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MEASURING THE WILLINGNESS TO PAY FOR HOUSES IN A SUSTAINABLE NEIGHBORHOOD

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ABSTRACT

This paper determines the responsiveness of the willingness to pay to changes in structural, locational, and neighborhood attributes of housing that incorporate sustainability objectives. In this study, 299 households from Kuala Lumpur and Selangor in Malaysia were interviewed. Results show that housing developers should build the neighborhood that promotes sustainability as house buyers generally are willing to pay more to live in a sustainable neighborhood. In order to build a progressive low carbon economy, the government should create the vision and give policy directions and guidelines that describe all aspects necessary of a sustainable neighborhood.

Keywords: Sustainable Neighborhood, Sustainability, Willingness to Pay, Malaysia

INTRODUCTION

A neighborhood is a fundamental building block of community. Nowadays, neighborhoods are actively making changes to become more sustainable, often aiming to promote development that is line with the principles of economic, social, and environmental sustainability. Sustainable neighborhood design involves the development of communities with the objective of greater levels of sustainability. Achieving sustainability goes beyond merely greening the environment in the neighborhood, it incorporates efforts in designs and activities to reduce greenhouse gas emissions.

Promoting sustainability do not come cheap (Engel-Yan *et al* 2005), but there are still a handful of housing developers in Malaysia that are really serious about the promotion of sustainable living. The sustainable neighborhood is growing in popularity and its market appeal has been reinforced by increasing acceptance by house buyers. In a period when Malaysian are becoming more environmentally conscious, house buyers appreciate the sustainability features or the value of the sustainable neighborhood as sustainable neighborhoods are places where house buyers want to live and work, now and in the future. It is not surprisingly to learn that all these houses in such neighborhoods were sold out immediately of the launching day. Some of these buyers stood in the overnight queuing before the launching. Because of a higher demand from the market, transacted house prices in such neighborhoods have increased by more than 50% after receiving the notice of vacant possession from the housing developers (Tan et al, 2010).

One of the prominent examples of sustainable neighborhood development is Desa Park City. The 473-acre Desa Park City is located about 13 kilometers west of Kuala Lumpur. This township is the first master-planned community that has made a serious attempt in incorporating key elements of the sustainable living concept. The master plan for this sustainable neighborhood is adhered closely to the principle of live, work, shop, and play, by mixing land use patterns so that these activities are able to function in close proximity to one another. Its 25 residential parcels are developed around the 33-acre public realms of parklands, lakes, waterways, clubhouse and sport center, all interconnected by a nine-foot wide pedestrian-friendly walkaway. Additionally, Desa Park City creates a recreational space within an artificial lake and jogging trails, all of which are just an easy stroll away from every home in the neighborhood. Leisure, entertainment and recreation are a stone's way from the residences, hence reducing the dependency and number of vehicles within the township. An important point of this sustainable neighborhood development is walkability. Residents can benefit from being able to take a short walk to the amenities in the neighborhood.

In addition to Desa Park City, Ara Damansara is another example of sustainable neighborhood development. The 762-acres Ara Damansara is located near Subang Airport in Petaling Jaya. The sustainability initiatives in this sustainable neighborhood development begin at its entrance with solar-powered landscape lightings. In support of the state government's One House One Tree campaign in 2007, the developer planted over 1,200 trees in the township. Besides, the developer incorporated in the landscape design a rainwater harvesting system to circulate the water in streams. The surveillance system in the township is also environmentally friendly as twenty-two solar-powered cameras are linked to the police station in the neighborhood.

House buyers in Malaysia are increasingly aware of the value of sustainable neighborhoods. It is important for housing developer to determine the responsiveness of the willingness to pay to changes in structural, locational, and neighborhood attributes of housing that incorporate sustainability objectives. However, there is little evidence to assess the willingness to pay for such houses in Malaysia. The main emphasis of this paper is to determine the responsiveness of the willingness of house buyers to pay for houses in the neighborhood that rides on the principle of sustainability. The responsiveness of the willingness to pay can be determined by the using the hedonic price model (Rosen 1974). Many researchers have used hedonic price model to examine the relationship between attribute preferences and house prices. There are many housing and neighborhood attributes that could affect the household's marginal willingness to pay.

