

## DETERMINING SIGNIFICANT FACTORS AFFECTING GREEN BUILDING PRICE USING MULTIPLE REGRESSION ANALYSIS

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### ABSTRACT

*The green building (GB) can be defined as the method of increasing the efficiency of the building and site. However, the spillover effect of GB price in Malaysia has not widely been discovered as there are limited case studies on this issue. This paper attempts to determine the significant factors that influence the GB price. The empirical experiment has been conducted to test the Multiple Regression Analysis (MRA) model on a real dataset of house prices in the area of Klang Valley, Selangor with GB specifications. The result showed that factors related to tenure have significant contributions to the GB price.*

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**Keywords:** Green Building Certificated, Green Building Index, Multiple Linear Regression (MLR), House Price



## **INTRODUCTION**

The green building (GB) can be defined as the method of increasing the efficiency of the building and sites by using water, energy, and natural materials. In turn, it can reduce the negative impact on human health, and the environment by improving the operation of a system, design of a building, ensuring maintenance, constructing and relocating of a longer building life cycle (Rahmat & Said 2015); Radwan, Kashyout, Elshimy & Ashour (2015). It can generate higher sales prices per square foot (per sqft) compared to conventional building (Abdulllah & Mohd (2017). The design, construction and operation of these accommodations and workplace buildings are responsible for the consumption of many natural resources. In light of this situation, GB compliance building can resolve the issues related to the consumption of energy and natural resources by reducing unnecessary waste, preventing pollution and minimizing energy usage, which consequently ensures a healthier living environment (Darko, Chan, Owusu, & Antwi-afari, 2018).

Acknowledging the above issues, it is important to identify the significant factors that affect the GB price (Abdullah & Mohd, 2018). This is due to the fact that developers, communities and agencies nowadays are already aware of the advantages of GB and they are keeping up with the development of the GB industry (Usman Aminu Umar, 2012; M. Yusoff, 2015). Furthermore, the criteria that GB possesses such as eco-friendly building materials, environment-friendly construction operations, consumption of green power, efficient water and energy consumption, and eco-friendly equipment are really significant (Uparwat, Gawatre, & Shahezed, 2012). These criteria become the reason why it is crucial to identify the significant factors that determine the price of GB. Moreover, very few researches have reported a study on factors affecting GB price such as the study on factors affecting homebuyer to pay green building price (Portnov et al., 2018), influencing factors of consumer willingness to purchase green housing (Sang et al., 2019) and factors influencing buyer's intention to purchase green building (Durdyev & Ihtiyar, 2020). However, there is no previous study investigating the significant factor that influences the GB price.

In conjunction to this issue, this paper will present the finding of a study that used regression analysis that focused directly on MRA in order to determine the significant factors for GB price chosen in this study.

## **LITERATURE REVIEW**

### **Factors Affecting Building Prices**

In general, the question arises on the factors affecting the prices of property. The factors influencing the property prices can be divided into five (5) groups; transaction-related features, physical structural features, location features, environmental and neighborhood features. In transaction-related features, the transaction prices of property are used as DV to predict the IV (factors). The following subsection will discuss the factors affecting the value of condominium property values, as our research refers to the dataset of real estate that focuses solely on condominium properties.

#### **Transaction-Related Characteristics**

Transaction price or sale price is used as a dependent variable (DV). According to the Royal Institution of Chartered Surveyors, sale prices are the most reliable data source in assessing property values because it has been purely exposed in the open market value RICS (2019). Other transaction-related characteristics are building status (freehold/leasehold), date of transaction, the position of unit and level of the unit Mohamad (2012).

#### **Physical and Structural Characteristics**

The structural characteristics of property data were obtained from the same source as the sale price data. Structural characteristics include lot size, main floor area (Trabucco & Douglas Miranda, 2019; Jayantha & Sze Man, 2013), building improvements, roof material, types of floor and ceiling, building material, conditions of outside and inside of the building (Mohamad, 2012), age of building (Clapp & Bardos, 2009; Mohamad, 2012) and number of bedrooms (Jayantha & Sze Man, 2013). Indeed, the physical and structural characteristics are important to be take into consideration as to ensure the quality and efficiency of the building. Hence, few site inspections have been conducted to assure all related structural characteristics are involved.

