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# **Analysing the desired quality of housing in the Klang Valley region, Malaysia**

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# **Analysing the desired quality of housing in the Klang Valley region, Malaysia**

## **Abstract:**

Housing is crucial for realising the basic requirements of people; it provides a shelter and people spend most of their daily activities in the locality. This study seeks to examine the quality attributes influencing the value of housing and their effect on housing prices according to generation cohorts and affordable housing prices. Twenty-one housing quality factors are first identified by a literature search, with a questionnaire survey ranking safety considerations, air quality, location choice, house ventilation, and accessibility to transportation services to be the highest influence. A further factor analysis reveals five major underlying dimensions of these attributes vis-à-vis locational qualities, values and lifestyles, the availability of public amenities, surrounding environment and product uniqueness, and accessibility. The study's contribution lies in its examination of the housing dimensions affecting quality of life along with providing insights and guidelines for emerging property developers in planning housing development projects in Malaysia and beyond.

## **Keywords:**

Quality of life; housing quality; housing environment; residential development; factor analysis; Malaysia

# **Analysing the desired quality of housing in the Klang Valley region, Malaysia**

## **Introduction**

Housing accommodation has a crucial influence on material living standards, being vital for fulfilling such fundamental requirements of people as being sheltered from an erratic local climate, a sense of privacy, security, and enclosed space. The social determinants of health and well-being are also affected by housing conditions (Baker, Lester, Bentley, & Beer, 2016), with good quality housing being central to productive, healthy, and meaningful lives. Furthermore, people's right to pleasant housing is more than something simply enclosed by four walls and a roof over one's head (Streimikiene, 2015). In this regard, purchasing a 'dream home' goes beyond finding basic shelter to live in, but is also concerned with housing characteristics and the surrounding environment (Sirmans, MacDonald, Macpherson, & Zietz, 2006; Wang, Ran, & Deng, 2012). This is because housing conditions considerably affect the life satisfaction of the inhabitants (Zhang, Zhang, & Hudson, 2018); highlighting the need for research into the determinants of desired quality living based on housing preferences (Coolen & Hoekstra, 2001).

The quality of life (QoL) of city dwellers is significantly associated with the living environment in urban areas (Kaklauskas et al., 2018; Ng, Zhang, Ng, Wong, & Lee, 2017; Winston, 2017; Zhang et al., 2018). Mallawaarachchi and Senaratne (2015) note that the quality of housing can be attained by meeting aesthetic, legal, and functional requirements. Nowadays, people are more concerned with their QoL, with expectations differing according to their background, especially in terms of gender, age, region, income, and ethnicity (Yeoh, 2014).

Housing prices are basically affected by such archetypal elements as neighbourhood, structure, and location (Saw & Tan, 2014; Thaker & Sakaran, 2016; Yap & Goh, 2017). However, more profound knowledge is needed of how Malaysian homebuyers vary in their perceptions, opinions, and preferences of house purchases (Tan, 2011). In today's competitive environment, property developers have to offer housing with design features that never go out of style while, at the same time, sustaining hedonic values. Hence, they aim to build the best homes for owner-occupier buyers that fit their lifestyle and engender a feeling of comfort and safety (Yvonne, 2014). The purpose of this study is therefore to analyse the quality attributes that significantly influence buying decisions and house prices. Since housing preferences vary significantly according to geographical settings (Sirmans et al., 2006), this Malaysian-based study aims to shed light on the desired quality of housing in an outperforming emerging economy with a culturally diverse society that is on its way to cross the threshold into being a developed country in a tropical Southeast Asian region.

## **Housing quality considerations**

### ***Relationship between quality factors and housing prices***

People in previous decades were less concerned about environmental amenities due to their lower income and low housing prices. Currently, however, increasing income levels have increased the willingness of individuals to pay a higher premium for houses in areas with ample public amenities, especially low-density neighbourhoods (Glaeser, Gyourko, & Saks, 2005). People seek housing that transcends conventional structural characteristic in terms of size, bedrooms, bathrooms, and having a garage, fireplace, and swimming pool (Sirmans et al., 2006). In Germany, Liebelt, Bartke, and Schwarz (2018) observe that larger urban green spaces give rise to higher residential prices. Comparable findings are also reported by Brander and Koetse (2011) in the Netherlands and Belcher and Chisholm (2018) in Singapore, as well as Mazzotta, Besedin, and Speers (2014) in the United States, where the

managed parks and trees provide recreational opportunities, aesthetic enjoyment, and an environmental function for the urban population.