LITERATURE REVIEW

A general definition of the sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Bruntland 1987). Based on this broadly applicable definition, the concept of sustainable development has become central not just in environmental preservation, but in the consideration of the quality of development in the neighborhood (Choguill 2007). This type of sustainable neighborhood development allows households to live comfortably by providing secure neighborhoods which minimize resource depletion, environmental degradation, cultural

disruptions, and social instability (Engel-Yan et al. 2005, Blum et al 2006, Jiboye & Ogunshakin 2010).

One of the characteristics of the sustainable neighborhood as pointed by Choguill (2008) is to be socially sustainable by having good environmental qualities within and around the neighborhood, such as green space provision, and proximity to parks. As mentioned by Al-Hagla (2008), the open spaces in the neighborhood, particularly parks and gardens play an important role in supporting sustainability objectives as their primary function is for informal activity or relaxation, social and community purposes. In the socially sustainable neighborhood, residents must be involved in community affairs and there is a high level of cooperation and collaboration, and consensus among residents. In order to justify social sustainability, housing developers are required to have a community hall in the neighborhood as the community hall will serve as a meeting place for residents to form a local improvement organization for dealings with local neighborhood facilities and services. Active engagement community hall meetings at the very local level should be seen as the first step towards participation of the public in decisions that affect them (Choguill 2008). Homeowners are believed to be more likely than renters to be involved in local neighborhood organizations and to associate informally with their neighbors (Rossi and Weber 1996, DiPasquale and Gleeser 1999, Tan 2008). As pointed by Rohe and Steward (1996), active participation of households in local improvement organizations is able to reduce threats by performing their duties to solve the problems of negative externalities on their housing and neighborhood conditions in the neighborhood. Social ties with neighbors living nearby may mitigate neighborhood cohesion by encouraging households to stay as they can derive financial and emotional support from its social networks (Kan 2007). Additionally, moderate neighborhood organization attachment and frequent interaction with neighbors are found to be associated with positive health outcomes of households (Carpiano 2007, Poortinga et al 2008). Although there are little studies in literature that examined the influence of social sustainability of neighborhood on the willingness to pay in Malaysia, it is reasonable to believe that good social places in the neighborhoods are positively and significantly related to changes in house prices. Empirical works have showed that open and green spaces raise prices by 7.1% (Jim and Chen 2006), and accessible open and green spaces near home could raise house price by 5% to 6% (Tyrvainen and Miettinen 2000, Tahuna 2003).

Previous housing studies generally found that quality structural attributes have a positive impact on housing prices. In fact, house buyers are not only willing to pay for houses with quality finishes, but also they are willing to pay for houses that promote the sustainable use of resources, energy efficiency, and healthy indoor environments (Buys *et al* 2005, Sitar and Krajnc 2008). Sustainable housing must be designed to be sensitive to the natural environment in order to achieve the objective of environmental sustainability**.** Being environmentally conscious is becoming increasingly important. Sustainable houses are designed to save energy and resources, use recycle materials, and minimize the emission of toxic substances (Buys et al 2005). Houses in the sustainable neighborhood should be economically viable and incorporate sustainable living features, such as a rainwater harvesting system, a solar water heating system, and environmentally-friendly building materials such as bamboo flooring and recycled composites.

In addition to social and environmental sustainability, sustainable neighborhoods should have incorporated high standards of economic sustainability in terms of a reduction of transportation

costs (Choguill 2008). Transportation costs can only be reduced if the permeability of the neighborhood is able to enhance. One way to enhance the permeability is to have a dedicated pedestrian network, dedicated cycling network, energy efficient public transport and lower provisions for privately owned vehicles. By enhancing the permeability of the neighborhood through the provision of the pedestrian network, carbon emission from vehicular usage within the neighborhood could be reduced, and the need for automotive travel to a central focal point could be minimized. As suggested by Choguill (2008), the diameter of the sustainable neighborhood should be in the vicinity of 1 km (radius is around 500 m). Considerable efforts needed for housing developers to provide housing in the sustainable neighborhood must be accompanied by investing in integrated infrastructure services. Sustainable neighborhoods should also equip with all elements of healthy living, earning, work and play. Therefore, the sustainable neighborhood should have services on healthcare, education, and special needs. Empirical results show that short distance to the workplace, schools, and retailing outlets have been found to significantly affect house prices (Chin et al 2004, Hui et al 2007, Jim and Chen 2006, Jim and Chen 2007, Redfearn 2008, Jim and Chen 2009, Poudyal et al 2009). This indicates that house price is determined not only by accessibility, but also savings in transportation costs. Another economical sustainable element should be included in the neighborhoods is to minimize and control internal traffic by reducing the number of roads that cut across or pass through the neighborhood (Choguill 2008). One way to control and minimize internal traffic is to develop a residential enclave within a gated-guarded environment. The gated-guarded neighborhood is a close community where space is privatized and is characterized by security guards controlling an entrance or exit to provide access to one or more smaller residential streets, with the entire development surrounded by a perimeter wall. The roads within the gated and guarded neighborhood are for internal use by residents only. Additionally, the gated-guarded neighborhood is fully self-sufficient as common areas and amenities within the gated-guarded neighborhood provide residents with day-to-day activity requirement. As a result, the safety, security, and well-being of every household are guaranteed. It is reasonable to believe that the positive perception of the gated-guarded neighborhood could induce a price premium as owning such property will create a neighborhood free from all physical, social and mental threats, and always in the best state of health, safety, and promote peace of mind and harmony (Tan 2010).