## **Location Characteristics**

The importance of the location of a particular property in determining the property value has been widely discussed in previous literatures (McCord, McCord, McClusky, Davis, & McIlhatton, 2014; J. B. Mohamad, Ismail, Mar Iman, & Mohd, 2017). It is said that the main factors that influence property value are location, location, and location (Abidoye & Chan, 2016; Ge & Du 2007; Messah, 2011). A demand rate for a particular property is affected by location (Kolbe & Wüstemann, 2015). This statement is supported by McCord et al., (2014), who suggested that location is the dominant factor to understand property demand and value.

Locational factors are related to amenities, transportation, physical attributes, neighbourhood, environment quality, and accessibility to work, among others. All these factors are related to location (Abidoye & Chan, 2016). Commonly, the assessors obtained the information for the subject property based on the location of the subject. For instance, location within a city is the most important factor in property market. A substitution for the locational factor is distance, which is the length of physical separation between property to the central business district (CBD) (Ernawati Mustafa Kamal, Hasnanywati Hassan, 2016; Ferlan et al. 2017; Nabilla et al. 2012; Nicholls & Crompton, 2005).

## **Environmental Characteristic**

The green building label is a system that can change the behaviour of potential buyers. Thus, it is important to convince the potential buyers that a particular green label (certification) is well recognized in the market and covers the whole set of the green features of a property (Mohd et al., 2020).

## **Neighbourhood Characteristics**

Neighbourhood characteristics refer to characteristics of a particular area; specifically, a residential area. This includes the physical features, quality of housing, the presence or absence of basic resources as well as the activities that happen there. Residential areas with denser population and more packed neighbourhood are usually located close to urban centres and can accord greater value to the proximity of the property price, while suburban and rural residents do not seem to accord as much price. This is

because as the density of a particular population increases (Miles, 2012; Huang, Du, & Yu 2015), the demand for housing also increases. Social sustainability is based on several social aspects such as the feeling of well-being, aesthetics, health and comfort, security and user satisfaction as claimed by Candas, Kalkan, and Yomralioglu (2015), Burinskien (2014), Ferlan, Bastic, and Psunder (2017), Nabilla, Husain, Rahman, and Ibrahim (2012), Sakip, Abdullah, and Salleh (2013), appropriate living environment and social integration stated by Adegoke (2017), infrastructure (Ajibola & Awodiran, 2013; Aluko, 2011; Pope, 2011; Frew & Wilson, 2002).

However, the report data from the above literature will not be included in this study, as the researcher will only focus on the existing data provided by the Valuation and Property Service Department (JPPH). JPPH has a collection of real market GB prices with specific determinants.

### **The Statistical Method in Modelling Green Building**

The MRA model can explore the relationships between the independent variable (IV) and the dependent variable (DV). It enables the researchers to predict DV based on a variety of information known as IV (Uyanık & Güler, 2013). Besides, the MRA can also identify a significant IV that contributes to the DV. This happens because the MRA model allows various components of the property to be included in it in order to achieve its market value by ensuring the flexibility of the parameter estimates, that are usually linear to the added benefit of manual property valuation, less subjectivity and cost-effectiveness (Ligus & Peternek, 2016).

Furthermore, the DV of this paper is selling price, while the IVs are Floor Level (FL), Lot Size (LS), Storey of building (SB), Age of Building, (AB), Land Use (LU), Price Per Square Feet (P) and Tenure (T). The researchers used real GB dataset of house prices in the area of Klang Valley, Selangor.

