting can bring disastrous effects to the society. For example, if the society tends to

use counterfeit pharmaceuticals, the tendency to suffer from death and injuries are high. Even there are a lot of strategies have been conducted to curb the counterfeit issues, unfortunately, most of the strategies failed to stop the consumers from continue purchasing the counterfeit products and the demand for the counterfeit products likely tend to be increased from year to year. People from different country or different cultural background will have a different reflection on the purchase intention towards counterfeit products. According to the unstructured interview done by the researcher, most of the consumers tend to purchase counterfeit products because they are sold at affordable prices and look quite similar with the original ones. Although counterfeit goods are viewed as the imitation products with low quality, inexpensive, can be easily access (Trott and Hoecht, 2007; Nordin, 2009), however, for the past several years, the counterfeit products are seen to have improvements in terms of their quality which their aim is to attract more consumers to purchase those products (Budiman, 2015). Every elements of the products have been improved especially its quality, durability and design (Turunen and Laaksonen, 2011). Therefore, some consumers may choose counterfeit products as an alternative if they can get those products at a lower price. Most of the people tend to consume counterfeit brands because it gives a positive social image to the users and they will get benefit in terms of psychological and value (Jiang & Cova, 2012). The outcome of previous study has positive results between the influence of surroundings (brand image, price and social influence) towards the purchasing intention of counterfeit products. For instance, the study by (Nguyen & Tran, 2013) shown that there are positive relationships between the social influence and brand image on the purchasing intention towards counterfeit products. The *research objectives* of this study are :

1. To examine whether there is a relationship between brand image and purchase intention towards counterfeit products among selected Malaysian consumers in Kuala Lumpur.
2. To examine whether there is a relationship between price and purchase intention towards counterfeit products among selected Malaysian consumers in Kuala Lumpur.
3. To examine whether there is a relationship between social influence and purchase intention towards counterfeit products among selected Malaysian consumers in Kuala Lumpur

### **Purchase Intention towards Counterfeit products**

Counterfeit products have contributed at least five percent of the world's trade economy (Carpenter and Lear, 2011). The recent study by Chaudary, Ahmed, Gill and Rizwan (2014), the phenomenon of counterfeiting has reached the alarming rise of the worldwide economy. Counterfeit activities can be seen as a serious problem as it not only affects the economic activities in certain countries but also affect the social life as well (Hendriana et al., 2013). By 2015, the International Chamber of commerce expected that the value of counterfeit products around the world will exceed \$1.7 trillion (Basu et al., 2015). Meanwhile, it is accounted that almost 2% of the value of counterfeit products contributed to the world's total current economic output. Some opinions perceived that people who have self-conscious perspective will have the high tendency to purchase counterfeit products as they cannot afford to buy the genuine products which quite expensive for them (Spink and Fejes, 2012) due to wide variety of advertisements that will increase the consumers' intentions to own the branded products although their purchasing power is limited. Therefore, some counterfeiters are aiming these opportunities by producing the same branded products with similar appearance from the

original products but offers at the cheaper price. According to Eisend et al. (2006), branded fashion items are the most products that been purchased, and this is the reason why these items are valuable for forging and becomes the main target for the illegal production.

Counterfeit products commonly known with sense of individuality and cheap prices (Grossman and Shapiro, 1988; Lai and Zaichowsky, 1999; Gistri et al., 2009; Sharma and Chan, 2011). According to Ahmad et al., (2013), the intention to purchase is the early stage before the consumers make the real buying decisions. In Pakistan, the counterfeit activities have dramatically increased and have been reached a vast level (Shafique et al., 2015). The problematic issue that arises regarding the counterfeits are these activities will badly affect the manufacturing of the genuine products in terms of sales volume (Peng et al., 2013). Due to the increasing demand of counterfeit products in the eastern countries such as China and India, the researchers start changing their research areas from western developed nations to the Asian nations. Some research in Indonesia found that the development of counterfeit products is increasing and become more famous (Kusuma, 2015). This study has been supported with the statement from Indonesia's trade minister in 2015 which the counterfeit products are contributed more than 40 percent to the economy in Indonesia (Fajriah, 2015). At the time when the purchase intention towards luxury products are high, then it will become a huge opportunity for the counterfeiters to create imitation from that luxury brand products even though those activities may cause some violations on the business ethics. There are many variables that influence the consumers' purchase intention towards counterfeit products such as attitudes (Budiman, 2012; Chaudary, Ahmed, Gill and Rizwan, 2014), past experience (Rasheed, Farhan, Zahid and Rizwan, 2014; Teik, Seng, Xin-Yi, 2015), novelty seeking (Jaiyeoba, Marandu, Kealesitse and Opeda, 2015), ethics (Teik, Kamaruddin, Bulathsinalage, and Seneviratne, 2013), social influence (Hadiwijaya, 2015), price (Ahmad et al., 2014), fashion conscious (Kiani, 2015), value conscious (Rahmawati, 2013), personal appearance (Yoo and Lee, 2009; Triandewi and Thiptono, 2013; Huang, Lee and Ho, 2004; Matos, Ituassu and Rossi, 2007). Some researchers in Malaysia revealed that the key predictors that lead the consumers to purchase counterfeit products are lower level of perceived risk and integrity, social recognition (Teo and Mohd Yusof, 2017), poor ethical values, materialistic behaviour (Ong et al., 2013), novelty seeking (Harun et al., 2012), social influence, personality, pricing and economic considerations (Haque et al., 2011).

### **Brand Image**

A brand can be referred to any product, service or concept that can differ from the others which it can be easier for the company to communicate and promote their products (Chacharkar, 2013). For the global company, a brand is important as it provides a positive link between branding strategies and financial performances (Stiehler & Tinson, 2015). Meanwhile, brand image can be defined as the way the brand appears in the customers' mind (Nguyen and Tran, 2013). Brand image plays a significant role in influencing the customers either to buy or not the products. It is because the brand itself brings some unique features on the customers' perceptions. Brand image is crucial for the customers to assist their decision making in finding the goods that suit their personality and styles. A strong brand image is important to companies in order to attract more customers to purchase their products. With the strong brand image, companies can build their own identity in the mind of customers, increase the customers' trust and also provide some opportunities for brand extension. The products that have better image have the highest tendency to attract the customers to purchase their counterfeit products

(Nguyen and Tran, 2013). It shows that most of the consumers that buy counterfeit products will choose the products that are luxury and have popular brand names (Eisend and SchuchertGuler, 2006). With the good image of the famous brand, many counterfeiters use these opportunities to produce counterfeit products because they believe that products with good brand image will give them huge profits.

Some studies show that customers tend to buy branded products in order express their self-image and self-esteem (Escalas,2004) and in the other way, they want to find specific brand that suit with their personality (Ashraf and Merunka, 2013). As the brand image of the genuine products become more prominent, some customers tend to involve in purchasing the counterfeit products and put their efforts in exploring the better branded counterfeit products that will reflect their self-image and styles. A study conducted in Indonesia found that Louis Vuitton, one of the well-known luxury brands become the most popular brand that have been counterfeited in Indonesia. On the other hand, in 2004, it is accounted almost 18% of the counterfeit products in Europe mostly came from Louis Vuitton brand (Hadiwijaya, 2015). In some cases, the customers perceive certain brands by focusing on the country of origin. For instance, such statement “Japanese electronics are trustworthy” or “Swiss watches are high class”. These stereotypes arise when the customers set in their mind that products come from that country are better than others. In China, the domestic brands such as Huawei and Oppo also become the target to be counterfeited (Long, 2017). Nowadays, the counterfeit mobile phones mostly from these two brands can be easily found in the night markets or in the street shops. Most of the sellers will offer these mobile phones at the lower prices and the customers also able to make some bargaining situation to get the price that they want before deciding to purchase that item. Therefore, it indicates that brand image provides the positive effect towards the purchase intention of counterfeit products.

### **Price**

In making the decisions to purchase counterfeit products, normally price will be the major indicator in deciding whether to buy that products or not (Cordell, Kieschnick and Wongtada, 1996; Rutter and Bryce, 2008; Tan, 2002). The success of counterfeits of luxury brands industry can be attributed primarily to the price advantages it offers over the genuine product. Luxury goods not only attract the customers from higher income but also people who come from lower income but cannot afford them. This leads to the continuous demand towards counterfeit products as consumers want to get those products at affordable prices. Price plays an important role in affecting consumers’ decision either to purchase counterfeit products or not. Generally, when customers want to purchase counterfeit products, they will try to find the counterfeit products that are cheap and at affordable prices. Sometimes, several customers will consider the quality of the counterfeit products as well as the price and several customers do not care much about the quality as long as they will get the products that they like at the lower price. Some customers believe that there was nothing wrong to purchase counterfeit products at a lower price as the price for luxury designer products offered to them are unfair. Whether consumers have enough budgets or simply do not wish to spend more money, an individual will make some decisions by purchasing legitimate products that fit with their financial conditions. To analyze the consumption of counterfeit products, it is important to understand how consumers manage their purchasing decisions by conceptualizing and evaluating price based on their budgets.

Consumer who has been categorized as price consciousness will always aware with

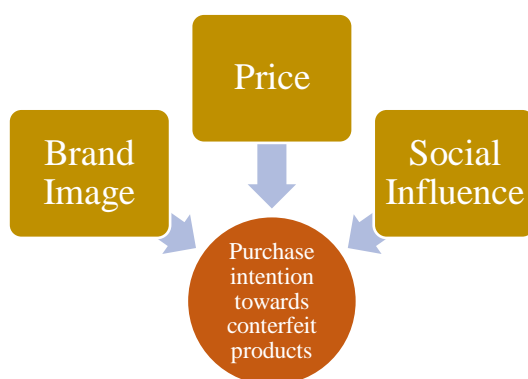
the product cost and will try to avoid themselves for paying high price (Ahmad et al., 2014). A study by Rahpeima et al. (2014) stated that consumers with high price consciousness tend to purchase counterfeit ones that offered them at a lower price rather than spend their money to buy the original product. In several situations, consumers tend to form their own price expectations or reference prices before deciding to purchase certain products (Kalwani et al., 1990; Lattin and Bucklin, 1989). Normally, people tend to use reference price to evaluate the value of the products that they purchase by making some comparisons with the real-life prices. It is to make sure that the price of the products that the consumers want to purchase will suits with their budgets and financial planning. Therefore, reference price is important especially when the consumers make the comparison price between genuine and counterfeit products. it is because consumers who tend to purchase counterfeit products will set the lower reference prices as they want to make sure that their money is worth when purchase that counterfeit products. Based on the other study by Phau, et al., (2009), it reflects that the consumers will tend to buy the counterfeit products if that products offer them the price advantage.

### **Social Influence**

Social influence generally refers to thoughts, feelings or behavior of an individuals that been influenced by their surroundings. Social influence can be either norm-based which the individuals been influenced direct by a referent group or information-based in which individuals accept information from a referent group before making the decisions. The desire to own luxury branded products to acquire admiration and influence from the surroundings are the reason that motivated the individuals to purchase counterfeit products. Therefore, social interaction with family and peers are considered as the main drivers in influencing the purchase intention towards counterfeit products (Hamelin, Nwankwo & El Hadouchi, 2013). Islam et al. (2017) indicated that social influence plays a major role which the consumers believe that their friends and families influence the use of counterfeit product and then purchase products in the future. Customers also will purchase counterfeit products if they get huge support from their friend or from people around them (Phau et.al, 2009) and they will purchase the counterfeit products under the influence of peers (Bearden, et al., 2016). Consumers purchase counterfeits if friends and relatives act as influencers or motivators to buy and approve the behavior to purchase the counterfeit products. The culture of the society itself also can bring side impact towards the behavior of an individual. A study by Yadav et al. (2013), it pointed out that social environment plays the important factor in influencing the decision making and encourages the people to buy the same products and services with their surroundings. In the situation of purchasing the counterfeit products, an individual will have the tendency to purchase the counterfeit products after they get some approval from their surroundings or after hearing the good feedback from their social groups.

According to Fernandes (2013), in relations with the Theory of Planned Behavior, social pressures play an important role in influencing an individual to make decision either to purchase counterfeit products or not. In fact, pressure from the surroundings can make the individual to break the rules as they gain some supports from the others that will encourage them to do that kind of acts (Fernandes, 2013; Ang et al., 2001). Applying to this fact, it shows that social influence can affect an individual's intention to purchase the counterfeit products (Fernandes, 2013). A study stated that there is a strong association between social

influence and purchase intention towards counterfeit products (Peace, Galetta and Thong, 2003). Nguyen and Tran (2013) also found that there is a positive relationship between social influence and purchase intention towards counterfeit products. In the situation of luxurious products, it found that social influence gives positive effect on the purchase intention towards counterfeit products (Hidayat and Diwasasri, 2013). A qualitative study conducted in China found that people tend to purchase counterfeit products because they want to get positive social image and attraction from their surroundings by wearing luxury brands even the products that they use are counterfeits (Jiang and Cova, 2012). Some counterfeiters properly target the individual that can easily be influenced by their peers as they will have the tendency to follow the trends around them. Some customers will seek for some opinions from their close people before making the decisions to buy the fake products. Therefore, this shows that social influence gives the huge impact on the purchase intention towards counterfeit products (Hamelin et al., 2013).



Source : Adhikari, H.P. & Biswakaram, G. (2017). Determinants of Purchase Intention towards Counterfeit Apparels in Nepalese Consumers. *International Journal of Research in Business Studies and Management*, 4(10): 10-17

## **METHODOLOGY**

The researcher wants to study the relationships between the factors that influence the purchase intention towards counterfeit products among selected Malaysian consumers in Kuala Lumpur. The researcher has distributed the questionnaires to a total number of 384 respondents from Kuala Lumpur area. The convenience sampling provides an immediate respond which the data is gained through the collection of information from the respondent which is the selected Malaysian consumers in Kuala Lumpur who are conveniently available and give cooperation to provide and give the information. In conducting this study, researcher had used a set of questionnaires as the primary data which the questionnaire contains independent variables and dependent variables. The questionnaire contained 5 sections. In section A, the questionnaire based on demographic of the respondent by using nominal scale which the questions mainly focus on the gender, race, income and age. In Section B, there are general information for the respondents about their intentions towards counterfeit products. In section C, the questionnaire about the brand image which is the independent variable was using an interval scale which is the Likert scale method. In section D, the questionnaire about the price which is the second independent variable also using an interval scale. In section E, the questionnaire about the social influence as the third independent variable which it uses the interval scale. In

section F, the questionnaire provides the respondents more details about the purchase intention towards counterfeit products which is the dependent variable. This section also uses the interval scale as the measurement. The procedure of data analysis may involve determining consistent patterns and summarizing the appropriate details revealed by the study. The Statistical Package for Social Science (SPSS) for Windows was used to analyze the data and obtain answers for the research questions. For this research, using SPSS for Windows, researcher conducted the Reliability analysis, Descriptive Analysis, Frequency Distribution Analysis, Correlation analysis and Multiple Regression Analysis.