METHODOLOGY

In order to determine the responsiveness of the willingness to pay to changes in structural, locational, and neighborhood attributes of housing that incorporate sustainability objectives, a self-administered survey was conducted to collect the required data directly from home owners in Klang Valley, Malaysia. This survey gleans information about the dwellings and neighborhoods of the respondents. In total, 600 copies of questionnaire forms were distributed to residents using convenience sampling. Of 600 copies of questionnaire forms, 430 questionnaire forms were returned to the researcher. However, only 299 were used in the analysis due to incomplete information in some survey forms.

The hedonic price is used to measure the impact of sustainability attributes of the neighborhood on residential property price. The fundamental assumption is that in choosing the right house to

buy, the house buyer is paying not only for the dwelling unit, but also for its surrounding environmental qualities that promote sustainable living. In this study the house prices are assumed to be affected by structural, locational and neighborhood attributes of dwellings that conform to economic, social, and environmental sustainability. A functional relationship between them can be developed. It can be represented by:

$$P_{ij} = \beta_0 + \beta_s S_{ij} + \beta_l L_{ij} + \beta_n N_{ij} + \varepsilon_{ij}$$

where β_s is the coefficient vector for the structural attributes *(S)* which measure the structural effect on the housing price *(P),* while β_l and β_n are locational *(L)*, and neighborhood *(N)* coefficient vectors respectively, reflecting the locational, and neighborhood effects on the housing price. ε is the stochastic disturbance vector.

Six locational variables (dichotomous codes) related to economic sustainability are considered in this study: distance to the workplace (Workplace), to shops (Shop), to the hospital (Hospital), to sport and recreation centers (Sport Center), to schools (Edu), and the gated-guarded neighborhood (Gated). Neighborhood attributes incorporating social sustainability included in this study are the availability of local pressure groups, social places (e.g. community hall, restaurants, etc) in the neighborhood, and the availability of landscaped parks (Park). Sustainable living features (solar power heating, rain water harvesting, etc), and environmentally-friendly building materials (bamboo flooring and recycled content ceramic tiles) are dichotomous variables to indicate the environmental sustainability characteristics of the dwelling. The house price, built up area and age of the dwellings are also included in the model. The house price refers to the transacted price of the dwellings in the current market in RM (Malaysian Ringgit). Respondents in the survey know the current market prices of their dwellings if they want to dispose their properties because they are aware of the recent transacted price of houses in their neighborhoods. Built-up area and age of the dwellings are treated as control variables as larger and newer dwelling units tend to have higher prices than small and older units. Table 1 shows a summary of variables used in this study.

Table 1: Definition of variables in the study

Variables	***Definition***
Dependent Variable	
Market Price (Price)	Transacted market price in RM (000)
Locational Attributes	
Workplace (Work)	1 if the travelling distance to the workplace is less than 500 m, 0 otherwise
Retailing Outlets (Retail)	1 if the travelling distance to retailing outlets is less than 500 m, 0 otherwise
Hospital (Hosp)	1 if the travelling distance to the hospital is less than 500 m, 0 otherwise
Sport center (Sport)	1 if the travelling distance to sport and recreation centers is less than 500 m, 0 otherwise
School (School)	1 if the travelling distance to education institutions