## **METHODOLOGY**

### **Method**

This study explored the influence of various factors that may contribute to the properties price. The estimation or prediction of prices was done by considering various features that can be applied using the MRA model. The DV is considered to be a linear function of one or more IV plus errors that was included into the account for all other factors. Mathematically, it is calculated using the equation formula below.

$$Y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \dots + \beta_nx_n + \varepsilon$$

Where Y indicates as Selling Price (DV),  $x_1, x_2, \dots, x_n$  as independent variable (IV), regression coefficient labelled as  $\beta_1, \beta_2, \dots, \beta_n$ , as constant, n is the total number of independent variables used in the model and  $\varepsilon$  as the error term.

### **Data Collection**

The dataset was collected from 2017 to 2019; the sources were taken from the Valuation and Property Service Department (JPPH) in digital form. The data contained a record of 191 of GB transaction under high rise status in Klang Valley areas. However, after the data cleaning process is finished, only 102 GB transactions were involved.

Furthermore, there were three (3) steps involved in discarding "problematic" data used by authors which were 1) removing any incomplete data such as those without information on land area, floor area, selling price and address; 2) getting data properties with the first transaction, directly from developers; and 3) categorize green building based on GB certificate. Table 1 shows the cleaning process of GB dataset by entering 102 GB data transactions into MRA and ran the analysis using IBM SPSS statistics.

**Table 1: A Record of Data Cleaning Process**

No	Data	Number of records left
1	Original Data from JPPH from year 2017 to 2019 with GB status	191
2	Excluding incomplete data (removing all incomplete data such as those without information on land area, floor area, selling price, address and data evidence under categories 2 years back)	140
3	Excluding the properties with the first transaction which means it is fresh from the developer	51
Total		102

Source: Author

## RESULTS AND DISCUSSIONS

The objective of this study was to determine of significant factor in influencing the GB price. Thus, the finding of using MRA model is presented in Table 2.

**Table 2: Anova Table**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.199E13	7	3.142E12	3.546	.002
Residual	8.153E13	92	8.862E11		
Total	1.035E14	99			

$R^2 = 0.212$

Source: Author

Based on ANOVA table, the model is fit ( $F = 3.546$ ,  $p\text{-value} = 0.002 < 0.05$ ). R square value of 0.212 indicates independent variables entered the model for 21.2 % of the total variation in selling price. Another 78.8% of the total variation may be explained by other independent variable. Table 3 shows the collinearity statistic result.

**Table 3: Collinearity Statistic**

Model	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
Floor level	.698	1.432
Lot size (psft)	.962	1.039
Storey of building	.409	2.447
Age of building	.874	1.144
Land use	.497	2.011
Price (psft)	.899	1.112
Tenure	.582	1.717

Source: Author

The -results show that the final model from MRA only included significant independent variables. The MRA model assumes that the IV is not highly correlated with each other. This is known as multicollinearity. In this study the assumption was tested using tolerance and variance inflation factor (VIF) values. The collinearity statistics indicated that all tolerance values were more than 0.10 which showed that there was no multicollinearity problem. This was also supported by VIF values of less than 10. Table 4.3 summarized the result of the regression coefficient.

**Table 4: Summarized the Result of the Regression Coefficient**

Model	Unstandardized Coefficients		Standardized Coefficients	t	p-value
	B	Std. Error			
(Const.)	-2645786.555	876866.710		-3.017	.003
Floor level	20178.767	15495.044	.144	1.302	.196
Lot size (psft)	-3.125	8.702	-.034	-.359	.720
Storey of building	31679.295	18456.855	.248	1.716	.089
Age of building	214965.562	89515.944	.238	2.401	.018
Land use	299098.617	281785.250	.139	1.061	.291
Price (psft)	-16.288	85.794	-.019	-.190	.850
Tenure	844547.341	336517.216	.304	2.510	.014

Source: Author

The finding of MRA model revealed the only factor that was statistically significant and contribute to some degree of information in determining the “Selling Price”. This is identified by the model that “floor level, storey of building, age of building, land use and tenure” had positive relationships with transaction prices. On the other hand, the other factors had negative relationship.