## **FINDINGS**

In this study, 384 questionnaires were successfully collected. However, out of 384 questionnaires, only 378 questionnaires used for the regression. The other 6 questionnaires defaults due to the respondents' mistakes when answering the questions. For the **descriptive analysis**, it shows that that the number of respondents that involved in this study consists of 54 male (14.3%) and 324 female (86.7%). Most of the respondents are Malay with 351 respondents (92.9%) followed by Chinese with 15 respondents (4.0%), Indian with 9 respondents (2.4%) and others with only 3 respondents (0.8%). Respondents with age 22 to 25 years old was the highest in answering the questionnaire with 196 respondents (51.9%). Then, it followed by respondents with age 26 to 30 years old with 59 respondents (15.6%), age between 31 to 35 years old with 56 respondents (14.8%), age between 36 to 40 years old with 33 respondents (8.7%), age between 18 to 21 years old with 21 respondents (5.6%) and the least number of respondents with only 13 respondents (3.4%) from the age 40 years old and above. Most of the respondents are from the range income below RM1,000 with 210 respondents (55.6%). Then, it followed by the range of income from RM1,001 to RM3,000 with 74 respondents (19.6%) and 50 respondents (13.2%) from the range income between RM5,001 and above. The least number of respondents are from the range income between RM3,001 to RM5,000 with 44 respondents (11.6%). 363 respondents (96%) agree that they tend to purchase counterfeit products. Meanwhile, only 15 respondents (4%) stated that they do not purchase counterfeit products. Therefore, based on the result recorded, it shows that most of Malaysians purchase counterfeit products. Apparels or shoes are the category of counterfeit products with the highest number of respondents with 169 respondents (44.7%). Then, it followed by bags or wallets with 102 respondents (27%), cosmetics or perfumes with 69 respondents (18.3%), electronic with 22 respondents (5.8%) and 15 respondents (4.0%) tend to purchase others category of counterfeit products. Meanwhile, only 1 respondent (0.3%) tend to purchase electronics of counterfeit products. 160 respondents (42.3%) tend to purchase counterfeit products through online. Then, 115 respondents (30.4%) tend to purchase counterfeit products at the street stalls and 78 respondents (21.6%) at the regular shop followed by 12 respondents (3.2%) tend to purchase counterfeit products from abroad and 13 respondents (3.4%) purchase the counterfeit products from the other sources.

Next is the **reliability analysis**. The purchase intention towards counterfeit products has an excellent result for Cronbach's Alpha with 0.946. Then, the price also has an excellent result with 0.913 while brand image has good result with 0.885. The lowest Cronbach's Alpha value is social influence as the third independent variable. The value is considered as acceptable because it amounted to 0.789. Based on the result recorded, it shows that the questionnaire has a relatively high internal reliability as Cronbach's Alpha for the variables are above 0.7. Therefore, it can be seen that all the variables pass the reliability test

**Table 1.1: Cronbach’s Alpha Value for Dependent and Independent Variable’s Items**

Items	Cronbach’s Alpha	Internal Consistency
Purchase Intention	<b>0.946</b>	<b>Excellent</b>
Brand Image	<b>0.885</b>	<b>Good</b>
Price	<b>0.913</b>	<b>Excellent</b>
Social Influence	<b>0.789</b>	<b>Acceptable</b>

**Pearson Correlation** is a technique used to test the relationship between each variable. In this study, it is important to test the strength of the variables’ correlation in a way to identify the relationship between brand image, price and social influence towards the purchase intention of counterfeit products.

**Table 1.2: Correlation Value for Independent Variable’s Items**

Variables	Pearson Correlation	Significant (2-tailed)	Directional Analysis
Brand Image	<b>0.673</b>	<b>0.000</b>	<b>Moderate</b>
Price	<b>0.692</b>	<b>0.000</b>	<b>Moderate</b>
Social Influence	<b>0.710</b>	<b>0.000</b>	<b>High</b>

\*\* Correlation is significant at the 0.01 level (2-tailed).

The findings show that brand image, price and social influence have a significant correlation with purchase intention towards counterfeit products at the p-values less than 0.01. Based on the result, social influence was recorded at (r=0.710, p<0.000) which it shows the highest correlation compared to the other independent variables. Hence, this showed that there was a positive relationship between social influence and purchase intention towards counterfeit products. Meanwhile, the correlation was significant at p<0.01 and the strength of relationship are high correlation based on Guilford’s Law. Then, the result of coefficient correlation between price and purchase intention towards counterfeit products at (r=0.692, p<0.000). This shows that price has a positive significant relationship as the p-value is less than 0.01 and the strength of relationship between price and purchase intention towards counterfeit products based on Guildford’s Law are moderate correlation. Then, the result for brand image is at (r=0.573, p<0.000) which showed that brand image also has a significant relationship with purchase intention towards counterfeit products as the p-value is less than 0.01. In conclusion, the result shows that there are significant relationships between brand image, price and social influence with the purchase intention towards counterfeit products.

**Table 1.3: Coefficient of determination**

R	R Square	Adjusted R Square
<b>0.783<sup>a</sup></b>	<b>0.613</b>	<b>0.610</b>

a. Predictors: (Constant), Brand Image, Price, Social Influence

**Regression analysis** was used when one independent variable is hypothesized to affect the dependent variable (Sekaran & Bougie, 2013). R<sup>2</sup> indicates the percentage of variance

in the dependent variable where it has been explained by the variation in the independent variables. Based on the table above, it shows that the result for regression of  $R^2$  is 0.613 which it implies that 61.3% of the dependent variable is influenced by the independent variables which are brand image, price and social influence. Meanwhile, the remaining variance is 38.7% is not explained by other variables in this study.

**Table 1.4: Table Multiple Regression Analysis**

Model	Beta	t-value	Sig.	Results
(Constant)		<b>-3.100</b>	<b>.002</b>	
Brand Image	<b>0.157</b>	<b>3.835</b>	<b>0.000</b>	<b>Significant</b>
Price	<b>0.338</b>	<b>7.469</b>	<b>0.000</b>	<b>Significant</b>
Social Influence	<b>0.407</b>	<b>9.275</b>	<b>0.000</b>	<b>Significant</b>

The three independent variables had a significant relationship on the purchase intention towards counterfeit products which is below the significant level  $p < 0.05$ . The parameter significance for brand image is 0.000, which is below 0.05 significant level. Therefore, brand image is significant. The second independent variable is price and the parameter significance result for price is 0.00, which is below 0.05 significant level. Next, social influence had shown that the variable has positively significant effect on purchase intention towards counterfeit products with the significant value 0.00. In terms of standardized beta coefficients, as brand image increases by one standard deviation, purchase intention towards counterfeit products increases by 0.517 of a standard deviation. Then, as price increases by one standard deviation, purchase intention towards counterfeit products increases by 0.338 of a standard deviation. Next, as social influence increases by one standard deviation, purchase intention towards counterfeit products increases by 0.407 of a standard deviation. Based on this result, the most important independent variable would be brand image as the magnitude of standardized coefficients is the largest. Hence, it shows that brand image has the highest influence on the purchase intention towards counterfeit products. After a several analyses, the researcher has found that the three independent variables which are brand image, price and social influence that have been supported and have a positive and significant effect on the purchase intention towards counterfeit products.

**Table 1.5: Verdict of Hypothesis Testing**

	<b>Hypothesis</b>	<b>Supported / Rejected</b>
H0	There is no relationship between brand image and purchase intention towards counterfeit products	Rejected
<b>H1</b>	<b>There is a relationship between brand image and purchase intention towards counterfeit products</b>	<b>Supported</b>
H0	There is no relationship between price and purchase intention towards counterfeit products	Rejected
<b>H2</b>	<b>There is a relationship between price and purchase intention towards counterfeit products.</b>	<b>Supported</b>
H0	There is no relationship between social influence and purchase intention towards counterfeit products	Rejected
<b>H3</b>	<b>There is a relationship between social influence and purchase intention towards counterfeit products</b>	<b>Supported</b>

### CONCLUSION

Brand image is seen to influence the purchase intention towards counterfeit products. Based on the regression result, it shows that brand image is significant and has a positive relationship with the purchase intention towards counterfeit products. This result can be related with the research conducted by Nguyen and Tran (2013) which stated that even the products are the counterfeit products, the consumers still want to purchase that products if the products have brand image. Price is also seen to influence the consumers to purchase counterfeit products since price has a significant relationship with the purchase intention towards counterfeit products based on the regression result. This is supported with the findings by Lu (2013) that stated price has influence the purchase intention towards counterfeit products and Febrina (2006) also stated that Indonesian people tend to purchase counterfeit products because the price of authentic goods quite expensive and do not fits with their income. According to Rahpeima et al. (2014) stated that consumers whom price consciousness will have the high tendency to purchase counterfeit product where it offered them at lower or discounted price compared to the authentic goods. Based on the result, social influence is seen to affect the purchase intention towards counterfeit products. The analysis shows that social influence is significant and has a positively related with the purchase intention towards counterfeit products based on the regression result. The results of this study are in line with the research of Hana (2012) and Trisdiarto (2012) which states that the stronger the social influence, the higher the tendency of the purchase intention towards counterfeit products.

In order to combat the counterfeiting issues in Malaysia, the government should prioritize more on the society as the society are the most contributors that purchase counterfeit products. Therefore, the government needs to conduct more campaigns by aiming to increase the awareness among the society about the side effect of using counterfeit products. The government also need to organize continuous educational programs that focus on the counterfeit issues happened in Malaysia. The government can also encourage more local manufacturers or small medium enterprise (SME) to produce more local products with a good quality that offered the consumers at an affordable price. Through this way, the government can help in reducing the counterfeit issues and also contributed to the economy of Malaysia. As the counterfeit activities have spreading around the world, the manufacturers of the original products must take some initiatives to save their products from being counterfeited easily. One

of the ways is the manufacturers should make some collaboration with the government to fight the counterfeit activities in terms of improving the quality of the enforcement officials. In order to protect the brand image and gain the trust from the consumers, companies have to take a legal action towards the counterfeiters. The consumers also been recommended to purchase the items from the authorized retailers to avoid being cheated and buy the counterfeit ones. Moreover, in order to make sure that the consumers can differentiate the original and counterfeit products, the manufacturers of original products need to introduce innovative and unique features on their products in order to avoid their products been easily imitated. To add, the manufacturers also need to deploy to the latest technology that can help the consumers to distinguish between original and fake products.

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## RETRIEVAL PERFORMANCE OF ARABIC LIGHT STEMMERS

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**Abstract:** *Despite the fact that stemming greatly improves Arabic information retrieval performance, yet no standard stemmer emerges in the field of Arabic IR due to some limitation and shortcomings. Among the recurring problems is that the stemmer can reduce unrelated words to the same stem as well as fall short to reduce related words to a common stem. Many studies have suggested Arabic algorithms to address the problem associated with stemming. This paper aims to review the state of the retrieval performance of Arabic Light stemmers based on the main objectives achieved, causes for retrieval success and failure, retrieval measure, the affixes and methodologies. The results showed that ligh10 has better retrieval performance compared to other reviewed Arabic light stemmers.*

**Keywords:** *Arabic Information Retrieval, Arabic Light Stemming, Retrieval Performance*

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### Introduction

Stemming is one of information retrieval strategies that are used to retrieve and locate query search with relevant documents. In other words, stemming is a process that conflates different words together and accordingly allows the system to retrieve the documents which are not exactly matching query words. This process has positive impact on the storage and index size, as it helps in index size reduction allowing for more storage space. Furthermore, stemming can be seen as a mean to increase the number of word occurrences (Allan and Kumaran, 2003). Stemming is used in many types of language processing and text analysis systems. There are many research works on the application and evaluation of stemming strategies for information retrieval purposes. Stemming has been implemented in many languages and proved its effectiveness. Arabic language is among those languages. As such, in broader perspective, languages have many variations in terms of structure, morphology and function. For instance, the variation in morphology can lead to various differences at the level of the effectiveness and precision of information retrieval. More than this, in information retrieval (IR), the relationship between user information need, which will be formulated to a query and document, is mostly determined by the number and frequency of terms which they have in common. Unluckily, words have many morphological variants which will not be recognized by term-matching algorithms without some form of natural language processing. Therefore, stemming algorithms have been developed for IR in order to reduce morphological variants to their root or stem form.

There are several types of stemmers or stemming algorithms. For example, affix removal, root stemmers, which return search query into its root or stem and statistical stemmer which is based on co-occurrence.

In the context of Arabic information retrieval, many Arabic stemmers were developed by addressing the morphological variations of Arabic language in order to improve Arabic retrieval performance against information needs. However, yet no standard Arabic stemmer emerged. The most popular and successful techniques developed to extract stems of the words is light stemming technique. Light stemming is defined as a process of removal a small set of prefixes and/or suffixes without trying to deal with infixes, or recognize patterns and find roots (Larkey et al., 2002). This paper sheds some light on the retrieval performance of several introduced Arabic light stemmers. It aims at showing the strength and shortcoming of some light stemmer paving the way for a better understanding of these stemmers and the possibility of coming up with a more integrated and effective stemmer that overcomes the shortcoming of the various light stemmer which currently in use.

