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FACTORS AFFECTING PRICES OF CONDOMINIUMS NEARBY DEVELOPING MRT STATIONS IN KUALA LUMPUR

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ABSTRACT

This paper studies the factors affecting prices of condominiums nearby developing Mass Rapid Transit (MRT) stations in Kuala Lumpur by using hedonic regression analysis. Other than MRT development, the condominium property prices are characterised by number of factors including structure factors and location factors such as floor area, unit floor, and public transports etc. Therefore, structure factors, locational and neighbourhood factors as well as other influences on condominium property prices have been analysed in this paper by using multiple linear regression. Total 377 condominium transaction price data from year 2010 to 2013 were collected from Valuation and Property Services Department (JPPH). The result indicated that floor area, mall, hospital, main road, highway, school, unit floor, park and MRT are significantly affecting condominium property prices in Kuala Lumpur, Malaysia. The findings of this paper can lead to the analysis of property value as well as other price model in other fields of study.

Keywords: hedonic regression, condominium, property price, structure factors, location factors, MRT.

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INTRODUCTION

Since the Asian Financial Crisis in 1997, the Malaysian Government has been performing well by safeguarding strong supply and demand of high-quality and affordable housing projects. These property prices have been rising rapidly over the years yet traffic congestion has become a major problem due to the increase of high-rise developments in Kuala Lumpur city centre (Khairul, 2013). Development in Kuala Lumpur is market-driven by integrating both commercial and residential land use in the city centre. In Kuala Lumpur, there are several modes of public transportation including the buses and rail system. However, the existing public transportations are deemed insufficient and ineffective, causing large number of cars entering the city centre daily which leads to severe traffic problems (Salem et. al, 2011).Recently, the mass Rapid Transit (MRT) emerges as a representation of a new type of infrastructure in Malaysia after the development of Malaysia's first Light Rail Transit (LRT) in 1998 and 1999. Proximity to the MRT is now one of the major concerns when buying residential properties as people value their time and cost saving from commuting to their workplace (Khairul, 2013)

The Real Estate and Housing Developers' Association of Malaysia (Rehda) emphasized that the Greater KL and Klang Valley Mass Rapid Transit (MRT) project will generally have a positive impact on the property market and economy. The rentals will increase in other countries such as Singapore and Taipei if properties are located in the vicinity of the MRT station. With over 30 stations, the development of the MRT will promote a lot of business opportunities as the stations will have a wealth creation effect. There will be higher density developments in the areas where the MRT reaches.

According to Kairul, 2013, most industry players are unanimous over one matter in which properties within a reasonable distance from the new MRT stations will unquestionably see an increase in value. Nevertheless, this MRT project may not cause a property "boom" as such a high annual increase in house prices is totally out of sync with the annual income increase in the general population which is also believed that the land and property prices have run ahead of the country's economic fundamentals, which affects the affordability factor (Rajeeshwaran & Neo, n.d.). Also, MRT stations which are located along the high-end or "wealthier" areas would not affect the property market so much since most landlords in these locations tend to occupy the units themselves (Khairul, 2013). This group of home owners would presumably prefer to drive their own cars.

The activities in KL CBD will naturally spread to the fringes of Kuala Lumpur with the advent of the MRT in accordance to the theories of urban growth. The growth pattern of Kuala Lumpur can be seen either heading towards the South or West of the city. (Khairul, 2013). Depending on which income group we are referring to, it can either have desired or adverse effect as far as the property market is concerned. The tendency of having new activities at the city fringe will actually benefit the middle income group due to lower transportation cost and rental rates, provided that their workplace is located within the new economic activities in these areas.

IMPACT OF MRT DEVELOPMENT TO THE SURROUNDING PROPERTY PRICES

Property price are affected by three major factors notably location attributes, structural attributes, and neighbourhood attributes. In the first place, location attributes concern the spatial effects occurred which can be described as the area where the building is located, say for instance, scenic views, proximity to CBD etc. Next, structural attribute variables are physical characteristics of the property including some common structural characteristics notably age of the building, facilities within the building, number of room, floor area. Lastly, neighbourhood variables contain set of characteristics including socioeconomic and physical make-up of the neighbourhood. They could be urban amenities, public services, or as far as air pollution or criminal rates (Can, 1992; Yang, 2001).