However, the positive and negative relationship did not affect any result generated by the model, it just showed the correlation between the DV and IV. This can be explained by the result of Unstandardized Beta Coefficients. For example, the floor level unit is 2645786.555. This indicated the higher the level of property unit, the higher the property price is. Otherwise, the selling price will be decreased by RM 3,125 per square feet if there was negative relationship.

To determine the significant factors influencing the green building price various features were involved. It is important to choose the highest value generated by the Standardized Coefficient (Beta). The value of tenure made the largest contribution to the MRA model by ignoring the  $\pm$  sign of the value based on (Standardized beta Coefficient = 0.304). This is because the value of 0.304 is higher compared to the other factors value. This means the tenure is the most significant factor that gave the higher contribution towards selling price.

## **MULTIPLE REGRESSION ANALYSIS EQUATION**

Hence, this section shows the application of the MRA model on the observation data to investigate the significant factor that affects the GB prices. Based on the previous discussion the equations for MRA are as follows:

Interpretation:

$$y = B_0 + B_1x_1 + B_2x_2 + B_3x_3 + B_4x_4 + B_5x_5 + B_6x_6 + B_7x_7$$

$$Y = -2645786.555 + 20178.767 x_1 + -3.125 x_2 + 31679.295 x_3 + 214965.562 x_4 + 299098.617 x_5 + -16.288 x_6 + 844547.341 x_7$$

$$\text{Selling Price (RM)} = 2645786.555 + 20178.767 \text{ Floor\_level} + -3.125 \text{ Lot Size} + 31679.295 \text{ Storey\_of\_Building} + 214965.562 \text{ Age\_of\_Building} + 299098.617 \text{ Land\_use} + -16.288 \text{ Price\_psqft} + 844547.341 \text{ Tenure}$$

Where:

$Y = B_0$  is referring to Selling price

$B_1X_1$  = Floor Level

$B_2X_2$  = Lot Size'

$B_3X_3$  = Storey of Building

$B_4X_4$  = Age of Building

$B_5X_5$  = Land use

$B_6X_6$  = Price Psqft

$B_7X_7$  = Tenure

## **CONCLUSION AND RECOMMENDATION**

By using the real dataset of housing in the area of Klang Valley, Selangor, Malaysia, this research presents an empirical experiment that studies seven IVs, and demonstrate significant factors toward the selling price of GB properties. The MRA model shows that there is one IV that influences the selling price, namely as tenure. The data analysis clearly specified that green building does, to a certain degree, influences the housing price in the adjacent area.

However, this research is only at the surface level and there are many determinants and attributes that contribute to the property prices. In future research, a more accurate determinant is needed to assess the effects of GB such as the factors used in the Hedonic Pricing Method (HPM) model, that calculates attributes such as number of bedroom positions, ease of accessibility, security, infrastructure, location, and crime rate.

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## FACTORS INFLUENCING HOME BUYERS' PURCHASE DECISIONS IN KLANG VALLEY, MALAYSIA

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### ABSTRACT

*Focusing on Klang Valley, this research studies the outcome of house purchase factors in Malaysia. This research identifies the house purchase factors that affect home buyers' purchase decisions. The researcher collected data using SurveyMonkey by using a questionnaire to elicit the opinions of Klang Valley residents on housing purchase factors and purchase decision. The factors were evaluated and studied to identify their influence on home buyers' purchase decision. Findings show that home buyers' purchase decision are influenced by house structure, space, finance, location, and neighbourhood factors. The findings have laid a foundation for the housing industry to improve.*

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**Keywords:** Home Buyers, House Purchase Decision, House Purchase Factors, Klang Valley



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## **INTRODUCTION**

The advancement of the Malaysian construction development industry by housing developers has led to the issue of property overhang. The Ministry of Finance, Valuation and Property Services Department (JPPH) defined overhang as housing units which were constructed and left unsold for a period of more than nine months. The Residential overhang units increased from 10,285 units worth RM (Malaysian Ringgit) 5.02 billion in 2015 to 14,792 units worth RM 8.56 billion in 2016 (JPPH, 2016).