In specific terms, this paper aims to review the state of the retrieval performance of Arabic LIGHT stemmers based on the main objectives achieved, causes for retrieval success and failure, retrieval measure, the affixes and methodologies. The Selected Arabic light stemmers to be reviewed are as follow: AL-Stem (Darwish,2002), Berkeley, (Thabet, 2004), al-Ameed, Light1, Light2, Light3, light 8, light10, CondLight, LS, Light11, Light12 and Light13

### **Characteristics of Arabic Language**

It is obvious that most Arabic words are morphologically derived from short list of generative roots, which constitute the bare verb form. (Abu El-Khair, p.508). For example, علم means “science” is the root base of different words with different meaning معلمات = teachers, معلومات = information, علوم = sciences, علم = flag.

The other chief feature of the Arabic language is that words are written in horizontal lines from right to left. The way of writing of letters change depending on their occurrence in the sentence whether they appear at the beginning, middle or end of a word. In Arabic language the noun can be feminine or masculine in form dual, singular or plural.

طفلان → two children, masculine.

معلمتان → two teachers, feminine.

كرسيان → Two chairs, masculine.

Another important feature of Arabic language is the existence of diacritics. The function of the eight main diacritics of Arabic language plays a vital role in the changing of meaning of words (Moukdad and Large, 2001). The same word with different diacritics makes two different meanings. These vowel diacritics appear fully in Qur'an to avoid any problem of ambiguity or mistakes. However, they are not used in modern Arabic script, except in some children stories to make it understandable.

The other leading feature of Arabic language is that it is morphologically complex in which it allows a large degree of flexibility in forming words. That is to say complex rules govern the creation of morphological variations, making it possible to form hundreds of words from one root (Fedaghi and al-Sadoum, 1990). For example, giving root words that derive many words with different meanings. In fact, all these features and others bear heavily on

Arabic information retrieval function. Hence, they have to be considered in choosing appropriate indexing strategies for IR so as to avoid all sorts of complexities and problems.

### **Arabic Light Stemmers**

Aljayl and Frieder in 2002 have proposed root based stemmer and examined different approaches of light stemming. They were the first to introduce the light stemming. Their research adopted Khoja's algorithm for root-based retrieval and introduced new stemming called "light stemming". The proposed light stemming (LS) did not specify the prefixes and suffixes that should be removed from Arabic word. Rather, the light stemmer algorithm that was given by the two researchers can be used for any Arabic valid affixes. The research investigated the effectiveness of light stemming against root-based and word-based for Arabic IR. The findings of the research showed light stemmer significantly outperformed the root-based approach. Khoja's stemmer was found superior over surface-based (without stemming). The differences between two approaches were statistically significant by using paired t-test and Wilcoxon sign test.

After introducing light stemming algorithm by Aljayl and his colleague, Larkey et al., (2002) was encouraged to develop several light stemmers for Arabic retrieval light1, light2, light3, and light8. The affixes removals by those stemmers are shown in Table 1. They were tested for both monolingual and cross-language retrieval. In addition, the research compared the retrieval performance of developed light stemmers and other morphological analyzers like Khoja stemmer, statistical stemming using co-occurrence analysis. Normalization is a type of stemming; it was also compared with light stemmers. The findings show that light stemming, specifically light 8 has improved the effectiveness of Arabic information retrieval for monolingual and cross-language retrieval compared to other stemmers. Measures used in the research to compare the performance of stemmers were recall and precision measures.

Al-Stem is an Arabic light stemmer developed by Darwish in 2002. The stemmer was intended for research purposes only, removed many prefixes and suffixes as illustrated in Table 1. It was claimed that the Al-Stem is more Aggressive than Light10 stemmer.

In 2003 Chen and Gey have developed two Arabic stemmers and an Arabic stop list at TREC 2001. The two researchers created a MT (Machine Translation)-based stemmer and a light stemmer. The light stemmer was called Berkeley which shares many of prefixes and suffixes that should be removed with the light stemmers developed by Larkey et al and the one was developed by Darwish (Al-Stem). The Berkeley light stemmer was compared with two trigram indexing, MT-based stemmer, without stemming, Al-Stem which developed by Darwish for both monolingual and cross-language retrieval. The results showed that the Berkeley light stemmer performed better than automatically created MT-based stemmer.

The light stemmer followed the following sequence:

- If the word is at least five-character long, remove the first three characters if they are one of the following: بال, فال, كال, ولل, مال, ال, لال, وال
- If the word is at least four-character long, remove the first two characters if they are one of the following: اكاول وي وس سي لا وب وت وم لل با. ف, ال, وا
- If the word is at least four-character long and begins with , remove the initial letter

- If the word is at least four-character long and begins with either *or*, *remove* or *only* if, after removing the initial character, the resultant word is present in the Arabic document collection.
- Recursively strips the following two-character suffixes in the order of presentation if the word is at least four-character long before removing a suffix: *ون*, *ان*, *ين*, *تم*, *تن*, *يا*, *هن*, *كن*, *ني*, *يا*, *هن*, *كن*
- Recursively strips the following one-character suffixes in the order of presentation if the character is at least three-character long before removing a suffix: *ة*, *ه*, *ي*, *ت*

Al-Ameed, et al. (2002) proposed five stemming algorithms in an attempt to enhance the TREC-2002 Arabic light stemmer presented by Kareem Darwish. In other words, the researchers used TREC-2002 Arabic light stemmer (Al-Stem) as a benchmark in order to compare their light stemmer with that presented by Kareem Darwish. The system performance evaluation was based on two testing manners; the first manner concentrated on measuring the number of acceptable produced words as an output of applying the stemmer algorithms on each test group. The second manner is grounded on measuring the frequency of removing affixation terms from the test words. The research outcomes were compared with TREC-2002 algorithm results. The results showed that proposed stemmers provide better accepted outcomes of Arabic words with up to 30-50% more than TREC stemmer outcomes. However, one cannot say that the proposed Arabic stemmers' outcomes are better than TREC-2002 stemmer results because the researchers did not use the same test collection of TREC-2002 in their research as well as standard evaluation measures. Therefore, one can conclude that one of the weaknesses of this research is that it did not follow appropriate methodological approach.

In another attempt, Naglaa Thabetin 2004 proposed a new stemming approach based on a light stemming technique that uses a transliterated version of the Qur'an in western script. These are the main procedures:

- Remove prefixes (wa, fa, la, li, lil, bi, ka, sa, s^a, al)
- After stemming, the word is inserted back into the word list.

Six groups of suffixes are identified ranging from one-letter suffixes to six-letter suffixes. The system starts stemming the words in the word lists from the longest prefixes (six-letter prefixes) to the three-letter prefixes. Stemming the one and two-letter suffixes causes some ambiguity, since some of the suffixes could sometimes be part of the word stem. To resolve this problem, the stemmer sorts the words alphabetically. In the sorted list of words, if a given sequence displays a variety of suffixes including one and two-letter suffixes, the suffixes are removed and the stem is retained, otherwise the word is left intact. The results for seven long suras selected randomly and representing 6% of the Qur'an showed that the stemmer achieves an accuracy of 99.6% for prefix stemming and 97% for suffix stemming. The disadvantage of this study is there was no experimental evaluation provided.

In order to look at the similarities and differences of the list of prefixes and suffixes that the reviewed light stemmers stripped off Table 1 was summarized and checking if there is any failure analysis reported in the research works. Those light stemmers share many prefixes and suffixes, besides some of these light stemmer removes only few prefixes and suffixes in order to protect the same meaning of the queries like *light8* and *light10*.

In 2005 Larkey, Ballesteros and Connell reassessed the light stemmers which were developed in the previous research at SIGIR in 2002 and developed another light stemmer

called light10. The light stemmers are demonstrated in Table 1. The research covers three folds. First, compared several light stemmers with each other for Arabic retrieval and cross-language retrieval (raw, normalization, light 1, light 3, light 8 and light 10) using TREC data. The results showed that light stemming is more effective in Arabic retrieving. It was reported that each of these increments is statistically significant except light 10 vs. light 8. This means that the research run statistical analysis, which was not stated in the article and no reporting of what test was run and its full results. The second fold is comparing Khoja's stemmer with light 10, normalization, raw (means no changes made to the word) for both monolingual and cross-lingual retrieval. The results showed that light 10 stemmer is significantly more effective than the Khoja stemmer for monolingual. The same results appeared for CLR. The research also has compared light 10 stemmer with several stemmers based on morphological analysis (Khoja, Buckwalter morphological analyzer, Diab Tokenizer) with expended queries and unexpended queries. The results showed that light 10 performed effectively than other morphological analyzer based on recall and precision measures.

The other major work on AIR and particularly in light stemming is the work of Nwesri (2008) The researcher investigated several techniques to improve Arabic text retrieval. As such, many techniques that improve the performance of AIR systems were explored. Generally, the main argument was on the idea that most current stemmers remove affixes without checking whether the removed letters are actually affixes. To address this concern the researcher propose lexicon-based improvements to light stemming that makes a distinction between the core letters from proper Arabic affixes. To this end, few rules to stem most affixes and show the effects of each individual rule on retrieval effectiveness as well as using all rules together were discussed. The researcher used the TREC 2001 test collection in order to demonstrate that applying relevance feedback with the proposed rules, that use the lexicon to differentiate core letters from actual prefixes and suffixes, produces significantly better results than light stemming.

It mainly compared effectiveness of existing AIR systems in order to prove that light stemming techniques are superior to existing systems. To achieve that, the researcher verified whether letters constitute an affix not only by checking whether the word with and without that affix exists in lexicon, but also by replacing that affix with other equivalent ones so as to examine the new instances against the lexicon.

This research has made improvement into light 10. It has developed three improved versions of the light10 stemmer namely; light11, light12, and light13. In the light11 stemmer, the researcher managed to reduce the number of suffixes (ية، ة). In the light12 stemmer, the number of stemmed suffixes was reduced to four suffixes. (ي، ه، ات، به). In light13, he removed the same suffixes as in the case of light 12 in addition to removing the definite article (ال) and prepositions and conjunctions. The empirical result of the study has shown that light11 and light12 do not significantly improve retrieval performance, but light13 made significant improvement in recall [*t*-test,  $p = 0:029$ ]. None of the algorithms led to a significant improvement in MAP or P@10.(Nwesri, 2008). As an overall result, the study has improved light stemming by introducing rules that use the lexicon to distinguish core letters from actual prefixes and suffixes, tested the effectiveness of AIR systems on a large text collection, and introduced algorithms that distinguish foreign words

One of the shortcomings of this study is the tendency of over reducing the valid prefixes and suffixes which are safe and with no negative impact on AIR like suffix (ين، ون). The latter, occur frequently in Arabic documents, therefore they should be omitted in line with other researches such as the one conducted by Larkey, Chen and Aljlal. Furthermore, he removed

the prefixes (فال، بال، كال) which are also widely occurring in Arabic document and safe to remove.

The latest Arabic light stemmer proposed by Al-Lahham et al.,(2018), named conditional light stemmer (CondLight). The researchers added new prefixes and suffixes to the table of Light10, and proposed a set of conditions on removing these affixes. These conditions are derived from the morphological nature of Arabic words. The application of the proposed light stemmer showed that adding some conditions to the extended light stemmer enhances the retrieval especially at lower recall levels.

To sum up, light 10 has proved to be more effective in improving retrieval performance of AIR. As a result, light 10 was included in Lemur toolkit, for research in language modeling and information retrieval. However, it fails in addressing morphological complexity of language in Arabic retrieval. For instance, irregular plural and under-stemming errors where many other inflected words of the queries are left out not conflated with them. Besides, yet there is no commercial system available in internet which implements any kind of stemmers. This may be due to the cost of this kind of implementation or to unavailability of standard stemming algorithm to be adopted by commercial systems.

Table1. Summary of Arabic Light Stemmers Affix Removal

Author and date	Algorithm name	Remove prefix	Remove suffix	Failure analysis
Aljlayl and Frieder (2002)	LS	NA	NA	NA
Larkey, et al., (2002)	Light1	ال، وال، بال، كال، فال	none	NA
	Light2	ال، وال، بال، كال، فال، و	none	
	Light3	Same as previous	ة، هـ	
	Light8	Same as previous	ها، ان، انت، ون، ين، يه، ية، هـ، ة، ي	
Darwish (2002)	Al-Stem	وال، فال، بال، بت، يت، لت، مت، وت، ست، نت، بم، لم، وم، كم، قم، ال، لل، وي، لي، في، وا، فا، لا، با	ات، وا، ون، وه، ان، تي، ته، تم، كم، هم، هن، ها، ية، تك، نا، ين، يه، هـ، هـ، ي، ا	NA
Chen and Gey (2003)	Berkeley	وال، لال، سال، ال، مال، ولل، كال، فال، بال، وا، ال، فا، كا، ول، وي، وس، سي، لا، وب، وت، وم، لل، با، و، ل، ب	ون، انت، ان، ين، تن، تم، كن، كم، هن، يا، ني، وا، ما، نا، هم، ية، ها، ت، ي، هـ، هـ	NA
Najwa (2004)	NA	و، ف، ل، لل، ب، ك، س، سا، ال		NA
Al-Ameed, et al. (2005)	NA	ي، ت، ن	هـ، هـ، ك، و، ي، ن، ا، ت	NA
		ال، لل، سي، سا، ست، سن، كا، فا، با، ب، ل، لي، لت، لن، فت، في، فن		

		وال، بال، فال، كال، ولل، وسي، وست، وسن، وساء، ولا، ولي، ولت، ولن وبال	ان، ين، ون، ات، هم، هن، ها، كم، كن، نا، وا، تم، ني، تن، ته، يه، ما، يا، تاء تك	
Larkey, et al. (2005)	Light10	ال، وال، بال، كال، فال، لل، و	ها، ان، ات، ون، ين، يه، يه، ه، ه، ي	NA
Nwersi, 2009	Light11	ال، وال، بال، كال، فال، لل، و	ان، ات، ون، ين، يه، ه، ي	NA
	Light12	ال، وال، بال، كال، فال، لل، و	ات، يه، ه، ي	
	Light13	ال، وال، بال، كال، فال، لل، و	ات، يه، ه، ي	
Al-Laham, et al., 2018	CondLight	ب، ت، ل، ي، ف، س، ال، وال، بال، كال، فال، لل، و	هم، هن، وا، ها، ان، ات، ون، ين، يه، يه، ه، ه، ي	NA

### Objectives achieved by Arabic Light Stemmers

The main objectives achieved by stemmers are that most stemmers which were developed tried to tackle the issue of morphology complexity by incorporating language morphology knowledge of the Arabic into stemming algorithm application. In addition, all stemmers were developed for AIR, whether based on affix removal or root based have achieved an important objective i.e., improving Arabic information retrieval performance against information needs.