In this research, the impacts of MRT development to the property prices are studied by referring to previous overseas cases. The extent to which subway or MRT affecting line-side property values has been studied in many large cities including Washington DC (Lerman et al, 1978), Toronto (Bajic,1983), San Francisco (Landis et al, 1995) and Atlanta (Nelson, 1992). Most of these studies have affirmed that subway systems significantly influence property values, yet these influences vary among different cities.

Followed by the impact of MRT, property price is undeniably affected by other locational and neighbourhood factors such as the nearest rapid transit station, distance from condominium to CBD and distance from condominium to main street. Chuti T.(2011). Additionaly, Varameth et al. (2010) discovered that rail transit system affects the population and employment concentration of the citizens. The closer the houses getting to the rail transit station, the denser the distribution of houses. Distance park community (Bible et al 2011), distance from school (Jud & Watts, 1981), distance from shopping mall (Des Rosiers et al, 1996), distance from hospital (Huh & Kwak, 1997) as well as distance from public facility (Lin & Hwang, 2003) should also be taken in the consideration on property price analysis.

For structure factors, Sirikolkarn (2008) suggested that the price per square meter, size of minimum size of room offered affects property price. Lin & Hwang (2003.), in the paper, added some factors which affect property price such as floor space and age of building while Chuti T.(2011) found out that price of condominium is affected by size of smallest room offered and height of building.

METHODOLOGY

This study aims to empirically assess impact of MRT on property values along MRT routes in Kuala Lumpur. With over 30 MRT stations in Klang Valley, the area of this study covered 14 MRT stations located in Kuala Lumpur which is chosen to be studied upon since it is Malaysia's capital city. Samples were taken from condominiums only. From the condominium transacted prices, the Housing Price Index which was obtained from Jabatan Penilaian dan Perkhidmatan Harta (JPPH) was used to normalize all the condominium prices. The property prices has boosted upon recent years.

These 14 stations include:

Table 1 MRT Stations in Kuala Lumpur

1. Taman Tun Dr Ismail	8. Pasar Rakyat
2. Pusat Bandar Damansara	9. Cochrane
3. Semantan	10. Maluri
4. KL Sentral	11. Taman Bukit Ria
5. Pasar Seni	12. Taman Bukit Mewah
6. Merdeka	13. Leisure Mall
7. Bukit Bintang Sentral	14. Plaza Phoenix

DATA COLLECTION

The transacted price data for condominiums were taken from Valuation and Property Services Department (Jabatan Penilaian dan Perkhidmatan Harta, JPPH). The booming of condominiums around Kuala Lumpur city contributes to the main reason for choosing condominium as the scope of this study. Due to the steep hike of property prices in Kuala Lumpur after the Financial Crisis, there has been a high demand for high rise residential properties. All condominium transacted price data were taken from 2010 due to the announcement of the mass rail transit until 2013. The transacted price data for condominiums were taken at every 14 stations around Kuala Lumpur within a distance of 2km space distance from the station.

However, there is lack of complete data for condominium near to Cochrane Station and there is no condominiums located within the aforementioned distance at Pasar Seni station. Therefore, condominium transaction data near to 12 MRT stations at KL are randomly collected from JPPH includes the price, area, unit floor, year of valuation and name of condominium. After obtaining this information, an analysis on the condominiums were conducted via Google Maps to obtain further information notably the distance of the nearest route from condominium to the nearest main road, nearest parks, nearest primary school, nearest LRT station, nearest kindergarten, nearest hospital, nearest mall, nearest highway and the distance from condominium to the nearest future MRT station.