	(primary & secondary) is less than 500 m, 0 otherwise
Gated-Guarded (Gated)	1 if the property is located in the gated-guarded neighborhood, 0 otherwise
Neighborhood Attributes	
Local Groups (Local)	1 if there are local improvement groups (pressure groups) in the neighborhood, 0 otherwise
Social Places (Social)	1 if there are social places (park, community club house etc) in the neighborhood, 0 otherwise
Landscaped Park (Park)	1 if there are landscaped parks in the neighborhood, 0 otherwise
Structural Attributes	
Sustainable Living Features (Feature)	1 if the house has sustainable living features (solar power heating, rainwater harvesting system, etc), 0 otherwise
Wall Tiles (Wall)	1 if wall tiles are recycled content ceramic tiles, 0 otherwise
Flooring (Floor)	1 if flooring is bamboo flooring, 0 otherwise
Control Variables	
Age (Age)	Age of the dwelling (years)
Built-up	Built-up area (square feet)

There are many forms that can be used to describe the relationships between price and housing attributes. Commonly adopted forms are linear, quadratic, semi-log, log-log and Box-Cox form, etc. In this study, a semi-logarithmic form is used. As pointed by Bolitzer and Netusil (2000), Geoghegan (2002), Jim and Chen (2007), this form is considered to be the best without too many complicated computations. The estimated equation in a semi-logarithmic form is expressed as:

$$\ln P = \beta_0 + \beta_1 \ln Age_{ij} + \beta_2 \ln Built\text{-}up_{ij} + \beta_3 Work_{ij} + \beta_4 Retail_{ij} + \beta_5 Hosp_{ij} + \beta_6 Sport_{ij} + \beta_7 School_{ij} + \beta_8 Local_{ij} + \beta_9 Social_{ij} + \beta_{10} Gated_{ij} + \beta_{11} Park_{ij} + \beta_{12} Feature_{ij} + \beta_{13} Wall_{ij} + \beta_{14} Floor_{ij} + \varepsilon_{ij}$$

Following Jim and Chen (2009), the impacts were calculated based on a double increase ($2^{coefficient} - 1$) for continuous variables; and the impacts were calculated based on ($e^{coefficient} - 1$) for dummy variables.

RESULTS & DISCUSSION

The results of the estimation of the semi-log model are presented in Table 2. A potential difficulty in hedonic analysis is the presence of heteroscedasticity. In order to correct for heteroscedasticity in the study, an ordinary least squares method together with a heteroscedasticity consistent covariance matrix estimator is used to estimate the willingness to pay for houses in the sustainable neighborhood.

Table 2: Housing Attributes on House Prices

	B	*Std Error*	*t*	*Sig.*	*Impact*

(Constant)	4.852	.292	16.612	.000	
Age of the building (year)	.105	.014	.390	.697	0.0758
Built-up area (square feet)	.136	.041	9.824	.000	0.0986
Park	.120	.043	2.771	.006	0.1273
Feature	.067	.043	1.568	.118	0.0694
Floor	.077	.029	2.680	.008	0.0801
Wall	.181	.051	3.571	.000	0.1989
Gated	.227	.039	5.765	.000	0.2551
Local Improvement Groups	.105	.037	2.798	.006	0.1105
Social Places	.089	.052	1.720	.087	0.0931
Workplace	.144	.034	4.265	.000	0.1550
Shop	.273	.074	3.697	.000	0.3142
Hospital	.166	.040	4.160	.000	0.1808
Sport	.034	.047	.724	.469	0.0347
School	.255	.084	3.033	.003	0.2903
Adjusted R square	0.857				
Standard error of the Estimate	0.219				
F Statistics	128.940				

As shown in Table 2, about 86% of variation in the responsiveness of the willingness to pay for a house in a sustainable neighborhood is explained by structural characteristics, location-specific environmental amenities and neighborhood characteristics of the dwelling.

The regression results reveal that all other thing equal, there are significant relationships in the willingness to pay based on structural attributes that incorporate environmental sustainability, such as floor and wall tiles. As indicated in Table 2, households in the survey are willing to pay 8% and 19% more to own houses with bamboo flooring and recycled content ceramic wall tiles respectively. However, the house with sustainable living features is insignificantly related to the property price, indicating respondents in this survey have excluded this variable in determining willingness-to-pay for a house. It appears that marketing a green house is not without its share of challenges. The developers are required to continue to undertake a long-term engagement programs to promote and raise awareness about "green living" and "being sustainable".