Table 2 Summary of Achieved Objectives by Stemmers

Stemmers	Achieved objectives
Al-Jaly1	<ol style="list-style-type: none"> <li>show that the light stemming algorithm significantly outperforms the root-based algorithm. It also shows that a significant improvement in retrieval precision can be achieved with light inflectional analysis of Arabic words.</li> <li>In general, it appears that all stemmers significantly perform better than no stemming at all.</li> <li>The root algorithm based on the work of Khoja, which is considered as an aggressive stemmer, has shown performance superiority over surface-based (no stemming) approach.</li> </ol>
Larkey light1 to 8	<ol style="list-style-type: none"> <li>The best light stemmer was more effective for cross-language retrieval than a morphological stemmer which tried to find the root for each word.</li> <li>A repartitioning process consisting of vowel removal followed by clustering using co-occurrence analysis produced stem classes which were better than no stemming or very light stemming, but still inferior to good light stemming or morphological analysis.</li> <li>Without stemming, the dictionary translations of query terms were unlikely to match the forms found in documents. In short, with sufficient parallel data, stemming may be unnecessary.</li> </ol>

Darwish	<ol style="list-style-type: none"> <li>1. The paper presents a rapid method of developing a shallow Arabic morphological analyzer. The analyzer will only be concerned with generating the possible roots of any given Arabic word. The analyzer is based on automatically derived rules and statistics.</li> <li>2. For evaluation, the analyzer is compared to a commercially available Arabic Morphological Analyzer. However, in this paper, it presents a quick method for performing shallow morphological analysis for use in information retrieval, which entails finding the roots of words, in one day. The method is based on collecting statistics from word-root pairs:</li> <li>3. To build morphological rules for deriving roots from words,</li> <li>4. To construct a list of prefixes and suffixes, and to estimate the probability that a rule will be used or a prefix or suffix will be seen.</li> </ol>
Larkey 2005	<ol style="list-style-type: none"> <li>1. Stemming has a large effect on Arabic information retrieval, far larger than the effect found for most other languages.</li> <li>2. The root detector algorithm performed much worse than the LS.</li> </ol>

### Arabic Light Stemmers Performance

Precision is defined as the number of relevant documents retrieved by a search divided by the total number of documents retrieved by that search. Therefore, precision is a measure of purity in retrieval performance. The Table6 shows the average precision for most of the Arabic light stemming reviewed in the literature. Some research works have calculated average precision with query expansion and without expansion. For example, Aljlayl and Frieder (2002) and Chen and Gey (2003) research works results showed that average precision of the light stemmers with query expansion are higher than average precision without query expansion. Larkey and Connell 2002 and 2005 research implemented for monolingual run precision at 11 recall points. However, they only provide precision measure result. Notably, light10 precision average is higher than other light stemmers that were reviewed in this research. Light Stemmers Performance Based on Precision Measure

Basically, recall is the number of retrieved relevant items for any given retrieved set. Recall is, therefore, a measure of effectiveness in retrieving performance and can be viewed as a measure of effectiveness in including relevant items in the retrieval set (Lancaster, 1979). However, most of the researches that investigated different Arabic light stemming have not stated Recall ratio results. Except for Chen and Gey (2003) research which stated the recall results for Berkerly light stemmer performance are 4952 with query expansion and 4543 when query unexpanded. Al-Stem recall results showed 4864 with query expansion and 4500 query is unexpanded. This revealed that average recall of light stemming improves when query is expanded. Even though, the research of Nagla and Al-Ameed haven't used recall and precision measures, they have shown an accuracy of 99.6% for prefix stemming and 97% for suffix stemming. Since their research works did not implement standard measures for retrieval performance. As a result, it is hard to make interpretation on their findings as well.

Experimental results show that the conditional light stemmer gains about 5% enhancement of retrieval over the original Light10 stemmer. 11-recall levels precision-recall curve for Light10 and CondLight stemmers. The enhancement occurs mainly at a lower recall level which satisfies users' needs by retrieving more relevant documents at the first page.

### **Conclusion**

Stemming is common requirement of Arabic information retrieval. It is a preliminary step in many applications involving information retrieval. Arabic language is morphologically complex which is complicated more than any other language. This paper reviewed the state of the retrieval performance of Arabic light stemmers based on the main objectives achieved, causes for retrieval success and failure, retrieval measure, the affixes and methodologies. The Selected Arabic light stemmers to be reviewed are as follow: AL-Stem (Darwish,2002), Berkeley, (Thabet, 2004), al-Ameed, Light1, Light2, Light3, light 8, light10, CondLight, LS, Light11, Light12 and Light13

The reviewed Arabic light stemmers showed that there was shortage of information and details on analyzing the causes of retrieval performance success or failure in AIR especially for stemmers. The reported causes of success and failure included the stemming method and the type of affixes removal. In addition, there is no comprehensive list of Arabic prefixes and suffixes that proved to be standard and effective for an Arabic stemmer such as the case of English Porter stemmer. Therefore, more research and empirical studies are needed particularly on analysing the nature of proposed prefixes and suffixes for removal.

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## **PSYCHOLOGICAL FACTORS AFFECTING CONSUMER'S BUYING BEHAVIOR TOWARDS LUXURY PRODUCTS AMONG STUDENTS IN UiTM MALACCA CITY CAMPUS**

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**Abstract:** *Nowdays, advertising of mass media become the most important factor influencing consumer behavior especially of luxury products. Consumer buying behavior is the attitude of the person that always to make decision making in shopping or buy goods or services. Hence, the luxury product is the things that consumer can own itself and the luxury product is the expensive goods and recently every person affordable to buy it. The main purpose of this research is to know how the psychological factor is affecting consumer's buying behavior towards the luxury product. The psychological factors such as perception, motivation, learning and education, and attitude. The problem is whether the factors can have a positive or negative impact on the consumer buying behavior towards luxury product. The data collected from the questionnaire had been distributed to the respondents among students from the UiTM Malacca City Campus which a sample of 100 students. As a result, attitude is the most significant factor towards luxury products and this factor and supported by information and communication technology (ICT). Consequently, several suggestions and limitations had been identified and recommended for future research with other variables related.*

**Keywords:** *psychological, luxury products and information and communication technology.*

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### **INTRODUCTION**

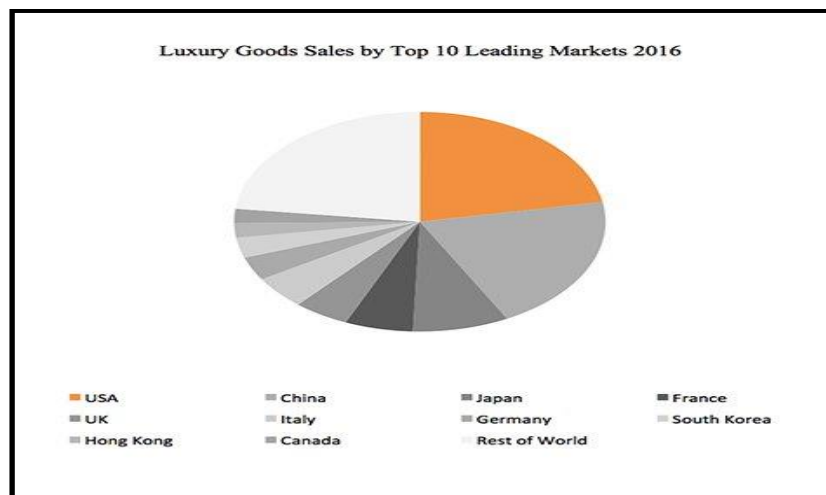
#### **Background of study**

Luxury goods are expensive, and people are willing to buy even when the luxury goods are too pricy. When people know luxury goods are expensive, the people bought because their quality is for them to use. Luxury products can give satisfaction to people who own luxury products. Luxury products are characterized by a relatively high rating on each of these dimensions compared to other products of its category (Heine 2009, p.1670). People who are using luxury products feel motivated and other people will look upon them. Based on Vigneron & Johnson (2004), exclusivity vis a vis superior quality is essential characteristics usually expected of luxury products. People use luxury products because they want to use the products in extended period. Self-satisfaction also becomes one of the objectives of why people tend to own luxury products.

**Statement of Problem**

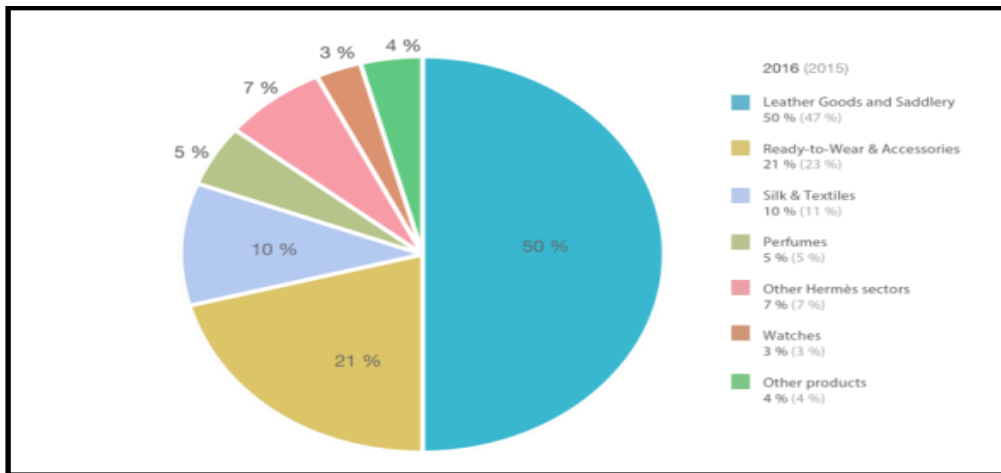
Nowadays, people like to buy things that make them satisfied. The consumer who likes to shop there are many ways to shopping such as online or go through the shopping mall. This is because the consumer wants to make sure their need and want are enough for them. Some of the consumers are working and they must be stress and tired after work. Then, if they have a time consumer may reward themselves by going shopping and besides can also do it with family and friends. There are many factors that can influence consumer buying behavior.

Firstly, this study wants to know what is the perception of consumer that buy luxury product, does the consumer have same perception or not. Next, the factors that the researcher need to know is motivation. Then, in this study the researcher wants to know why the consumer buy and choose luxury product. Moreover, this study wants to find out learning and education have a connection or not with the luxury products that can influence consumer buying behaviour. Other than that, this study wants to determine whether attitude can make consumer do a decision to buy a luxury product based on what make consumer attract to luxury product. Aside from that, this study wants to find out the psychological factors that affect consumer buying behavior towards luxury product among students in UiTM Malacca City Campus.



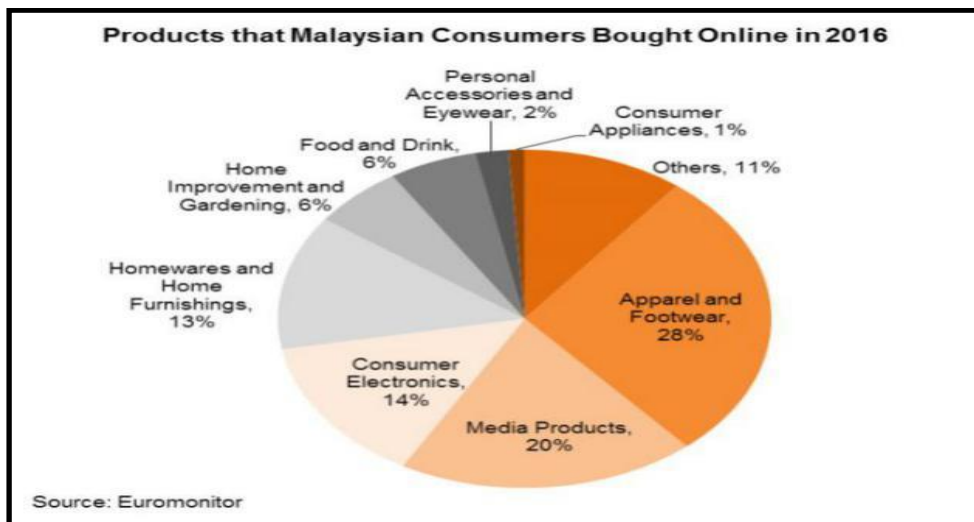
**Figure 1: Luxury goods sales by top 10 leading markets 2016**  
Sources from [www.luxurysociety.com](http://www.luxurysociety.com)

Figure 1 showing 10 leading markets in 2016 which slow growth but still leading the pack. From the figure, the top leading is the USA, UK and others. The luxury goods sale was slow growth and it can see people are not buying more in luxury products. So, the researcher wants to know if there is any effect of consumer buying behavior toward luxury products in psychological factors.