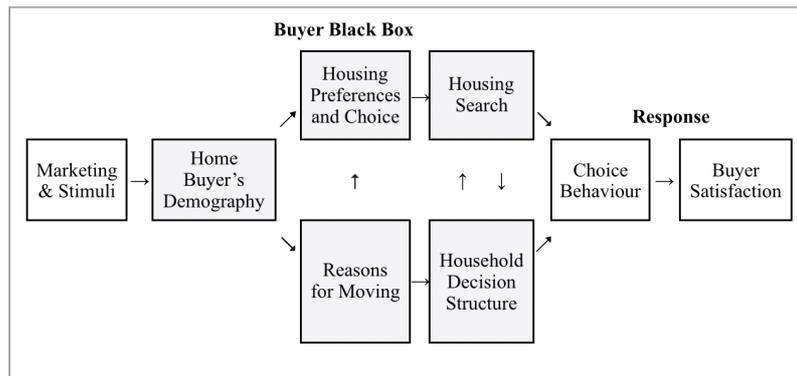
Klang Valley (Malaysia's largest residential area) housing and property sectors were in a state of imbalanced development since 2009, with a limited growth of 17% and 14% growth of transaction amount (Liew & Haron, 2013). Apparently, the houses do not satisfy the target market with the locations, amenities, and job opportunities provided (Chyi, 2014), making buyers hesitant and hold up the decision to purchase which led to the mismatch in the housing supply, opinion, perceptions and their housing preferences. In order to solve this problem, it is essential to understand what the market truly needs because house buyers nowadays are becoming more prudent before making a purchase decision. Housing developers need more detailed information on how Malaysian home buyers vary in opinion, perceptions and their housing preferences (Saw & Tan, 2014).

When people are making a house purchase decision, there are many factors they take into consideration because it involves not only a large amount of money but also long time commitments. There are numerous housing developers in Malaysian housing market such as Eco World, Sunway, IJM, and LBS as the provision of the residential houses rise remarkably. Developers are competing with each other for branding, marketing, sales and market shares (Choong & Cham 2014; Osman et al, 2017). Thus, these housing developers require answers and solutions for what a home buyer will examine when they plan to buy residential houses. With so many choices in the market, the potential buyer would have more dimensions to look into it, for example price, design of the house, location, promotions, rebates and services quality (Alaraji & Jusan, 2015; Osmadi et al., 2015; Zeng, 2013).

## LITERATURE REVIEW

### Parent Theory: An Overview of House Buying Behaviour Model

Figure 1 shows the house buying behaviour model of home buyers. This model is a combination of home buying model (Hempel & Jain, 1978) and consumer behaviour model (Kotler & Keller, 2009). This model explains how and why a buyer decides to purchase a house (Schiffman & Kanuk, 2007). Commonly, a house buying model illustrates the specific behaviour patterns of a home buyer. Kotler & Keller (2009) stated that marketing and other stimuli will penetrate the consumer's awareness and then they will merge with the consumer characteristics, occasioning in house purchase decision-making.



**Figure 1: House Buying Behaviour Model**

Source: Hempel & Jain, (1978); Kotler & Keller (2009)

Marketing and other stimuli enter the buyer's "black box" and result in certain responses. Marketing management will have to figure out what is going on in the black box (the mind of the home buyer) because the home buyer's characteristics will affect how they react to the stimuli; and eventually affect the choice behaviour pattern of the buyer. In order to further understand the home buyer's behaviour, marketers need to focus on the buyer's characteristics and the elements in the black box which will be discussed in the next section.