### ***Relationship between quality factors and demand for housing***

To meet the expectations of increasingly affluent and discerning house buyers, housing developers are duty-bound to offer intangible advantages in the neighbourhood (beyond ‘location, location and location’) that are consistent with the needs and demands of current housing buyers (Tan, 2010). These include harmonising the planning and design of townships with their surroundings, incorporating a sense of security and integrated infrastructures to engender eco-friendly lifestyles.

Klang Valley (also known as Greater Kuala Lumpur) is a region in Malaysia where major cities such as Kuala Lumpur, Petaling Jaya and Shah Alam are located (Yap & Lock, 2017); currently home to about 7.2 million people or more than a fifth of Malaysia’s total population – one of the fastest growing metropolitan cities in Southeast Asian region (Kushairi, 2017). Nowadays, one of the crucial issues in Klang Valley is the scarcity and high cost of land (Bakhtyar, Zaharim, Sopian, & Moghimi, 2013), because of the significant increase in demand for high quality strategic land – targeted by developers for the construction of elegant and high-class leisure housing property (Liew & Nuzul, 2013).

### ***Relationship between quality factors and branding***

A popular key strategy to differentiate competitive products is branding. For example, the premium list of homebuyers usually includes branded property developers, and property buyers use assigned property branding characteristics to identify the difference between property developers. Hence, even for the property industry, the role of branding is increasingly important (Cheng & Cheok, 2008). However, developers selling high-priced properties are not necessarily quality developers or branded developers.

### ***Relationship between quality factors and well-being***

Many studies investigate the health of populations and their housing conditions, and a body of evidence now strongly links poor health with poor housing (Carnemolla & Bridge, 2016). Some of this suggests that the neighbourhood interactions are influenced by housing type, density, and the layout of streets; they also affect trust, social cohesion, and collective sense of community, all of which have a significant effect on mental health (Pearson, Barnard, Pearce, Kingham, & Howden-Chapman, 2014).

### **Factors influencing the *quality* of housing development**

The factors that affect the quality attributes of housing development have been analysed through building interiors and exterior spaces. Table 1 presents the 21 factors that impact housing quality attributes synthesised from previous studies. These relate to housing features, social environment, availability of public amenities, and other factors, including the proximity to matured townships and brand identity of property developers. They are described in more detail in the results sections that follow.

[Please insert Table 1 here]

### **Research methodology**

A cross-sectional quantitative approach employing a questionnaire survey is used to study the housing quality factors of Malaysian homebuyers. The questionnaire contains two parts. The first solicits the respondents' background information, such as gender, ethnicity, age group, house ownership, housing preference, and affordable price range. The second requires the respondents to assess the influence of the 21 factors on the quality attributes of a house on a five-point Likert scale ranging from 1 (not important) to 5 (very important).

The questionnaire was piloted with 45 potential homebuyers comprising the four generation cohorts of Generation Z, Generation Y, Generation X, and Baby Boomers to

ensure the questionnaire was clear and understandable (Yap & Goh, 2017). A total of 30 valid questionnaires survey were returned at this stage. The internal consistency of the pilot survey instrument was ascertained by Cronbach's coefficient alpha value of 0.930, which is higher than the 0.70 needed for acceptability (Hair, Black, Babin, & Anderson, 2010). As no changes were needed, another 130 questionnaires were distributed to targeted homebuyers from different age groups and generation cohorts within Kuala Lumpur and greater Kuala Lumpur areas. Seventy-two valid responses were received which, after combining the pilot questionnaires, provides 102 valid responses at a satisfactory consolidated response rate of 58%. In addition, being more than 100, the sample size is large enough for exploratory factor analysis (Fellows & Liu, 2008).

Table 2 provides detailed information relating to the demographic profile of the respondents, showing an approximately equal distribution between gender and age groups. The majority (approximately 61%) prefer landed property, and the affordable housing price range is between RM 100k to RM 500k, analogous to Yap and Ng's (2018) recent observation in Malaysia where the housing affordability ranged from RM 150k to RM 300k.