All the price transacted data were evaluated on different years between 2010 until 2013. Therefore, price transacted data were converted to present value using the Malaysian House Price Index from JPPH (Condominium Categories) and Net Present Value Formula:

$$\frac{X}{Y} \text{ x Transacted price}$$

Where X is current house price index, and Y is the transacted year index

Chau et. Al. (2002) and So et. Al. (1997) have classified residential property as multidimensional commodities that is characterised by durability, structural inflexibility and spatial fixity. To put it simply, the house price are exposed by location attributes, structural attributes, and neighbourhood attributes. There are a number of functional forms employed in the analysis of hedonic price function such as linear, semi-log and log-log model. Nevertheless, there is no such appropriate model for every case.

Regarding hedonic price model, the price of the residential property can be expressed as:

$$P = f(S, L, N)$$

Where: P =price of the property
L =location attributes
S =structural attributes
N =neighbourhood attributes

Linear form:

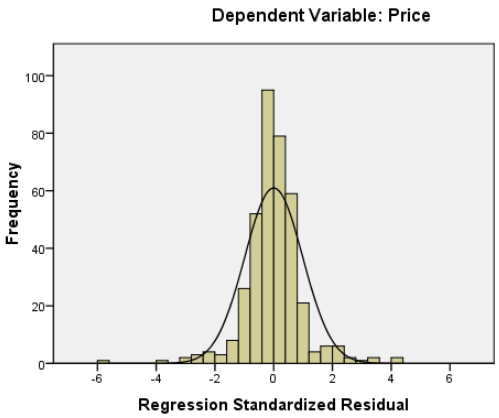
Where P denotes price of property and X denotes characteristics or attributes.

Each form of function will influence the interpretation of the result. A comparison between linear and semi-log model, a linear model provides the estimation of price value in regard to different characteristics or attributes, whereas a semi-log functional form estimates the demand resistance (Dunse & Jones, 1998). Indeed, there is no strong evidence for choosing the right functional form since it depends on particular case (Malpezzi,2003).

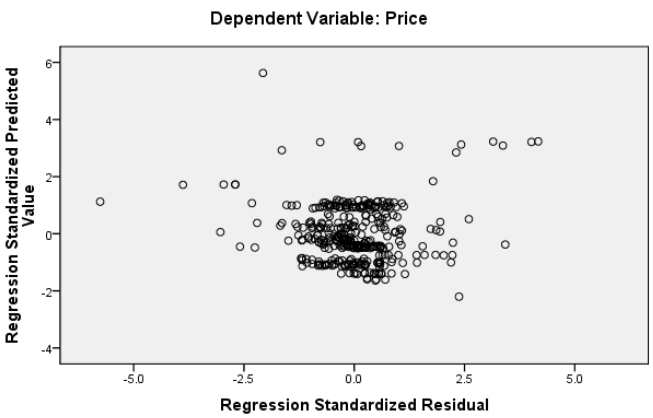
ANALYSIS

Figure 1 Histogram & Scatterplot

Histogram



Scatterplot



The above plot is a check on normality if the histogram appears normal; a fitted normal distribution aids us in our consideration. Serious departures from the normal line would suggest that normality assumption has not been met. As can be discerned in the above histogram, all variables appear to be normal and hence, Box-Cox Transformation is not required in this analysis to normalize the data.

To verify the assumption about variances, a scatterplot is necessary. The above scatterplot of standardised predicted value against predicted values should be a random pattern centred on the line of zero standard residual value. These points should have the same dispersion about this line over the predicted value range. From the above scatterplot, we can see no clear relationship between the residuals and the predicted values, which is consistent with the assumption of linearity. The dispersion of residuals over the predicted value ranges between -2.5 and 2.5 are constant, as for predicted

values below -2.5, there is too few points to provide evidence against a change in variability. In fact, both histogram and scatter plot depict non-significant variables, implying an acceptance of the hypothesis of normality.