## **House Buyer's Purchase Factors and Choice**

In 2001, previous researchers like Beamish, Goss & Emmel have studied house purchase factors from the buyers' perspective based on seven categories of factors such as Tenure, Space, Structure, Quality, Expenditure, Neighbourhood and Location. Then in 2007, Lee, Gosh & Beamish have simplified the factors and classified them into four categories which are Physical, Social, Space, Environment. However in 2008, the same researchers highlighted the importance of Location for a house purchase decision. However, Sufian & Mohamad's findings in 2011 show that the Legal and Law factors also have significant effects on Malaysian house buyers' decision.

The studies for Malaysians' house purchase later (Chia, et al., 2016; Saw & Tan, 2014; Hinshaw & Allott, 1972) have categorised the factors into House Features, Living Space, Finance, Distance, Environment, and Superstition. For this study, the researcher combines the factors in previous studies to create a new classification for the variables. The factors which will be studied are classified into five categories: Structure, Spaces, Finance, Location, and Neighbourhood.

### **Structure**

According to Collen & Hoekstra (2001) and Arimah (1992), structure involves all physical conditions and quality of the house. The factors include air circulation, build-up area, built quality, design, disability features, layout, natural lighting, number of storey, number of electrical socket, number of windows, house type, and orientation. These features will influence house purchase decision of a homebuyer (Kinsey & Lane, 1983). Moreover, many researchers have discovered that these house features are highly critical in house purchase decision making process (Lindberg, et al., 1987; Pasha & Butt, 1996). Therefore, the result of this study which have gone through the house structure as house purchase factors are significant and can be a reference for home buyers.

### **Spaces**

Living space includes backyard, balcony, car park, dining room, garden, kitchen, living room, number of bathroom, number of bedroom, and storage space (Palmquist, 1984; Steward, 2000; Shen & Huang, 2003).

Living space can fulfil the needs and requirement of the person living inside the house. Besides, house buyers will always compare the living space in the house to their demands before they make the purchase (Gosling, et al., 2005).

### **Finance**

Finance defines the payment of cash in buying houses (Aoki, Proudman & Vlieghe, 2004). Financial factors include Application & Closing Costs, Base Lending Rate (BLR), Developer Interest Bearing Scheme (DIBS), Downpayment, EPF Withdrawal, Lawyer Fee, Loan Duration, Loan Interest Rate, Loan Agreement Fee, Mortgage Availability, Mortgage Loan to Value Ratio (LTV), Monthly Repayment, Real Property Gain Tax (RPGT), S&P Agreement Fee, Stamp Duty, Utility Deposit (Opoku & Abdul-Muhmin, 2010; Gimeno & Martínez-Carrascal, 2010). Previous studies have found that home buyers make decisions based on the financial factors (Iacoviello, 2005; Chiuri & Jappelli, 2003). Financial factors also involve the affordability of the home buyers.

### **Location**

Location of a house and its distance to nearby facilities and interest points are significant factors that can influence house purchase decision (Kockelman, 1997). For instance: location close to food courts, government departments, grocery stores, hospital, library, main street, public transport, recreational park, schools, shopping centre, sports facilities and workplace (Kryvobokov, 2007; Thériault, 2003; Kauko, 2007; Kim, Pagliara & Preston, 2005). If the location is close to the mentioned points of interest, it is considered strategic (Kiel & Zabel, 2008; Archer, Gatzlaff & Ling, 1996) and a strategic location is important to evaluate a house in the buying process.

### **Neighbourhood**

Another important aspect to be considered when it comes to house purchase decision is the neighbourhood. The neighbourhood factors of housing area include air quality, crime rates, flooding issues, greenery, open space, population, quietness, road and passage width, safety, security, street layout, street lighting, traffic condition and water drainage (Lawton, 1983; Parra, et al., 2010; Aspinall, et al., 2010). Previous studies also discovered that these neighbourhood factors are becoming more important and home buyers will evaluate them in their house purchase decision (Opoku & Abdul-Muhmin, 2010; Banner, et al., 2010).

## **METHODOLOGY**

This research will collect data from Malaysian home buyers and there are plans to use primary data to test the hypotheses. Therefore, survey research is the most appropriate to be used to achieve the objectives.