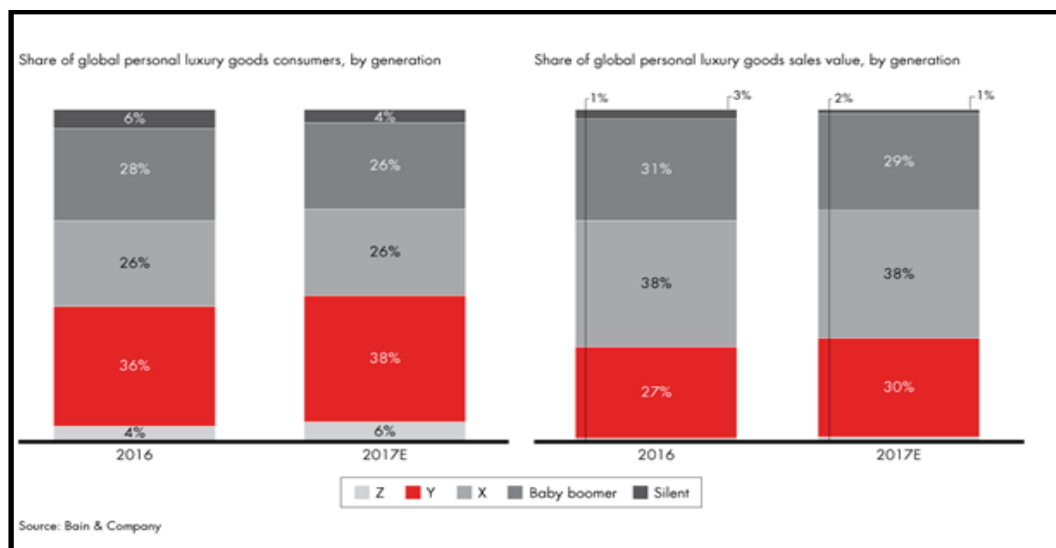
**Figure 2: The percentage of luxury goods that consumer buy Sources from finance.hermes.com**

Based on Figure 2, shows that the higher percentage is leather and saddlery which is 50 percent that consumers buy for it. Then, another product is 4percent that consumers buy because the consumers are not interested in other products. So, in this research, the researcher finds out whether the consumers are like in which products.



**Figure 3: Products that Malaysian Consumers bought online in 2016 Sources from economists-pick-research.hktdc.com**

Based on Figure 3, the highest of products that Malaysian consumer bought is apparel and footwear because the consumers like to buy more of product than others. From this figure, that can be seen the consumer are more likely choose the products that can show them more elegant, more credibility and others. So that, in this research the researcher wants to know what type of products that the students most buy of the luxury products.



**Figure 4: Share of global personal luxury goods consumer, by generation.**  
Sources from [www.bain.com](http://www.bain.com)

Figure 4 shows that the highest of luxury goods consumers is generation Y already accounts for 30 percent of luxury sales and generation Z is on the rise. So, to make sure whether the generation have more spend for luxury products or not, the researcher has done their research to generation Y. The range age for generation Y is between 17-37 years old which the year is from 1980 until 2000. Based on figure 4, generation Y has shown that they already buy luxury products.

### Research Objectives

- To identify the psychological factors that affect consumer buying behavior toward luxury products among students in UiTM Malacca City Campus.
- To determine the relationship of psychological factors that affect consumer buying behavior toward luxury products among students in UiTM Malacca City Campus.
- To determine the most significant of psychological factors that affect consumer buying behavior toward luxury products among students in UiTM Malacca City Campus.
- To identify the significant relationship between all variables if information and communication technology (ICT) as moderating.

### LITERATURE REVIEW

#### Consumer Buying Behavior (CBB)

Consumer buying behavior is the process of decision making and the attitude of people to buy and use the products. Consumer buying behavior shows how the people choose, what the perception and attitude that can give impact to the buying behaviour. Consumer buying behavior research enables better understanding and forecasting not only of the subject of purchases but also of purchasing motives and purchasing frequency (Schiffman, Kanuk 2006). A customer is a person, organization, or other element which purchases products and enterprises created by someone else, organization, or other entity (Durmaz & Jablonski, 2012).

Consequently, consumers have their right if the goods and services do not have quality and not suitable for them to use. Consumer buying behavior has two factors which are individual and environmental. The individual factor is about demographics, perception, learning, motivation, beliefs and attitude that can affect consumer buying behaviour. The environmental factor is other than individual factors such as culture, social, family, psychological and household. The environmental factors also can affect an individual's decision-making process. In marketer views, consumer buying behavior is very important for them.

### **Perception (P)**

Perception defines as the ability of the person that can see, hear or aware of something through the senses. Other than that, if people want to buy something or do something, they have their perception on that things. According to Brown and Trevino (2006), perception is the process of selection, processing and interpretation of input data from the environment to make them purposeful. Every individual has their own perception and their perception based on what they feel, what they have experienced and what they know in the past. The consumer also has different perception which on what they like or dislike. Consumer perception can affect consumer buying behavior because the senses of the consumer will make them like the goods and services that have been advertised to them. From the information that consumer have, consumer perception leads to what decision that consumers make in buy the things that they prefer.

The more information that consumer knows about the products, they will choose the products and feel comfortable to use the products. To have consumer perception, the product that is produced by the firm must be liked by others. Marketing strategies also important for consumer perception to make a buying decision on how the consumer thinks, feel and look upon the products. Perception is another vital element to the marketer because it can determine whether consumers buy the products or not (Hanna et al 2013). The marketer also must recognize the message from their competitors to catch up with consumer's attention. Marketers need to ensure their products stand out in terms of quality to ensure their consumers could persuade other potential consumers to use their products as well. Through all the decision-making process they search for prompts to approve their expectations. According to Solomon, et al.2010, perception focus on what an individual takes away from these feelings and what meaning they assign to them. Perception is how consumer comprehends their world around them considering data got through their senses. Moreover, according to Connoly (2010) because of stimuli, consumers subconsciously assess their needs, values and desires and afterward they utilize that assessment to choose, compose and interpret the stimuli. Besides that, the perception process has three different processes which is selective attention, selective distortion and selective retention.

### **Motivation (M)**

Motivation is the main thrust that encourage them to action and the activation or energization of goal-oriented behaviour. Consumers may be motivated by external factors be it in positive or negatively. When consumers know what makes them motivated, they are ready to act to achieve whatever that makes them motivated. In the words of William J Stanton, "A motive can be defined as a energy or an urge for which an individual seeks satisfaction through the purchase of something". Other than that, motivation has a level that can affect consumer buying behavior. According to Maslow's Theory, different people have different needs. Maslow's

Theory has been arranged according to human needs. The needs that human typically want are basic needs and security needs are more pressing needs than the other. Hence, these necessities turn into a thought process that guides consumer behavior to look for fulfillment. However, motivation refers to the process that leads people to behave as they do (Solomon et al 2010). When consumers buy and use luxury products other people will look at them, so the consumers feeling motivated because other people look up. The consumers will be more confident when other people look at them and giving praise to the consumers using luxury products. Nowadays, everyone wants to use luxury products because of their quality and longevity. As consumers intends to be impressed and show off their wealth even though the luxury products are expensive. Motivation have two types which are intrinsic and extrinsic motivation (Ryan & Deci, 2000). Intrinsic motivation is when people interested in the activity then the people enjoy the activities. Meanwhile, extrinsic motivation refers to the people who take part in the activities in order to get other rewards such as money and praise (Ryan & Deci, 2000).

### **Learning and education (L & E)**

Every people have learned before this from their experiences, observations and interaction with others. With the learning the consumers can use the information to know about the products more details and can do their right decision. When consumers know the products, they will be satisfied with the products and the tendency for consumers use the products are high. According to Lamb, Hair and McDaniel (2010) defined learning as the process that makes changes in behavior through experience and practice. From education, consumers can learn many things that they do not know anything. So that when the consumers have knowledge they do not worry if others are lie to them. So, knowledge about something that consumers do not know are very important for nowadays. Feedback about the products also can give impact to the consumers that have knowledge, this is because the consumers are know more details about the products. According to Blythe 2008, they have learned from past experienced and seek to maintain balance or consistency by relating to and interpreting new stimuli in terms of past. Learning have two types which is experiential and conceptual learning. This two learning is good for the consumers that want to know the products and as consumer buying behaviour. Experiential learning is when the learning changes the person's behavior while conceptual learning refers to not acquired through direct experience. From experiences also the consumers will not buy the worse products. Learning not only affect what consumers buy but also what the consumer shops. The organizations also play an important role that must give the consumers information and explanation for their products. So that the consumers will not have many questions about the products. It is how the consumer buying behavior are happened nowadays.

### **Attitudes (A)**

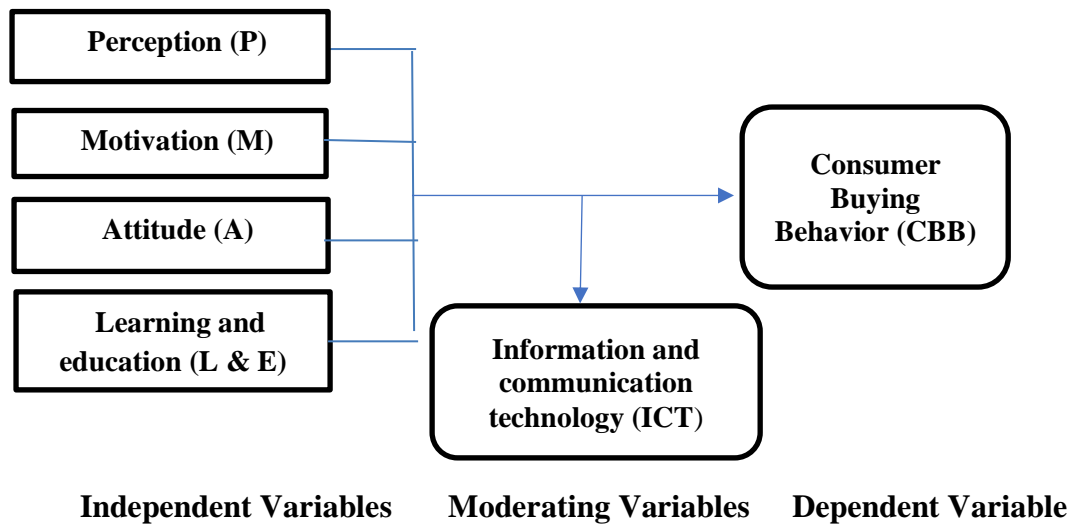
Attitudes is the feeling, emotion, belief and manner that a person have. Every person has their own attitude that can show their attitude either good or not. But in this study, the researcher wants to know what kind of attitude that consumer shows in consumer buying behaviour. Attitude also shows that consumers feeling or perception towards product that make consumers like. The consumers have their own attitude so that difficult for the consumers change their attitude. Those are secured somewhere down in consumers mind and can be a person's personality (Kotler & Armstrong 2010, p. 175). Other than that, consumers possess mentalities towards different products. By staying contact with changing consumers state of attitude, advertiser are better interest to consumers through their promoting messages and request. The

marketers also can change consumers attitude with attract the consumers with various ways that make consumers change their minds. Attitude for consumers also can influences the consumer buying behaviour. According to Hoyer & Deborah (2008), the marketers find winning state of mind towards their products and try to make it positive and on the off chance that it is as of now positive at the point attempt to look after it. There are three components of attitude which is cognition, affection and conation. Cognition attitude is the process of people form a attitude from experience and knowledge. Then, for affection refers to the emotion that happen from experience while conation is the probability of consumers to behave to buy the products. Marketers should play an important role in promoting and advertising their products for the consumers buy their products. With promoting and advertising their products can make consumer's perception can influence the consumer towards their products. It also can change consumer attitude when the marketers have promoting and advertising their products that can attract the consumers. Good products can make the consumers like to their products. According to Sarangapani 2009, people can have beliefs and attitude about particular goods and services. Consumer attitude can influence the image of products and can give impact to the final decision of the consumers. According to Lamb, Hair & McDaniel (2010), attitude is subjective because it is depending on individuals' information and confidence.

### **Information and communication technology (ICT)**

Technology includes the age of learning and procedures to create frameworks that tackle issues and broaden human abilities. In other words, technology can change or alter how people access, gather, analyze, present, transmit, and simulate information (See, 1994). The impact of technology is one of the most critical issues in education (Webber, 2003). The use of information and communication technology (ICT) creates a powerful learning environment and it transforms the learning and teaching process in which students deal with knowledge in an active, self-directed and constructive way (Volman & Van Eck, 2001). ICT isn't simply viewed as a device, which can be added to or utilized as a substitution of existing instructing strategies. ICT is viewed as a vital instrument to help better approaches for instructing and learning. It should be used to develop student's skills for cooperation, communication, problem solving and lifelong learning (Plomp et al., 1996; Voogt, 2003). The customer choice models and hypotheses created in the 1960s are still being used to structure research in the field of consumer buying behavior. This is the decision-making today be a phenomenon more complicated because of factors, for example, the digital media revolution and globalization. Besides, previous research endeavors have focused on surveying client acknowledgment of specific previous innovations instead of examining the appropriation and acknowledgment procedure of developing ICTs. It would appear to necessary that advertisers grasp the new customer and pick up a more profound knowledge into the psychological traits and cognitive behavioral antecedents that drive the take-up of rising Information and Communication Technologies (ICTs). Nowadays, technology is more advanced, and consumers can use the technology to look for their luxury products to satisfy their needs and wants. So, in this research, the researcher want to look at whether there is any impact or not on consumer buying behavior towards luxury products.

**Theoretical Framework**



*Adaption from Psychological Factors Affecting Consumer’s Purchase Intention of Agarwood Beads by Sawaros Srisutto (n.d)*

**RESEARCH METHODOLOGY**

**Research Design**

Research design is an outline for the collection, measurement and analysis of data, based on the research question of the study (Uma Sekaran and Roger Bougie, 2013). In this, research it was a blueprint for the collection, measurement and analysis of data on psychological factors of consumer buying behavior towards luxury products among students in UiTM Malacca City Campus. It explained the details of the procedure that was necessary for obtaining the information needed.

**Population of study**

The population is the entire group of people, events or things of interest that the researcher wishes to investigate. It also is the interest in which the researcher wants to make assumption based on sample statistics (Sekaran and Bougie, 2013). The population of this study is the total numbers of students in the UiTM Malacca City Campus.

**Sampling Technique**

There are two types of sampling design which are probability and nonprobability sampling. In probability sampling, the elements in the population have some known, nonzero chance or probability of being selected as sample subjects. In nonprobability sampling, the elements do not have a known or predetermined chance of being selected as subjects (Sekaran and Bougie, 2013). In this study, the probability sampling technique used because the elements of the population have some known. It fits into the broad categories of stratified random sampling. In this research, stratified random sampling was chosen as the sampling technique. As its name implies, stratified random sampling refers to the process of stratification or segregation, followed by a random selection of subjects of each stratum. It is most often used for a research

project and is perhaps the best way of getting some necessary information quickly and efficiently.