Model Summary

Table 2 Stepwise Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.808[a]	.654	.653	2.47E+05	.654	707.769	1	375	.000	
2	.881[b]	.777	.776	1.98E+05	.123	206.179	1	374	.000	
3	.911[c]	.831	.829	1.73E+05	.054	118.857	1	373	.000	
4	.936[d]	.876	.875	1.48E+05	.046	137.152	1	372	.000	
5	.939[e]	.882	.880	1.45E+05	.005	16.812	1	371	.000	
6	.944[f]	.891	.890	1.39E+05	.010	33.524	1	370	.000	
7	.945[g]	.893	.891	1.38E+05	.001	4.822	1	369	.000	
8	.947[h]	.897	.895	1.36E+05	.005	16.177	1	368	.000	
9	.951[i]	.904	.901	1.32E+05	.006	23.659	1	367	.000	
10	.951[j]	.905	.902	1.31E+05	.001	3.971	1	366	.047	1.523

a. Predictors: (Constant), Area
b. Predictors: (Constant), Area, Mall
c. Predictors: (Constant), Area, Mall, Kindergarten
d. Predictors: (Constant), Area, Mall, Kindergarten, Hospital
e. Predictors: (Constant), Area, Mall, Kindergarten, Hospital, MRTdistance
f. Predictors: (Constant), Area, Mall, Kindergarten, Hospital, MRTdistance, NearestPark
g. Predictors: (Constant), Area, Mall, Kindergarten, Hospital, MRTdistance, NearestPark, PublicPrimarySchool
h. Predictors: (Constant), Area, Mall, Kindergarten, Hospital, MRTdistance, NearestPark, PublicPrimarySchool, MainRoad
i. Predictors: (Constant), Area, Mall, Kindergarten, Hospital, MRTdistance, NearestPark, PublicPrimarySchool, MainRoad, NearestHighway
j. Predictors: (Constant), Area, Mall, Kindergarten, Hospital, MRTdistance, NearestPark, PublicPrimarySchool, MainRoad, NearestHighway, UnitFloor
k. Dependent Variable: Price

Stepwise analysis has been used at the initial stage to determine which variables have to be taken out. Sig. F Change has to be fall below or equal to 0.050 to indicate that it has minimal correlation between variables. According to the data above, the sig. is acceptable until Model 10 and hence, model 10 or 'j' is chosen. All factors are the predictors whereas Price is the dependent variable. Variables in model j include Area, Mall, Kindergarten, Hospital, MRT distance, Nearest Park, Public Primary School, Main Road, Nearest Highway and Unit Floor. Variable LRT had been excluded in this stepwise analysis. Durbin-Watson test exhibits a value of 1.523 indicating a minimal correlation amongst predictors since a Durbin-Watson test of 2.0 indicates a perfect uncorrelated model.

Enter method of regression

Table 3 Enter Method Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.951[a]	.905	.902	1.30990E5	1.523

a. Predictors: (Constant), UnitFloor, MainRoad, NearestPark, PublicPrimarySchool, Mall, Hospital, Area, MRTdistance, NearestHighway, Kindergarten
b. Dependent Variable: Price

R squared is the proportion of variation in the response variable explained by the regression model. From the above model summary, the model with R square value of 0.905 fits the data reasonably well; 90.5% off the variation in the standardized predicted value can be explained by the fitted line together with the regression standardized residual values. In the model summary above, the adjusted R squared (0.902) has slightly reduced the estimated proportion. However, adjusted R squared value is only reported when a small set of data is used.

The value of Sig. F Change falls below 0.05 indicates that the variability in all the conditions is not the same. Scientifically, it means that the variability in all the conditions is significantly different. The value for Dublin-Watson Test ranges from 0 to 4. As a main principle, residuals are considered uncorrelated if Dublin-Watson statistic value is approximately 2. A value close to 0 indicates strong positive correlation, while a value close to 4 signifies strong negative correlation. In this case of multiple regressions, the Dublin-Watson Test is 1.523 which is close to 2. Therefore, it is fair to conclude that the residuals are uncorrelated.