[Please insert Table 2 here]

Instead of the mean ranking and following Yap & Lock (2017) the influencing factors are prioritised by ranking using the relative importance index (RII) technique. The RII values, which range from 0 to 1, are obtained by

$$RII = \frac{\sum W}{(A * N)}$$

where  $W$  denotes the respondents' rating of each variable,  $A$  the highest attainable score, and  $N$  the sample size. The closer the RII value to 1, the more important is the factor perceived by the respondents. Table 3 summarises the category of significance (CoS) according to the Yap and Lock (2017) evaluation scale where  $0.143 \leq RII \leq 0.286$  (not significant),  $0.286 < RII \leq 0.428$  (somewhat significant),  $0.428 < RII \leq 0.571$  (moderately significant),  $0.571 < RII \leq$



0.714 (significant),  $0.714 < RII \leq 0.857$  (very significant) and  $0.857 < RII \leq 1.0$  (extremely significant).

[Please insert Table 3 here]

The opinions of the respondents are also evaluated according to their age and housing affordability price range groups respectively by employing the one-way analysis of variance (ANOVA) for the z-scores. A factor analysis is further used to identify the underlying dimensions that affect residents' QoL.

## **Analysis and discussion of results**

### ***Current satisfaction with housing***

Despite public concerns over the growth of living quality increasing in recent years (Wang, Ran, & Deng, 2012), Table 4 shows the majority of respondents (56.8%) being satisfied with their current housing (mean = 3.58) - neighbourhood and residential satisfaction reflecting the condition and quality of housing, which affects the QoL of an individual (Salleh, 2008). According to Mohit and Mahfoud (2015), residential satisfaction also indicates the fulfilled needs of an individual's housing. Almost 80% of the respondents also agree that the quality of housing attributes significantly enhances price (mean = 4.14), the price changing from one residential area to another according to the variety of environments and characteristics involved.

A close examination of Table 3 reveals that more than 75% of the respondents are willing to pay a premium for better housing quality attributes (mean = 4.06). This indicates that households are generally environmentally aware (Mandell and Wilhelmsson, 2011), the desired additional housing attributes including public amenities and accessibility, to enhance their living environment and QoL (Li, Wei, Yu, & Tian, 2016).

[Please insert Table 4 here]

### ***Factors of housing quality attributes***

Cronbach's coefficient alpha for the 21 factors of housing quality attributes is 0.913, greater than the 0.60 threshold value needed for an exploratory study (Hair et al., 2010). Tables 5 and 6 present the RII and ranking according to age group and affordable housing price range respectively.

[Please insert Tables 5 and 6 here]

Cross-referenced with Table 3, all 21 factors are significant, with RII values greater than 0.571. As Table 5 indicates, the five most significant factors influencing housing quality attributes are:

- (1) Safety considerations (RII = 0.904; CoS = ES)
- (2) Air quality (RII = 0.878; CoS = ES)
- (3) Choice of location (RII = 0.841; CoS = VS)
- (4) House ventilation of (RII = 0.837; CoS = VS)
- (5) Accessibility of transportation services (RII = 0.824; CoS = VS).

The two leading factors are rated as extremely significant (ES) while the other three are very significant (VS). Comparable findings are also reported by Tan (2013) regarding the factors influencing homeownership decisions by potential first-time homebuyers in Greater Kuala Lumpur, in which the neighbourhood crime rate is ranked the highest. Areas with less vehicle traffic (Gu et al., He, Chen, Zegras, & Jiang, 2018) and large green spaces (Liebelt et al., 2018) are often associated with better air quality. Overall, the findings suggest that the major elements enhancing living quality for homebuyers in the Klang Valley region relate to security, comfort, and convenience. This is very much aligned with the Malaysian Government's aim of reducing crime, raising living standards, and transforming the urban public transportation system in the quest to improve the QoL for all Malaysians (Performance Management and Delivery Unit, 2010; Shuid, 2016).