### **Size**

The sample is subset of the population. The sample size is essential to set up the representativeness of the example for generalizability. For this study, the actual listing of students in UiTM Malacca City Campus can be known. So, it was determined to distribute the questionnaires to 100 students in UiTM Malacca City Campus.

### **Data Collection**

This study uses primary data which is questionnaires. A questionnaire is a formulated written set of questions to which respondents record their answers, usually instead rather closely defined alternatives. Questionnaires are commonly created to gather large numbers of quantitative data. This study research uses personally administered questionnaires. The main advantage of this is that the researcher or a member of the research team can collect all the completed responses within a short period of time. Any doubts that the respondents might have on any question can be clarified on the spot. The researcher also can introduce the research topic and motivate the respondents to offer their frank answers. Administering questionnaires to large numbers of individuals at the same time is less expensive and consumes less time than interviewing; equally, it does not require as much skill to administer a questionnaire as it does to conduct interviews. Wherever possible, questionnaires are best administered personally because of these advantages.

### **Data Analysis**

In this study, Statistical Package for the Social Sciences SPSS version 22.0 is used to run and summarize the data. The tabulation of SPSS is to complete the data collected for further analysis. The data could also be presented in sum and frequency while it can be used to test the regression analysis as well. Furthermore, correlation also was used to see the relationship between perception, motivation, learning and attitude with consumer buying behavior.

### **Reliability Analysis**

The reliability of a measure is established by testing for both consistency and stability. Consistency indicates how well the items measuring a concept hang together as a set (Sekaran and Bougie, 2013). Cronbach's alpha is a reliability coefficient that indicates how well the items in a set are positively correlated to one another. Cronbach's Alpha is a computed in terms of the average inter-correlations among the items measuring the concept. The closer the Cronbach's alpha to 1, the higher the internal consistency reliability.

### **Descriptive Analysis**

The descriptive analysis produces descriptive statistics such as maximum, minimum, means, standard deviations, and variance that obtained for the multi-item, interval-scaled independent and dependent variables (Sekaran and Bougie, 2013). What's more, a correlation matrix can also be obtained to examine how the variables in our model are related to each other.

**Pearson Correlation Coefficient Analysis**

A Pearson Correlation matrix indicate the direction, strength, and significance of the bivariate relationships among all the variables that were measured at an interval or ratio level. The correlation is derived by assessing the variations in one variable as another variable also varies (Sekaran and Bougie, 2013).

**Multiple Regression Analysis**

Regression Analysis is a conceptually simple method for investigating the functional relationship between dependent variables and independent variables (Chatterjee & Hadi, 2006). It is also including many techniques for modeling and analyzing the variables, when the focus is on the relationship between a dependent variable and one or more independent variables. For this study, the researcher is using multiple regression analysis to determine the contribution of each of the significant predictors or also known as independent variables towards the variance in the criterion or dependent variable. According to Sekaran & Bougie (2013), multiple regression analysis is a statistical technique to predict the variance in the dependent variable by regressing the independent variables against it. The contributions of the independent variables to the variance in the dependent variables could be interpreted using the coefficient of multiple regression of determination R2 value. Since R2 value could estimate of the real population value, in explaining the contributions of the significant independent variables that accounts for the variations in the dependent variable and reports using R2 value.

**DATA ANALYSIS AND FINDINGS**

**Reliability analysis**

The reliability shows the Cronbach’s Alpha gained from the research. Table 1 shows that the Cronbach’s Alpha for a dependent variable which is consumer buying behavior is good with a value of 0.857 with 5 items in the questionnaire. The reliability test us the tested on independent variables which are perception, motivation, learning and education and attitude. Based on Table 1, the Cronbach’s Alpha for perception is good with 0.835 with 4 items in the questionnaire. As for motivation, Cronbach’s Alpha is also good with a value of 0.821 with 5 items in the questionnaire. Meanwhile, the Cronbach’s Alpha for learning and education is 0.799 with 5 items in the questionnaire which is accepted. For attitude, the Cronbach’s Alpha value is 0.716 with 5 items in the questionnaire and it is accepted based on table 4.0. The last one is the moderating which is information and communication technology. The Cronbach’s Alpha value is 0.826 with 5 items in the good questionnaire. Hence, all the variables used in the research are considered excellent and acceptable.

Variables	Cronbach’s Alpha	No. of items	Result
Consumer buying behavior	.857	5	Good
Perception	.835	4	Good
Motivation	.821	5	Good
Learning and education	.799	5	Accepted
Attitude	.716	5	Accepted
Information and communication technology	.826	5	Good

**Table 1: Reliability Analysis Of Each Variables**

### Descriptive Statistics

Descriptive analysis is to know maximum, minimum, means and standard deviation for independent variables, moderating and dependent variable.

Variables	Mean	Standard deviation
Consumer buying behaviour	3.67	.805
Perception	3.63	.865
Motivation	3.43	.808
Learning and education	3.77	.739
Attitude	3.83	.661
Information and communication technology	4.03	.571

**Table 2: Summary of Descriptive Analysis for Each Variables**

From Table 2, the most factors that influence consumer buying behavior is the attitude with the highest mean of 3.83 and the lowest factors that influence consumer buying behavior is motivation with the mean 3.43. Hence, the information and communication technology have influence consumer buying behavior and all the variables with the mean 4.03. As for standard deviation the most factors that influence consumer buying behavior is a perception with the standard deviation of 0.865 while the lowest factors that influence consumer buying behavior are information and communication technology with the standard deviation 0.571.

### Correlation Coefficient Analysis.

Variables	Perception	Motivation	Learning and Education	Attitude	Information and communication technology	Consumer Buying Behavior
Perception	1 100					
Motivation	.741** .000 100	1 100				
Learning and Education	.471** .000 100	.665** .000 100	1 100			
Attitude	.632** .000 100	.707** .000 100	.516** .000 100	1 100		
Information and communication technology	.519** .000 100	.529** .000 100	.568** .000 100	.510** .000 100	1 100	
Consumer Buying Behavior	.574** .000 100	.631** .000 100	.491** .000 100	.710** .000 100	.387** .000 100	1 100

\*\* Correlation is significant at the 0.01 level (2-tailed)

**Table 3: Correlation coefficient between Consumer Buying Behavior and All Independent Variables**

Pearson’s correlation statistics commonly used to measure the strength and direction of the relationship between two variables. The variables that the research wants to measure is perception, motivation, learning and education, attitude, information and communication technology and consumer buying behaviour. Table 3 shows that the independent variables are perception, there is a moderate correlation between perception and consumer buying behaviour. The Pearson correlation is at 0.574 and it is significant at 0.000. It indicates that perception has substantial relationship with consumer buying behaviour. The Pearson correlation for motivation is 0.631 and it is significant at 0.000. There is a moderate correlation between motivation and consumer buying behavior. Motivation has substantial relationship that can influence consumer buying behavior. There is moderate correlation between learning and education and consumer buying behavior. The Pearson correlation is 0.491 and the p=0.000. It shows that learning and education have substantial relationship with consumer buying behaviour. It also shows that, there is a high correlation between attitude and consumer buying behavior. The Pearson correlation is 0.710 and it is significant at 0.000. It shows that attitude influence the consumer buying behavior. The Pearson correlation for information and communication technology is 0.387 and the significant is 0.000. There is low correlation between information and communication technology and consumer buying behavior. The degree of correlation is low, so that information and communication technology have low impact on consumer buying behavior.

**Multiple Regression Analysis**

Model	R	R Square	Adjusted R square	Standard error of the estimate
1	0.740	0.548	0.529	0.553

**Table 4: Model Summary**

Based on Table 4, the R square indicates how much model explain the variance in the dependent variables (Customer Buying Behavior). For this research, the independent variables explained 54.8% (0.548) of variations in dependent variable (Consumer buying behaviour). However, the remaining 45.2% was unexplained in this research which other factors that affect consumer buying behavior that has not been considered in this research.

Model	R	R Square	Adjusted R square	Standard error of the estimate
1	0.743	0.552	0.528	0.553

**Table 5: Model Summary**

Based on Table 5, the R square indicates how much the model explain the variance in the dependent variables. For this research, the independent variables explained 55.2% (0.552) of variations in dependent variable. Other than that, the R square also affect by moderating which is information and communication technology. However, the remaining 45.2% was unexplained in this research which other factors that affect consumer buying behavior that has not been considered in this research.

## ANOVA

F-Statistics	Significant
23.173	0.000

**Table 6: ANOVA**

Table 6 shows that F-value is 23.173 and the significant 0.000 which is less than 0.05. This means it is significant at the 0.05 level. All the independent variables and moderating was suitable in explaining the variation in dependent variable.

## Hypothesis testing

	Hypothesis	Result (Accepted/Rejected)
H1	There is a positive relationship between perception and consumer buying behavior towards luxury products among students in UiTM Malacca City Campus	Rejected
H2	There is a positive relationship between motivation and consumer buying behavior towards luxury products among students in UiTM Malacca City Campus.	Rejected
H3	There is a positive relationship between learning and education and consumer buying behavior towards luxury products among students in UiTM Malacca City Campus.	Rejected
H4	There is a positive relationship between attitude and consumer buying behavior towards luxury products among students in UiTM Malacca City Campus.	Accepted

**Table 7: Result of hypothesis**

Regression analysis has given a clear picture of whether the hypothesis is accepted or rejected. Table 7 shows the results of hypothesis testing. Hypothesis 1 is there is a positive relationship between perception and consumer buying behavior towards luxury products among students in the UiTM Malacca City Campus. The p-value is 0.121 which is more than 0.05, Thus the hypothesis is rejected. So, there is no significant relationship between perception and consumer buying behaviour. Hypothesis 2 is there is a positive relationship between motivation and consumer buying behavior towards luxury products among students in UiTM Malacca City Campus. The p-value is 0.133 which exceeds 0.05. So, the hypothesis is rejected and there is no significant relationship between motivation and consumer buying behavior. Hypothesis 3 is there is a positive relationship between learning and education and consumer buying behavior towards luxury products among students in UiTM Malacca City Campus. The p-value is 0.091 and the significant value is more than 0.05. The hypothesis is rejected which there is no significant relationship between learning and education and consumer buying behavior. Lastly, hypothesis 4 which is there is positive relationship between attitude and consumer buying behavior towards luxury products among students in UiTM Malacca City Campus. This hypothesis is accepted which is the p-value is 0.492 and the significant value is 0.000. It shows that there is an impact between attitude and consumer buying behaviour.

<b>Dependent variable: Consumer buying behavior</b>		
<b>Independent variable</b>	<b>Standardized coefficient Beta</b>	<b>Sig.</b>
Perception	.121	.254
Motivation	.133	.309
Learning and education	.091	.327
Attitude	.492	.000
F-value	28.789	
Sig	0.000	
Adjusted R2	0.529	
R2	0.548	

**Table 8: Table coefficient without moderating**

### **Moderating factors**

Based on Table 11, there is only one variable that has a positive relationship between attitude and consumer buying behavior. The other three variables are not significant in this study which are perception, motivation, and learning and education. Other variables are not having relationship with consumer buying behavior. Based on table 5.0, the table shows that the result with the moderating. The moderating is not giving any effect to the psychological factors that influence consumer buying behavior towards a luxury products. The p-value for the moderating is -0.084. The sign negative has shown that there are no relationship and impact on the psychological factors that affect consumer buying behavior towards luxury products because the consumer wants to buy their luxury product through the shopping complex. Apart from that, information and communication technology have their benefits that can help consumers to buy luxury products online. The consumer chooses to go shopping because they have known the place that sells the luxury product.

<b>Dependent variable: Consumer buying behavior</b>		
<b>Independent variable</b>	<b>Standardized coefficient Beta</b>	<b>Sig.</b>
Perception	.143	.190
Motivation	.129	.323
Learning and education	.124	.215
Attitude	.507	.000
Information and communication technology	-.084	.354
F-value	23.173	
Sig	0.000	
Adjusted R2	0.528	
R2	0.552	

**Table 9: Table coefficient with moderating**

## **CONCLUSION AND RECOMMENDATION**

### **Research Objective 1**

For research objective 1 is to identify the psychological factors that affect consumer buying behavior toward luxury products among students in UiTM Malacca City Campus. 3 out of 4 variables the hypothesis testing is rejected. This is because the significant value is more than 0.05. The hypothesis of perception is rejected and supported by journal the impact of psychological influences on consumer buying behaviour.

### **Research Objective 2**

For research objective 2 which is to determine the relationship of psychological factor that affect consumer buying behavior toward luxury products among students in UiTM Malacca City Campus. There are only attitudes that have relationship between consumer buying behavior which the beta value is 0.492 and the significant value is 0.000. The hypothesis of motivation and learning are rejected and supported by journal factors affecting consumers' buying decision in the selection of a coffee brand.

### **Research Objective 3**

For research objective 3 is to determine the most significance of psychological factor that affect consumer buying behavior toward luxury products among students in UiTM Malacca City Campus. So that attitudes is the most significance factors that affect consumer buying behaviour. The hypothesis is accepted and have a relationship between consumer buying behaviour.

### **Research Objective 4**

For research objective 4 is to identify the significance relationship between all variables if ICT as moderating. The significance relationship between variables if ICT as moderating is only attitudes. The other variables do not have relationship. The moderating also has no effect to the psychological factors because the p-value is -0.084.

## **Recommendations**

According to the data collected, 100 respondents have been chosen to answer the survey. The respondents who have answered the questionnaire have different background and most of them are the younger generation so that it could influence the result of this study. Other than that, not all people have their same life cycles and not everyone thinks the same way. This is because the results in this study have not affect consumer buying behavior. Three variables that have been rejected, which are perception, motivation, learning and education. Hopefully future researchers would not use these variables in their study because the variables are not having impact in this study. Future researchers can look for other factors such as age, income, education, lifestyle and personality. These factors could have better impact in this study if future researchers add these factors into their study. All the variables have been rejected have supported by journal. For perception is the impact of psychological influences on consumer buying behavior of luxury products. Other than that, for motivation and learning the supported journal is factors affecting consumer's buying decision in the selection of a coffee brand. Hence, the accepted hypothesis is an attitude. Furthermore, when the researcher does this study among students as their respondents it shows that not all students like to have luxury products.