Table 5 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	738852.086	80550.313		9.173	.000
	Area	6240.288	232.067	.626	26.890	.000
	MRTdistance	-322.410	78.755	-.174	-4.094	.000
	NearestPark	92.117	10.496	.404	8.777	.000
	PublicPrimaryScho	403.638	73.432	.333	5.497	.000
	MainRoad	1055.599	159.889	.314	6.602	.000
	Hospital	-770.380	76.955	-.631	-10.011	.000
	Mall	188.434	32.222	.174	5.848	.000
	Kindergarten	-1322.966	131.550	-.740	-10.057	.000
	NearestHighway	-88.709	17.291	-.246	-5.130	.000
	UnitFloor	2403.525	1206.140	.045	1.993	.047

a. Dependent Variable: Price

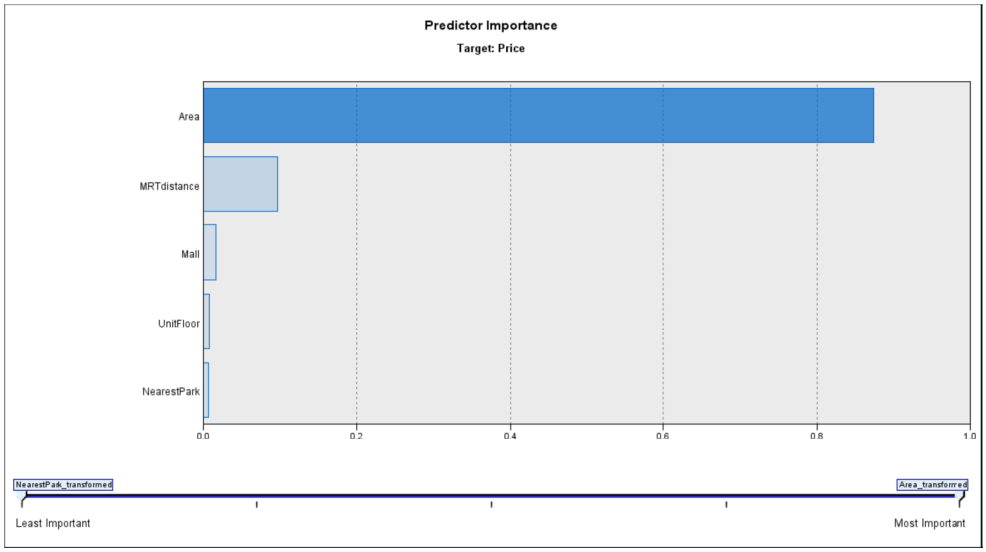
FINDINGS & DISCUSSION

Table 6 Hedonic Regression Analysis Result

Variables	Expected Result	Results (Unstandardized Coefficients B)
Area	Positive	6240.288 (Positive)
MRT Distance	Negative	-322.410 (Negative)
Nearest Park	Positive	92.117 (Positive)
Public primary school	Positive	403.638 (Positive)
Main road	Positive	1055.599 (Positive)
Hospital	Positive	-770.380 (Negative)*
Mall	Positive	188.434 (Positive)
Kindergarten	Negative	-1322.97 (Negative)
Nearest Highway	Negative	-88.709 (Negative)
Unit Floor	Positive	2403.53 (Positive)

Based on above findings, floor area is significant to the condominium prices with a positive coefficient B value of 6240.288. This is particularly true in accordance to Lin & Hwang (2003), since the area of a condominium is the primary factor affecting the price of condominium. The increase in size of condominium increases the price of condominium. The figure 2 shows the important of area to the price of condominiums as compared to other factors. It is everyone's desire to find a bigger area of space or land and buyers are intended to pay more.

Figure 2 Predictor Importance



Based on the figure above, the second most important factor influencing the price of condominiums is the distance of condominium to MRT station. The condominium price is affected by future MRT station with a coefficient B value of -322.410. In short, it can be explained that when the distance of condominium to the future MRT station is decreased, the condominium price is increased. This is particularly true based on Chuti T. (2011) studies which found out that distance from condominium to the nearest rapid transit station affects the prices of the houses. Varameth et al. (2010) discovered that rail transit system indeed affects the population and employment concentration of the citizens. The closer the houses getting to the rail transit station, the denser the distribution of houses. Therefore, the result affirms that condominium prices rises the closer it gets to the MRT station.