On the other hand, the least significant factors are new materials and technologies (RII = 0.696; CoS = S), availability of a place of worship (RII = 0.655; CoS = S), and developer brand (RII = 0.641; CoS = S). The built-environment sector lags behind in the uptake of new technologies (Henderson & Ruikar, 2010), hampering innovation diffusion into the housing market. It is interesting to note that place of worship is not perceived as a crucial neighbourhood facility in assessing housing quality by a multi-ethnic, multi-religious society such as Malaysia. Although prospective homebuyers are brand conscious (Cheng & Cheok, 2008) in which a developer's reputation significantly influences the price of housing, the findings suggest that branding does not directly impact housing quality. While place branding is often exploited as a status symbol for luxury, it is not necessarily associated with a modern and high-quality environment (Wu, 2010).

Further, ANOVA test on the data in Table 5 shows that the overall means of the four age groups are significantly different ( $F = 2.983$ ;  $df = 3,80$ ;  $p = 0.036$ ); consistent with Thaker and Sakaran's (2016) Malaysian and Haddad, Judeh, and Haddad's (2011) Jordanian observations that there are significant differences in decision making among home buyers according to age. In light of this, developers need to consider the demand for homeownership according to generation differences (Li, 2015). According to Zhang et al.'s (2018) study in China, housing satisfaction increases with age. On the other hand, an appraisal based on the four discrete affordability housing price ranges (Table 6) also reveals significant differences between the respondents ( $F = 3.457$ ;  $df = 3,80$ ;  $p = 0.020$ ). Li's (2015) mixed methods research in Hong Kong found that generation X buyers are more concern about 'income and housing prices' while Generation Y buyers emphasise on 'affordability and accessibility'. In contrast, Sirmans et al. (2006) found that U.S. household income does not significantly change the housing preferences of residents.

### ***Factor analysis of housing quality attributes***

Factor analysis enables the underlying dimensions from a number of variables to be identified (Wang & Yuan, 2011) and is used here to explore the principal groupings of the 21 factors that influence housing quality attributes.

The Kaiser-Meyer-Olkin (KMO) for the 21 variables is 0.847, which is above the 0.50 value for allowable sample adequacy for a good factor analysis (Yap, Low, & Wang, 2017). Bartlett's Test of Sphericity is 1100.9 ( $p=0.000$ ), which indicates that the population correlation matrix is not an identity matrix and the variables are sufficiently inter-correlated (Field, 2013). The principal component analysis (PCA) yields five underlying factors with loading values larger than 0.50 which explain 65.78% of the total variance; exceeding the 60% needed to attain acceptable construct validity (Hair et al., 2010). The varimax orthogonal rotation of PCA is used to construe these manifested factors (Yap et al., 2017). Two variables (viz. guarded community and availability of a recreation park) are omitted as their loading values are less than 0.50. Table 7 presents the final rotated matrix.

[Please insert Table 7 here]

#### Factor 1: Locational quality

This factor accounts for 17.18% of the total variance and contains location choice, air quality, accessibility of transportation services, safety considerations, and quality of finishes used. In terms of *location choice*, it is known that poor location and unattractive neighbourhoods by the target market or do not meet the housing requirements of the target group are the primary reasons for unsold residential units and property overhang in the Malaysian Klang Valley region (Tan, 2010); location is considered by developers to be the most critical factor stimulating housing prices in Malaysia (Kamal, Hassan, & Osmadi, 2016) a convenient location is one that is close to the workplace (Acolin & Green, 2017; Kim, Horner, & Marans, 2005; Tan, 2012; Wu, 2010); while the location of housing and the

quality of the neighbourhood are similarly dominating factors for housing gratification in Hanoi, Vietnam (Nguyen, Tran, Vu, & Luu, 2018). However, there seem to be limited large-scale townships in mature urban areas due to the scarcity of a sizable land bank (Tan, 2013) and the high cost of land (Yap & Ng, 2018). Hence, it is important that housing developers understand the trend of the current market and what the market wants, as today's homebuyers are more cautious their choice of permanent housing.

*Air quality* is positively associated with QoL (Darçın, 2014), making areas with a high pollution index less desirable (Kaklauskas et al., 2018; Weziak-Białowolska, 2016), while the positive effects of *accessibility of transportation* services can be seen when good network connectivity of public transportation services enhances the mobility of residents (Li et al., 2016). Likewise, good mobility with a seamless public traffic network is the main concern young Chinese consumers in Guangzhou province (Wu, 2010) and Hong Kong (Li, 2015). Meanwhile, gated-guarded communities provide a practical function for security and enhancing a sense of *safety* (Tan, 2011; Wu, 2010).