### **Data Collection Method**

In this study, questionnaire method is chosen because there is a large number of respondents involved. However, it is not appropriate to employ personally administered questionnaires when there is a large sample because of high cost and the time needed. Moreover, many firms and companies are reluctant to spend their work time on data collection (Marczyk, et. al., 2005). SurveyMonkey will be employed to conduct the survey because it could reach a large geographical area and is low in cost compared to face-to-face interviews (Massat, McKay & Moses, 2009). Respondents can fill them at their convenience because it is anonymous. Also, in comparison to e-mail survey which has a lower response rate (Kothari, 1985), respondents do not need to reply after completing the survey form and the researcher will still get the responses.

### **Sampling**

The target population for this research is the potential home buyers and house owners staying in the Klang Valley. This area is selected because it is densely populated with a population of 7.6 million (Masseran, et. al., 2016), allowing the researcher to make a general and overall conclusion for Malaysia.

The sample size is fixed at approximately 400 which is considered acceptable in a business study and it can provide nearly the equal exactness in a population of 200 million even with a population of only 4,000 (Neuman, 2001). In addition, so as to enhance the accuracy for multivariate analysis, the sample size is best between 300 and 500 (Neuman, 2001). Therefore the effective sample size for this research is 400. To assure there are about 400 completed and returned questionnaires, 2,000 questionnaires will be sent out, expecting a 20% response rate.

## Data Analysis

SPSS is the most widely adopted software program used for survey data analysis because of the various data analysis products that are suitable for collecting, analyzing, and modeling data. Therefore in this study, SPSS will be employed. The statistical analysis techniques which will be used to acquire the research output is Logistic Regression.

## RESULTS AND DISCUSSION

### Data Analysis Result

**Table 1: Logistic Regression Test Result**

House Pur-chase Factors	Variables with High Significance Influence	Variables with Low Sig-nificance Influence
Structure	Build up area Built quality Design Natural Lighting	Air Circulation Disability Features House Type Layout Number of Storey Electrical Socket Number Window Orientation
Spaces	Number of Bedroom Number of Bathroom Number of Car Park	Backyard availability Balcony availability Dining Area size Garden availability Kitchen size Living Room size Storage Space size
Finance	Down payment Monthly Repayment	Application & Closing Costs BLR DIBS EPF Withdrawal Lawyer Fee Loan Duration Loan Interest Rate Loan Agreement Fee Mortgage availability LTV RPGT S&P Agreement Fee Stamp Duty Utility Deposit

Location	Food Courts Main Street School	Government Departments Hospital & Clinics Library Public Transport Recreational Park Shopping Centre Sports Facilities Workplace
Neighbour-hood	Safety Security Street Layout Traffic Condition	Air Quality Crime Rate Flooding Issues Greenery Open Space Population Quietness Road & Passage Width Street Lighting Water Drainage

Source: Author

## Discussion

### Structure

Klang Valley home buyers are most concerned about the built up area of the houses because an average Malaysian family comprises 4 to 5 persons. Unlike other Asian countries like Singapore, Japan and even China which only have an average family size of 3 persons or less (Statista, 2019). This is also the reason the average Malaysian home size has become the top 10 largest in the world today (1264 sq ft). Furthermore, the Malaysian house size is the biggest in the Asian region (Tan, 2019).

On the other hand, the most insignificant housing factor for Klang Valley home buyers is air circulation. Consumers always neglect the importance of air circulation because they would prefer air-conditioning over natural air ventilation. 65% of Malaysians own air-conditioning in their houses and use it for 6 hours daily on average which is why they do not consider air-circulation as an important variable (Kubota, et.al., 2010).