This is because they cannot afford the luxury products. The income per month are also used for their daily expenses. Some of the students could afford to buy or own the luxury products because of their family background. Meanwhile others do part-time jobs to increase their income. The future research must choose the respondents who have income or profession that can give impact to the study.

### **Future Research**

From the data and findings, the results have shown that perception, motivation, learning and education have no relationship between consumer buying behavior towards luxury products among students in the UiTM Malacca City Campus. For future researchers, they can look for other variables that can influence the consumer buying behavior. So, they do not need variables such as perception, motivation as well as learning and education for the future research. Other than that, future researchers must choose the correct variables for them to achieve a better result for their research. Moreover, the R square is low so future researchers can look for other stronger variables to make sure the R square is high. Future researchers can look for other factors such as age, income, education, lifestyle and personality. These factors could have better impact in this study if future researchers add these factors into their study. Besides that, future researchers must choose respondents based on the person that have their profession because the profession are essential to answer the questionnaires.

### **Conclusion**

In conclusion, the results of this study are only one factors that have positive relationship between consumer buying behavior towards luxury products among students in UiTM Malacca City Campus which is attitude. The R square without moderating is 54.8% while the R square with moderating is 55.2%. Other than that, the moderating factors are do not have any effect to the psychological factors that affect consumer buying behavior towards luxury product among students in UiTM Malacca City Campus which is information and communication technology (ICT). For F-value is 23.173 and the significant is 0.000 which is less than 0.05. It shows that all variables were suitable in explaining the variation in dependent variable.

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## IDENTIFICATION OF POTENCY FOR DEVELOPING BUSINESS VALUE OF NEGERI KATON TOURISM VILLAGE, DISTRICT OF PESAWARAN, LAMPUNG PROVINCE

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**Abstract:** Development of a tourism village is inseparable from the development and excavation of the tourism potentials itself. The issue that should be a concern in the development of tourism village is how the community can be encouraged and developed continuously, so that the potential of the village and society can be developed optimally (Adityaji, 2018). Negeri Katon is one of the tourist villages in the district of Pesawaran, Lampung province with the potential such as handicraft tourism, namely Tapis. The problem is the lack of knowledge and individual ability of the community in managing the business, as well as a lack of creativity and innovation in production and marketing. This research aims to identify the potential value of business of Negeri Katon Tourism Village, district of Pesawaran, Lampung province. Methods of research using qualitative methods with observation data collection techniques, interviews, and documentation. Data analysis techniques use descriptive techniques. The results of this research show that there is a large potential of Negeri Katon Tourism Village to be developed so that it has good business value. Negeri Katon Tourism Village has carried out various activities to improve the tourism value, both in the form of independent activities and cooperation with the Government and private sector. It is hoped that this research can be useful in drafting a strategy to increase business and tourism value for the community, especially for the local government of Lampung province.

**Keywords:** Tourism Village, Tourism Development, Potential Value, Business Value, Tourism Potency

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### Introduction

A developing tourism village is a village that has managed to maximize the existing potential of its area. The potential of a tourist village can help by paying attention to individual abilities in local community. The identification of this potential can be done directly by way of observation and direct interaction (face-to-face and heart-to-heart) for the local community. This potential tracking activity as the basis of developing strategies for increasing the business value of a tourist village.

Negeri Katon is one of the villages that has been declared by the Lampung provincial government as the Leading Tourism Village. Namely a tourist village that is characteristic or identity of an area and has a high tourist value. In this case the Negeri Katon Tourism Village has a characteristic as a Tapis fabric artisan village, which is a special cloth comes from Lampung Province.

Tapis is a product of traditional art from Lampungese community which is a woven fabric. Tapis fabric is made of woven cotton with sudi motives or decorations, embroidered with silver or gold thread. The material used is woven fabric, cotton yarn and gold or silver thread. Tapis cloth is usually used at the top of gloves that made of cotton yarn with motives such as flowers and animals, embroidered with gold or silver thread a (Exploride, 2012).

### **The Tourism Village and The Craft of Tapis Lampung**

The village is the smallest community of life that has given color and features (landmarks) to the pattern of life of Indonesian so that they can be distinguished from the characteristics of the lives of other nations. Sastrayuda (2010) revealed that tourism development, in line with developing dynamics, has penetrated various terminologies such as, sustainable tourism development, village tourism and ecotourism, which are tourism development approaches that seek to ensure that tourism can be carried out in non-urban tourist destinations. Whereas in the conceptual dimension of the tourism village has the understanding of making the overall potential of the village and its people as a tourist attraction so that there is direct interaction with the community and consuming a variety of tourist attraction products and services provided by the village community such as homestay-eating and drinking-art and culture-village services educational motivation, experience, life enrichment.

Tourism village is one form of application of community-based and sustainable tourism development. Through the development of tourism villages, it is expected that equity will occur in accordance with the concept of sustainable tourism development. In addition, the existence of a tourism village makes tourism products more valuable in rural culture so that the development of tourism villages is cultural value without damaging it. Inskeep (1991) says that village tourism is a form of tourism, where a small group of tourists live in or near traditional life or in remote villages and study village life and the local environment. Nuryanti (1999) defines a tourism village as a form of integration between attractions, accommodation, and supporting facilities that are presented in a structure of community life that integrates with applicable procedures and traditions. It was also stressed that the most important component in a tourism village was (1) accommodation is part of the residence of the local population and/or units that developed in accordance with the residence of the population, and (2) attractions, namely the entire daily life of the local population and their background physical location of the village which allows integration of tourists as active participants, such as dance, language, painting, and other special things. Tourism village is tourism which consists of overall rural experience, natural attractions, traditions, unique elements that can attract tourists as one (Joshi, 2012). So the essence of the tourism village is the development of a village that utilizes the capabilities of the elements existing in the community and the village that functions as an attribute of tourism products into a series of integrated tourism activities and has a specific theme in accordance with the characteristics of the village. Based on the essence of the tourism village, a village is referred as a tourism village if it is able to offer an overall atmosphere that reflects the authenticity of rural areas in terms of socio-economic, socio-cultural, daily customs of the villagers, village building architecture, or daily activities of villagers that has unique value and interesting, both in the form of attractions, accommodation, food and beverages, and other uniqueness that is owned by a village.

### **The Development of Tourism Village in Indonesia**

In the development of a tourist village as a tourist attraction it needs to be understood from the beginning if the local community is not as a passive object but rather as an active subject. A rural environment can be seen as an object as well as a tourist subject. As an object it means that the village is a destination for tourism activities while as a subject is the organizer, what is produced by the village will be enjoyed by the community directly and the active role of the community will determine its continuity (Raharjana, 2005). The implementation of community-based tourism, especially for the development of rural tourism, several issues that must be considered are participation, decision making, community capacity building, and access to the tourism market.

The management of tourism villages through excavation of village and community potential on an ongoing basis then the development of tourism villages can have a maximum impact on the welfare of farmers and village communities. Thus, the development of a tourist area inseparable from the development and excavation of tourism potential itself starting from the level of the region or the lowest (Adityaji, 2018).

The development of the tourism village refers to the local government policy that Pesawaran Regency Government in assisting the Tapising community in the District of Negeri Katon is to form a Regent Regulation Number 17 of 2016 concerning the determination of rural areas based on the Tapis Craft industry center. The District of Negeri Katon is one of the superior programs in Pesawaran Regency with the aim of improving service quality, economic development and empowering rural communities.

### **The Tapis and Its Development**

Tapis Fabric for Lampung Indigenous People has a symbolic meaning as a symbol of purity that can protect the wearer from all impurities from outside. In addition, the use of Tapis Fabric also symbolizes the user's social status. At each Customary Marriage Ceremony the bride is required to use Tapis and Siger fabrics in certain forms as a characteristic for the Indigenous and Caste Communities of the bride concerned (Ariani, 2016).

Lampung Province has a very rich culture, one of them is Tapis. Tapis is a Lampung people's identity that has been preserved for centuries. Negeri Katon District, many of its residents earn a living as Tapis artisans, especially women. The role of the Pesawaran Regency Government in carrying out its function is to prioritize local wisdom by utilizing the potential of human resources, natural resources, science and technology for improving the welfare of the community, therefore demands innovation, creativity, entrepreneurial spirit and are more responsive to the public interest.

Preservation of Tapis as a local wisdom of Lampung, in effort to improve the economic welfare of the artisans, therefore the Government of Pesawaran District established a Regent Regulation Number 17 of 2016 concerning the determination of rural areas based on Tapis Craft industry centers in the District of Katon and the village in question namely:

**Table 1: The Name of Villages, Number of Artisan, and Its Type of Products**

No.	Name of Village	Number of Artisan	Type of TapisProducts
1	KagunganRatu	100	Shawl and sarong
2	NegeriKaton	158	A variety of Tapis products
3	TanjungRejo	50	Shawl and sarong, cap
4	HalanganRatu	100	A variety of Tapis products
5	Negara Saka	40	Shawl and sarong
6	Kalirejo	150	A variety of Tapis products
7	Pejambon	8	TapisClothes
8	UlanganJaya	60	A variety of Tapis products

Tapis is the identity of Lampung in aligning life with both the environment and the creator of nature. Tapis is one of commodity that will assist local governments in absorbing labor, providing employment, if carried out in accordance with the aims and objectives of the policy. The general characteristics of small industries in Indonesia has no exception. The Pesawaran District is reflected in entrepreneurship, capital, marketing, skills, availability of raw materials, product design, equipment and business facilities. Problems faced by Small and Medium Enterprises (SMEs) include limited quality of Human Resources (HR) of SMEs actors, access to productive resources such as limited access to capital and use of technology, infrastructure problems, such as representative markets, and road facilities that facilitate SMEs to sell the results of their business and government bureaucracy issues, such as the quantity and quality of government apparatus resources in coaching and mentoring for SMEs (Ramadhansyah & Silalahi, 2013).

### Method

Methods of research used qualitative methods with observation data collection techniques, interviews, and documentation. Data analysis technique used descriptive techniques.

### Data Collection

Data collection techniques used observation, interviews, and documentation. The type of sampling used snowball sampling (Johnson, 2014) by applying positivism paradigm. As a philosophy, positivism adheres to the view that only “factual” knowledge gained through observation (the senses), including measurement, is trustworthy. In positivism studies the role of the researcher is limited to data collection and interpretation in an objective way (Dudovskiy, 2016).

### Data Analysis

Data analysis technique used descriptive techniques with positivism paradigm approach. Moreover, in positivism studies the researcher is independent form the study and there are no provisions for human interests within the study. Crowther and Lancaster (2008) argue that as a general rule, positivist studies usually adopt deductive approach, whereas inductive research approach is usually associated with a phenomenology philosophy. Moreover, positivism relates to the viewpoint that researcher needs to concentrate on facts, whereas phenomenology concentrates on the meaning and has provision for human interest.

## Results and Discussion

### The Wealth of Tapis Handicraft Products as a Tourism Value

Based on observations and interviews, the current condition of the Negeri Katon Tourism Village still needs to be improved. The villagers hope that their handmade-Tapis can be sold easier and reach many areas, both local and abroad. Although in reality, some of their works have reached foreign countries such as Germany and Japan, but when compared with the number of works that have been made are still very few in number. There is only few number of foreign tourists who come to the village of Negeri Katon. It means Tapis and Negeri Katon village are still not popular. It also happened for our local tourist. There are only a few interested people who come directly to Negeri Katon seeing the process of making and buying Tapis as merchandise.

On the other hand, the government has carried out various activities that support the increasing popularity of Negeri Katon tourism villages, such as involving a mentor and several representatives of the Tapis country village artisans at the 2017 KKI Export-Import event in Jakarta organized by the Office of Trade Republic of Indonesia. But this activity certainly will not give a maximum impact if it is not accompanied by other supporting activities that are continuous and consistently carried out directly by Negeri Katon village community.

According to the villagers of Negeri Katon, which is also one of the producers of Tapis cloth, it takes a week to weave Tapis cloth, with a wage of 50 thousand rupiahs per cloth. As for Lampung embroidery that is called Sulam Usus, it takes a month with a salary of 500 thousand rupiah. Most of Tapis artisans Negeri Katon Village are from Lampung. The culture of weaving Tapis cloth or known as '*nyucuk*' is a cultural hereditary heritage that has been done by the villagers of Negeri Katon since they are teenagers (age 10 - 12 years old) and most of them are females. This *nyucuk* activity becomes a side job, especially for housewives while taking care of children and other household needs. From the business side, they get income about Rp. 200,000,- - Rp. 500,000,- per month, depending on the number of products they produced.



Figure 1: The Looms Made of Wood and The Artisans

PNPM Mandiri Pedesaan (National Community Empowerment Programing Rural Independent) and the local government are helping the community by providing assistance in the form of looms made of wood. While the needles, sewing machines, and raw materials (cloth and gold thread or embroidery thread) are sought by the community, both independently and

in groups. At present the marketing efforts of Tapis products are carried out by including products at the SMEs exhibition held by various parties, especially by the Republic of Indonesia's Department of Tourism and Trade Office, both regional and national level events.



**Figure 2: The Group of Family Craftmen and Researcher Team**

The problem that occurs is that the community has not been able to market the results of its products to the wider community, so the income earned is not optimal. Whereas in terms of aesthetics and cultural values, Tapis cloth of Negeri Katon Village has a high selling value. This is evidenced by the appreciation of foreigners who buy Tapis cloth in the form of dresses with sizable nominal compared to other similar products.

**Table 2: The Products of Tapis Crafts from Negeri Katon Tourism Village**

<b>Intact Tapis Products</b>	<b>Tapis products as accessories</b>	<b>Souvenir products</b>
Traditional Fabric	Skullcap/cap	Key chains
Sulam Usus (intestinal embroidery)cloth	Fun bag	Wall decoration
Scarves	Sling bag	
	Wallets	
	Ties	
	Hats	
	Motive on Shirts and Batik	
	Jar	
	Tablecloth	
	Hijab	
	Long dress	

In addition to fabric traditional products, there are several other types of Tapis products, such as skullcap/cap, bags, wallets, scarves, ties, key chains, hats, and other accessories that are affixed, such as Tapis motives on shirts and batik.