## Factor 2: Values and lifestyles

This factor accounts for 16.34% of total variance explained and contains the availability of retail outlets, housing support services by the developer, landscape design, developer brand, new materials and technologies, and house appearance. In terms of *retail outlets*, retail proximity is a significant issue in generating a higher premium in housing submarkets in Seoul, Korea (Jang & Kang, 2015), and the availability of retail outlets also significantly influences the satisfaction of European city dwellers (Weziak-Białowolska, 2016).

As well as locality, *landscape design* substantially is known to affect resident comfort levels (Liebelt et al., 2018), with a well-defined landscape space improving the quality of residential areas to fulfil the preferences of residents (Shahli, Hussain, Tukiman, & Zaidin, 2014) and beautiful landscaping raising housing prices (Belcher & Chisholm, 2018; Brander

& Koetse, 2011). In this vein, Hussain, Tukiman, Zen, and Shahli (2014) suggest providing an open space or park, which is one of the critical elements attracting prospective buyers. Hence, these are factors that can add value to a housing development, which not only affect price but also enhance the QoL of the residents.

Generally, the first feature noticed by homebuyers when purchasing their housing is its *appearance* (Rahadi, Wiryono, Koesrindartoto, & Syamwil, 2015). This is the case in China, for instance, where home buyers favour an aesthetically appealing neighbourhood environment (Wu, 2010). In Hong Kong, Li (2015) notes that Generation X accentuates quality of living more than other housing issues, which is also in agreement with Baker et al.'s (2016) study in Australia, where housing environments appear to affect mental, physical, and general health. With this in mind, homebuyers prefer a good neighbourhood and are more willing to pay a higher premium for such good environmental qualities as shopping convenience, lush greenery, innovative technological home systems, and stylish architectural designs.

### Factor 3: Availability of public amenities

This factor explains 14.11% of the total variance and contains the availability of medical and wellness cluster, availability of a place of worship, availability of educational facilities, and neighbourhood relations. The determination of housing prices depends to a large extent on the availability of public amenities around residential areas (Acolin & Green, 2017; Tan, 2010; Yap & Goh, 2017) and housing located close to public amenities that are convenient to residents has a greater value appreciation. Hence, the distance to such public amenities as medical and health centres, places of worship, and educational facilities is an unavoidable factor to be considered when purchasing a house (Kaklauskas et al., 2018; Kamal et al., 2016; Fan Wu, 2010). A separate study by Livy (2017) in the U.S. found a positive association between housing prices and the quality of schools in the neighbourhood. Similarly, Wen,

Xiao, and Zhang (2017) show that an excellent educational environment in Hangzhou, China, has already been capitalized into housing prices

#### Factor 4: Surrounding environment and product uniqueness

This factor explains 11.57% of the total variance and contains a sense of calmness, and the layout and ventilation of a house. Further to the dwelling quality itself, housing quality also relies on the wider residential area (Streimikiene, 2015), for living conditions that provide residents with a sense of peaceful environment. Noise pollution, for instance, can have a disturbing effect of householders. Loud traffic noise impacts on the residents' QoL, with its degree of influence depending on the distance from the housing - those in housing located next to the street or highway suffering the most (Rashid, Ngah, & Eluwa, 2013). Nelson's (2004) meta-analysis of airport noise and hedonic property values in Canada concludes that there is a noise discount of around 0.80 to 0.90 per cent per dB; according to Cohen and Coughlin's (2008) U.S. study, the average price of housing in noisy areas (70-75 dB) is 20.8% less than those in less noisy areas (<65 dB); while a comparable finding is also reported by Iman, Hamidi, and Liew (2009) on the effects of environmental disamenities on house prices in Malaysia. On the other hand, however, Weziak-Białowolska (2016) found European residents to be less concerned with noisiness when living in cities.