### Spaces

Klang Valley home buyers prefer more bedroom, bathroom and car parking lot when they are making home purchase decision. Malaysian home buyers need more bedrooms and bathrooms for their daily usage since

most of the Malaysian families have more than four persons in a household (Ismail, Tay & Lai, 2018). Besides, a single Malaysian household owns an average of two cars and the car ownership is 93%. In comparison with other Asian countries, almost half of the Filipino and Indonesian households do not possess a car, whereby the figure is 47% and 46% respectively. Therefore, the number of car parking lot is also another significant factor to be considered in the purchase decisions of Klang Valley home buyers (Fischer, 2014).

The result of the analysis shows that the most insignificant factor is the size of the living room. Malaysian house owners do not mind having small living room but they want it to look spacious (Tan, 2018). According to Chris Yap (Malaysian Institute of Interior Designers president), median size house owner prefer minimalist design houses which provide no room for mess and garish decoration, and most importantly spacious room for daily activity.

### **Finance**

Home buyers in Klang Valley prefer lower down payment and lower monthly repayment when they intend to purchase houses. The average income for a household in Klang Valley is RM7,225 (DOSM, 2016). However, their monthly expenditure has reached up to RM5,183 (DOSM, 2017). This monthly expenditure only covers the basic needs of the household but does not include some extra spending for entertainment purpose and savings. So, an average household only has RM1,000 plus for their house monthly repayment, not to mention the 10% down payment needed to purchase a house. This is why most home buyers are more concerned about down payment and monthly repayment when they are making a purchase decision.

The most insignificant factor is mortgage availability. As mentioned in Section 1.7, this research only focus on individuals' residential housing purchase, not for investment purpose. Also, according to Yusof (2018), in Kuala Lumpur, the house owning rate is only about 50%. The other half would buy houses for residential purpose and they have no property to be converted into a loan. Therefore, the mortgage availability option is not so important for most of the house buyers.

## **Location**

Home buyers prefer location close to schools because for working parents who need to send their children to school, they could simply drop their children to school on the way to the workplace and their children can reach home sooner than usual because the school is near to their home (Arellano, 2015). Besides that, if they chose houses near to the main street, the centralized living give advantages to the residents, they can access transportation and recreation more easily (Probasco, 2019).

The most insignificant location factor is public transport. According to Khor (2017), Klang Valley public transportation system is lagging behind in effectiveness and reliability. It is ranked 95th among 100 cities in a study related to sustainable urban mobility (ARCADIS, 2017). This low ranking status demonstrates that the transport system in Klang Valley is far from satisfactory and needs to be improved. Hence, many residents would rather use their own vehicle and would not consider using public transportation when they are making house purchase decision.

## **Neighbourhood**

The result of the analysis shows that consumers wish for safety, security, better street layout and traffic condition. McBride (2019) has stated that people would like to ensure their family is safe and away from any danger that might occur. Neighbourhood safety and security would always be of utmost concern. Besides, home buyers hope for a better street layout and traffic condition in the neighbourhood to maintain and improve neighbourhood streets by reducing negative effects of traffic, such as noise and air pollution.

## **CONCLUSION**

### **Contributions of the Study**

This research provides contribution to the understanding in the purchase decision of home buyers. This research has brought a particular set of housing purchase factors for Malaysia's housing market. These housing purchase factors identified in the literature review were used in the survey targeting a sample of Malaysian home buyers in the Klang Valley. Thus,

this study contributes to the knowledge of home buyers' decision-making processes for the housing market in Malaysia.

### **Implications of the Study**

The outcomes of this research have some important implications related to management systems and operational activities in Malaysia's residential housing industry. Moreover, there are also implications for housing industry and home buyers.

The five groups of house purchase factors listed in this study could be used as the main elements in the Klang Valley's residential housing market. Housing developers should understand the significance of the house purchase factors in determining house purchase decision. They ought to concentrate and invest on these housing purchase factors to satisfy home buyers' demands, so they will have the added advantage to compete with their competitors.

This study also provides home buyers the means to make wiser decisions for their residential house selection. Besides, home buyers will gain benefits and greater satisfaction when housing developers improve their products with the attributes listed in this research.

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