**Figure 3: Intact Tapis Products (left to right: Traditional fabric, Sulam Usus, and Scarf)**



Figure 4: Tapis Products as Accessories (left to right: Skullcap/cap, Wallet, and Hijab)

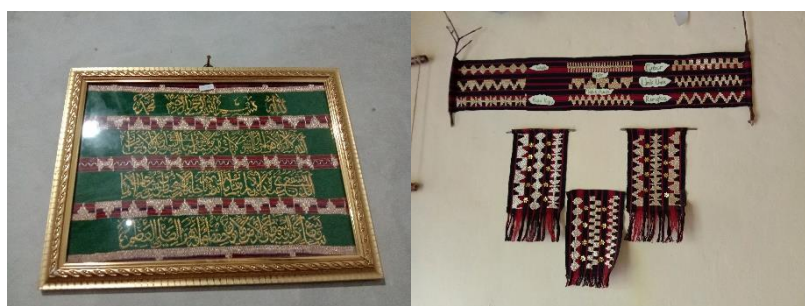


Figure 5: Souvenir Products (left to right: Wall Decoration)

### Tapis Artisans Group as Barometer of Success

Initially, the Tapis artisans in Negeri Katon Tourism Village carried out these ‘nyucuk’ activities individually, but did not have a group yet. Tapis Jejama is the name of a group of Tapis artisans who manage Tapis handicraft products in Katon Negeri Village. This Tapis producer group was first established in 2014 with an asset value of 100 million. Nowadays, the annual business turnover reaches 100 million rupiah. Activities that are often carried out by the Tapis Jejama group include: taking part in exhibitions, conducting training, and sending members / group leaders as resource persons at several events. At this time, Tapis Jejama group is chaired by Redawati. In addition, there is Zuliana and Juwariyah who also helped manage and market Tapis handicraft products.



Figure 6: Tapis Jejama Group

**(left to right: Researcherteam with Zuliana, Researcher team with Redawati,  
and A certificate of Tapis Jejama Group)**

### **Development Opportunities in the Tourism Business Value of Negeri Katon Village**

The tourism industry has the potential to provide sustainable employment and empowerment for Negeri Katon villagers. With the Tapis Jejama artisan group, they try to increase the value of this business on the right track. Government and private sector support is already in place. Then the opportunity to increase the business value of the Negeri Katon tourism village is even greater. Some things we can do to increase business value of Negeri Katon tourism village include:

- Increase the amount of intensity of participation at the exhibition
- Increase the number of looms, both manual and automatic tools, such as weaving wood and sewing machines
- Maintain work training routines for the artisans community
- Bring in external speakers to increase the knowledge and insights of the artisan community about the value of the tourism business
- Improving village facilities and infrastructure directly related to improving the image of the Negeri Katon tourism village, such as renovating and decorating the Village Hall for permanent, permanent exhibition facilities.
- Promoting products through information technology, such as social media and internet.
- Preserving and increasing the quality of products.
- Exploring more various design and motive of products.

### **Conclusion**

The current condition of the Negeri Katon Tourism Village still needs to be improved, this is based on observations and direct interviews. There are only a few interested tourists who come directly to Negeri Katon to see the process of making and purchasing Tapis handicraft products. Meanwhile, the government has held supporting activities represented by the Republic of Indonesia's Department of Tourism and Trade Office. But this will not give maximum impact if it is not supported by other supporting activities that should be done by Negeri Katon villagers.

The problem that occurs is that the community has not been able to market their products to the wider community, so the income will not be optimal. While in terms of aesthetic and cultural values, Tapis Village Katon Negeri fabric products have a high selling value. This is evidenced by the appreciation of foreigners who buy Tapis in the form of dresses with a sizable nominal compared to other similar products. Some things we can do to increase the business value of a tourist village include: 1) increasing the number of participation in exhibitions, 2) increasing the number of looms, 3) Maintaining work training routines for artisans community, 4) Bring external speakers to increase the knowledge and understanding of the artisan community about business value, and 5) Improving village facilities and infrastructure that are directly related to improving the image of Negeri Katon tourism village, 6) Promoting products through information technology, such as social media and internet, 7) Preserving and increasing the quality of products. 8) Exploring more various design and motive of products.

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## **COMPUTER-AIDED SOFTWARE IN LEARNING STATISTICS COURSE: A CASE STUDY AMONG FURNITURE TECHNOLOGY STUDENTS**

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**Abstract:** *Computer-aided software is one of the most promising innovations to improve teaching and learning process. With the integration of modern information and communication technology, the most suitable statistical software that can be used to assist students in statistic course is Minitab software. Minitab software was used in this study as a computer-aided software in learning statistics course especially in the data analysis part. In order to measure the effectiveness of learning statistics using computer-aided software, 26 students who enrolled statistics course was selected. From the result, there is significant improvement in students' score when Minitab software was used in the course. The average of score also showed improvement by more than 14 percent compared to the traditional approach. The positive impact of students' performance indicated that the computer-aided learning is more applicable to be implemented in many different courses, not only limited to statistics.*

**Keywords:** *Computer-aided Software, Minitab, Statistics Course*

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### **Introduction**

Cobb, George and Moore (1997) had defined "Statistics is a methodological discipline study of a coherent set of ideas and tools for dealing with data. The focus on variability naturally gives statistics a particular content that sets it apart from mathematics itself and from other mathematical sciences, but there is more than just content that distinguishes statistical thinking and mathematical thinking, because data are not just number, they are number with a context". The definition by Cob et al. (1997) is consistent to the Brook (2010), who stated that statistics is the study of the collection, analysis, interpretation, presentation, and organization of data which dealing with all aspects of data including the design of surveys and also the experiments.

Statistics becomes a very useful course due to the knowledge and skill gathered can be applied in different disciplines including social sciences and technology. In addition, statistics also becomes among the most important course in higher education level due to the higher demand from government and private sectors. Nowadays, statistics has started to be introduced as a compulsory subject at higher learning institution, so that majority of the programs offer this course in their curriculum structure. Aszila, Suriyati and Sharifah Norhuda (2015) in their

study found that many perceptions were given to statistics course by students at higher learning institution such as it is considered as a killer course, difficult to understand and hard to score. These negative perceptions occurred based on the way statistics knowledge and skills were delivered.

Consequently, the aim of this study is to measure the effectiveness of computer-aided learning as teaching method of statistics course. The statistical software used in learning process conducted in lab session will provides instructors with external quality elements. This paper discusses the early phase of the teaching and learning process using traditional method followed by statistical software method. Tourism is one of the fastest growing development sectors in addition to other development strategic agendas such as energy, food, infrastructure

### **Literature Review**

In general, the teachers or instructors are trying to teach with their own understanding and beliefs. Teaching method refers to the general principles, pedagogy and management strategies used for conducting learning process. The used of teaching method depends on the different factors; educational philosophy, classroom demographic, subject or course area and also may influenced by school mission itself. As stated by Mahmud (2001), a suitable teaching method used will attract students to take part in the learning session. Being attracted to learn is very important factor to evaluate the students' acceptance toward learning process. Furthermore, Ng (2005) stated that a lot of teaching styles such as blended learning will reflect teaching learning to be better.

According to Bergeson (2000), the students would try to learn especially in calculation subject with their maturity, intellectual ability, preferred learning styles, attitude and social adjustment. In addition, Greer (n.d.) suggested that a concept mapping learning technique can be used in order to improve the quality of learning mathematics. The alternative method conducted by Aszila et al. (2015) has revealed that there was significance difference in students' performance after conducting the probability workshop. Students performance in probability topic were better after they attended the workshop.

Currently, teaching and learning process are facing new era of education transformation. One of the basic requirements for education in the future is to prepare the students to participate in the knowledge that related to social and economic development (Ministry of Education, 2015). Educational institutions are being forced to find better pedagogical methods to cope with these new challenges. Due to this process of development, it is expected that computers could play an important role in restructuring teaching and learning processes to be better prepared for future challenges. Computer-aided learning is one of the most promising invention to improve teaching and learning process that has integrated both modern information and communication technology. This tool becomes one of the most innovations in educational process that can be an interactive method to be used in teaching and learning process, not only limited to qualitative course, but also quantitative course such as statistics.

Therefore, the evaluation of teaching method should be implemented not only limited to traditional method, but using computer-aided learning method. According to Furner and Daigle (2004) and Nisançi (2000), the effectiveness of educational evaluation is the primary area with which developers of learning software must concern. Development of software for learning purpose must be usable and educational so that the learning process will successful. Many courses can deal with the educational software, such as mathematics and statistics. Azidah, Fatariah and Ahmad (2012) had conducted a study among students in learning drawing using

software as a learning support tools. Their study revealed that the students had an excellent improvement in drawing skills. In addition, Raafat, Nabil, Taleb and Ghaleb (2014) also used the computer-aided software to help students increasing the understanding level of chemical engineering problem. It was proven effective when the students become more understand towards chemical engineering problem.

As stated by Cobb et al. (1997) and Brook (2010), one of the steps in statistics is data analyzing. Statistics itself can be analyzed using the statistical software such as SPSS, Minitab, SAS, S-Plus and R. One of the most popular statistical software among science and engineering field is Minitab. Minitab is a statistics package developed by Barbara F. Ryan, Thomas A. Ryan, Jr., and Brian L. Joiner in 1972 at the Pennsylvania State University. This software is distributed by Minitab Inc, a privately owned company headquartered in State College, Pennsylvania (Meyer and David, 2004).

## **Research Methodology**

### ***Participants***

The sample comprised all 26 students of Bachelor in Furniture Technology from one of the public universities in Malaysia. Majority were female (68%) and the rest were male (32%). The students were enrolled a statistics course namely Statistics for Sciences and Engineering. The course covered the basic and intermediate methods of data analysis. All students participated on a voluntary basis by answering a questionnaire.

### ***Instruments***

Two different sets of tests were developed in order to measure students' performance in statistics course. The first test, Test A, comprised of questions that need students to calculate manually on every solution in order to finally come out with the results and conclusion. On the other hand, Test B had applied Minitab output in the question to achieved the same goals. In order to measure the effectiveness of computer-aided learning as a teaching methods, scores for both tests were recorded. Students were also asked to answer a self-developed questionnaire which contain 10-items, including a set of demographic questions. Responses for the questionnaire were based on Likert scale that ranged from 1= *Strongly Agree* to 5 = *Strongly Disagree*.

### ***Methodology***

The statistical methods used were descriptive statistics and paired sample t-test. For paired sample t-test, the null hypothesis was set to identify whether there is no significant improvement in students' score when computer-aided software was used as teaching method in Statistics course. The Statistical Procedures for Social Sciences (SPSS) was used to analyze the data.

## **Finding and Discussion**

Total of 26 students from Bachelor in Furniture Technology were involved in this study. From all participated students, 65.3% preferred the use of computer-aided software in learning statistics course, and the other 34.7% were disagree. Table 1 showed that 56.8% of the students agreed that statistics is an easy course if Minitab is used in the data analysis part, and 46.2% were unsure. Result also revealed that 61.5% students enjoyed learning statistics with the use of Minitab.

**Table 1 Students’ Acceptance Towards the Use of Minitab in Statistics**

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Statistics is an easy course if using Minitab in the data analysis	0.0	0.0	46.2	42.3	11.5
I enjoy learning statistics using Minitab	0.0	3.8	34.6	50	11.5

According to the result showed in Table 2, it is found that 57.7% of the students agreed that they would understand better when learning statistics with the use of Minitab, but 3.8% were disagree. Majority of the students also agreed that Minitab as the computer-aided software were more applicable in data analysis part and helped them to understand the concepts in statistics better.

**Table 2 Students’ Opinion Towards the Use of Minitab in Statistics**

Statement	Strongl Disagree	Disagree	Neutral	Agree	Strongly Agree
I will understand better when learning statistics with the use of Minitab	0.0	3.8	38.5	46.2	11.5
I think statistics will be more applicable with the use of Minitab	0.0	3.8	30.8	53.8	11.5
I think I will explain the concepts in statistics better with the use of Minitab	0.0	7.7	26.9	57.7	7.7

The analysis of paired sample t-test for Test A and Test B were run as shown in Table 3 to measure the effectiveness of computer-aided software as a teaching tools in learning statistics course. Test A referred to test that needs students to calculate manually each of the solutions and come out with their finding and conclusion, meanwhile Test B referred to test with provided output from Minitab software in order to describe finding and conclusion. The results revealed that the *p*-value of Test A and Test B scores data is 0.000 (less than 0.05) which indicated that there was statistically differences between mean score obtained for Test A and Test B. Since the null hypothesis is rejected, it can be concluded that there is strong evidence ( $t = 8.089$ ,  $p$ -value = 0.000) that the students’ score has improved when computer-aided learning was used as teaching methods.

**Table 3 Paired Samples T-Test**

Statistics	T	Degree of freedom	<i>p</i> -value
Test A-Test B	8.089	25	0.000

According to Table 4, the mean scores for Test A and Test B are 76.73% and 91.15% respectively. The finding indicates that the test using output from Minitab software had improved students' score in statistics subject on average by approximately 14 points. The results obtained have been supported by Azidah et al. (2012) who stated that there is an excellent improvement in students' achievement in learning engineering drawing after using software as a learning support tools. The other study conducted by Raafat et al. (2014) also found that computer-aided software helped students in enhancing their understanding of chemical engineering problems.

**Table 4 Paired Sample Statistics**

Test	Mean	No of students	Standard deviation	Standard error of the mean
Test A	76.73	26	10.67	2.09
Test B	91.15	26	6.05	1.19

**Conclusion and Recommendation**

This study was conducted to measure the effectiveness of computer-aided learning as teaching method in statistics course. The statistical software used in learning process conducted in lab session had provided instructors with external quality elements. The finding indicates that the test result using minitab software improved students' score in statistics subject. The score on average increased by approximately 14 percent. It has proven that using software will help students to increase their performance. For further research, this method could be expanded to other campuses and courses for more representative result. For early exposure, statistical software for statistics course should be introduced for diploma level.

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