The table above further illustrates that the condominium price is affected by the nearest park with a coefficient B value of 92.117. Chuti T. (2011) found out that public facility within the area indeed affects prices of condominium. However, certain housing attributes employed by studies in other countries may not be relevant to studies in Malaysia for example Mok, Chan & Cho (1995) and Cheung et al (1995). In this case, it depicts that residents in Kuala Lumpur do not require a park in their neighbourhood. It is not one of the most important factors in setting a house price.

With coefficient values of 403.638 and 1055.599 for primary school and main road, the increase in condominium price is accompanied with the decrease in distance from condominium to primary schools and main roads. According to Khairul (2012), houses within the vicinity of a school tend to suffer from massive traffic conditions daily notably during peak hours. As mentioned earlier in this paper, the reason of proposing MRT is based on the current traffic condition in Kuala Lumpur. Condominiums in main road tend to experience traffic and noise nuisance.

The coefficient B value of 188.434 for mall depicts that there is an increase in condominium price for every kilometre away from the mall. Shopping mall is not listed as a public facility according to the study by Chuti T. (2011). Malls are not necessity to residence in a condominium. Besides, the studied condominiums are of medium to high cost condominiums. The residents will tend to drive instead of walking to the mall. Therefore, a short distance to shopping mall displays a decrease in condominium prices for the 12 studied condominiums.

Kindergarten does not give adverse effects to condominium prices. Condominiums located closer to a kindergarten experience a price increase, subtly showing that kindergarten is crucial to KL residence notably for the working parents in this city. Additionally, traffic congestion is not an issue around the kindergarten since the kindergarten is not a high density educational organisation compared to primary schools. The availability of hospital has a negative impact due to superstitious beliefs of house buyers from Seoul Korea (Huh & Kwak, 1997). However, the analysis indicated that condominium price is increased for every kilometre nearer to a hospital. Due to this contradiction, further studies on the impact of hospital to the property prices in Malaysia is recommended.

The studied condominiums range from medium to high cost condominiums around Kuala Lumpur. The residents tend to drive to another destination by using highway. The price of condominium increases with the nearer distance from condominium to the highway. These are some typical highways in Malaysia notably the Federal Highway, New Pantai Expressway (NPE), Lebuhraya-Damansara-Puchong (LDP) and et cetera which play significant roles to all residents in a condominium. Therefore, highways affects the price of condominiums positively.

Lastly, a coefficient B value of 2403.525 for unit floor indicates that the condominium price is increased when the unit is placed one floor higher. Unit floor plays another pivotal role in the setting of condominium prices. Higher floors provide better views and better air quality (Lin & Hwang, 2003) and hence, leading to the higher price as compared to unit located on the lower floors of the condominium.

CONCLUSION

Locational, neighbourhood and structural factors influencing property prices were used in this hedonic Regression Analysis. The hedonic regression analysis model had been developed by following previous studies in order to indicate the factors affecting property prices. Finally, the relationships between condominium prices and different factors had been studied. These ten factors which are significantly affecting the condominium price in Kuala Lumpur include area of condominium, distance from MRT station, nearest primary school, nearest highway, unit floor, nearest park, distance to hospital, nearest shopping mall, age of building and distance to main road.

Analysis of hedonic price model indicates that the prices of condominium in Kuala Lumpur are affected by location attributes, structural attributes and neighbourhood attributes. However, area of condominium contributes to the main factor affecting the condominium property prices. The accessibility to MRT is statistically significant in the model. Although the condominium price is proportional to the distance to the nearest mass rail transit station, the proximity to MRT is not the most significant characteristic that affects the prices of condominium. Followed by the most influential characteristics influencing these prices, which is the area of property, the next affected factors are age of building, MRT distance, unit floor, primary school, mall, nearest highway, nearest LRT and nearest park.

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