The neighborhood variables associated with social sustainability are key factors in the household's marginal willingness to pay. This study reveals that house buyers are willing to pay 11.05% and 12.73% more to live in the neighborhoods with the presence of local improvement groups and landscaped parks respectively. However, the availability of social interaction places is not statistically significant in this study.

Location and accessibility also play a role in the household's marginal willingness to pay. There are significant relationships between the property prices and four locational attributes, namely the distance to the workplace, to shops, to the hospital, and to schools. As indicated in Table 2, a house that is situated within 500 m traveling distance from the work place could fetch a 15.50% higher property price. This is quite consistent with the economic theory because a long distance

to the work place means incurring more traveling time and cost and that would dampen house prices. According to the survey, it is interesting to note that the house prices located near shops are 31.42% higher. In contrast to the findings of Tse and Love (2000), proximity to retailing outlets does not seem to have any positive impact on the house price as the quality of living would be affected if a house is located near retailing outlets. The response of this survey might be different as house buyers would like to benefit from being able to take a pleasant walk to the shops. As indicated earlier, the main emphasis of the sustainable neighborhood development is walkability. A higher house price (18.08% more) is reported if the house is located less than 500 m away from the hospital. The availability of schools in the neighborhood is an important factor in the household's marginal willingness to pay, assuming all other variables remain constant. A 29.03% higher sale price is observed for the houses that are less than 500 m away from primary and secondary schools. However, the results show that the distance to sport and recreation centers is insignificantly related to the willingness to pay. Generally, results are comparable to findings obtained in other studies and indicate similar buyer behaviors in the housing market with reference to locational attributes. Assuming all other thing being equal, house buyers in the survey are willing to pay 25.51% more to live in the gated-guarded neighborhood. It could be due to the security provided by security guards in the gated-guarded environment. Better security measures could instill a sense of trust and peace of mind amongst the residents.

Among the control variables, Table 2 shows that only the build-up area is statistically significant in relation to the house price. Generally homeowners want to own bigger dwelling units because of the symbolic status that goes along with their properties (Tan 2010). The estimation results also show that, holding all other factors constant, house age contributes a positive relationship to house prices. However, the relationship is not statistically significant. This finding is not in line with the works of Hui et al (2006), Tse and Love (2000), and Jim and Chen (2009), and Poudyal et al (2009). They reported negative and significant relationships between house prices and age of the properties. Generally, older properties are inferior in quality, which would fetch a lower price than a new one.

RECOMMENDATION AND CONCLUSION

The implications of this study are that housing developers should build the neighborhood that promotes sustainability as house buyers generally are willing to pay more to live in a sustainable neighborhood. Housing developers are advised to develop neighborhoods that are much in line with the principles of sustainable neighborhood development.

The analysis of the household's marginal willingness to pay indicates that house buyers may place priority on sustainable neighborhood characteristics, such as economic, social, and environmentally sustainability. In order to achieve environmentally sustainability, housing developers should use environmentally-friendly building materials in home design and quality. Housing developers are also advised to provide quality self-sufficient neighborhood where house buyers can reduce many daily vehicle trips to the workplace, to shops, to schools, and to recreational centers and facilities as far as economic sustainability is concerned. As indicated in this study, integrated amenities in a single location are equipped with all the elements of healthy living, learning, work, and play, and in fact, these amenities have become more sought-after as

householders find it more cost-effective to move into well-connected neighborhoods. From the social sustainability perspective, housing developers should encourage social interaction among residents of the neighborhood. Based on the findings of this study, social and recreation facilities, and landscaped parks within the neighborhood allow free interaction among residents of the local neighborhood. As Rohe and Steward (1996) point out, these social interactions are the first step toward participation in local neighborhood organizations.

It is reasonable to believe that the sustainability features of the neighborhoods play a role in determining the willingness to pay. However, Malaysian housing developers are still weighing the costs and benefits of building sustainable housing as many are concern that sustainable housing means a huge price tag and costs. That explain why it is still early days for Malaysia's green housing initiatives. The government should promote the adoption of more energy saving and sustainable measures for housing by subsidizing housing developers in the total development cost of a sustainable housing project. Additionally, the government should create the vision and give policy directions and sustainable neighborhood guidelines that guide the States and Local Authorities, developers, architects, planners, engineers and the public in planning and designing of sustainable neighborhoods towards creating a low carbon society and meeting the objectives of sustainable development.

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