The value of residential development is affected by the *housing layout* and design which notably affect the comfort level of dweller (Rahadi et al., 2015). According to Azad, Morinaga, and Kobayashi's (2018) case studies in Tehran, Iran, designers should consider housing layout to attain a better quality of space in residential buildings. Mohit and Mahfoud (2015) appraisal of residential satisfaction in double-storey terrace housing in Kuala Lumpur, Malaysia reported that the most significant housing design elements are a provision of study room and family hall. In Saudi Arabia, Opoku and Abdul-Muhmin (2010) found significant gender differences concerning interior layout. As for obtaining thermal comfort in a tropical

humid climate, architectural design elements such as type and location of window, balcony and interior floor plan influence the indoor *ventilation* standard (Prianto & Depecker, 2003). Windows also allow daylight penetration and offer view to the exterior for outdoor connection (Azad et al., 2018).

#### Factor 5: Accessibility

This factor explains 6.57% of the total variance and is a prime reason determining the values of residential property and changes in these values. As is well known, accessibility generally has an important influence on the choice of housing to purchase (Acolin & Green, 2017; Gurran & Whitehead, 2011; Rahadi et al., 2015). This is particularly the case in Malaysia, where a tolerable walking distance in hot and humid weather conditions is around 400 to 800 m (Yap & Goh, 2017). A large number of developers also invest in areas of development with direct access to a toll road to increase sales (Rahadi et al., 2015).

#### **Conclusions and recommendations**

An increased QoL is the primary aim of most people around the world and Malaysia is no exception. In this study, the influence of housing on QoL is explored and evaluated in terms of potential Malaysian homebuyers' attitudes to the quality attributes of housing. The majority believe that quality factors influence housing prices and are willing to pay a premium for superior features that will significantly enhance their QoL. The five most influential of these are safety considerations, air quality, location choice, ventilation, and the accessibility of transportation services. The five underlying dimensions relating to the impact of housing residents' QoL are identified as locational quality, values and lifestyles, availability of public amenities, surrounding environment and product uniqueness, and accessibility. These expand existing knowledge of the QoL aspects associated with housing, providing insights and guidelines for property developers in planning their housing



developments in townships to correspond with the housing needs of the population, particularly in the improvement of the residents' QoL.

This study has its limitations, however. The sampling of this study is limited to the Kuala Lumpur and greater Kuala Lumpur areas, and further studies are needed of other major cities in Malaysia and beyond. In addition, it would be fruitful to investigate the property developers' perspective of the market needs for comparative purposes.

## References

- Acolin, A., & Green, R. K. (2017). Measuring housing affordability in São Paulo metropolitan region: Incorporating location. *Cities*, *62*, 41–49.
- Azad, S. P., Morinaga, R., & Kobayashi, H. (2018). Effect of housing layout and open space morphology on residential environments - Applying new density indices for evaluation of residential areas case study: Tehran, Iran. *Journal of Asian Architecture and Building Engineering*, *17*(1), 79–86.
- Baker, E., Lester, L. H., Bentley, R., & Beer, A. (2016). Poor housing quality: Prevalence and health effects. *Journal of Prevention & Intervention in the Community*, *44*(4), 219–232.
- Bakhtyar, B., Zaharim, A., Sopian, K., & Moghimi, S. (2013). Housing for poor people: A review on low cost housing process in Malaysia. *WSEAS Transactions on Environment and Development*, *9*(2), 126–136.
- Belcher, R. N., & Chisholm, R. A. (2018). Tropical vegetation and residential property value: A hedonic pricing analysis in Singapore. *Ecological Economics*, *149*(February 2017), 149–159.
- Brander, L. M., & Koetse, M. J. (2011). The value of urban open space: Meta-analyses of contingent valuation and hedonic pricing results. *Journal of Environmental Management*, *92*(10), 2763–2773.

- Carnemolla, P., & Bridge, C. (2016). Accessible housing and health-related quality of life: Measurements of wellbeing outcomes following home modifications. *International Journal of Architectural Research*, 10(2), 38–51.
- Cheng, F. F., & Cheok, J. (2008). Importance of branding for property developers in Malaysia. *Sunway Academic Journal*, 5, 65–81.
- Chia, J., Harun, A., Abdul Wahid, M. K., Martin, D., & Kepal, N. (2016). Understanding factors that influence house purchase Intention among consumers in Kota Kinabalu: An application of buyer behavior model theory. *Journal of Technology Management and Business*, 03(02), 94–110.
- Cohen, J. P., & Coughlin, C. C. (2008). Spatial hedonic models of airport noise, proximity, an housing prices. *Journal of Regional Science*, 48(5), 859–878.
- Coolen, H., & Hoekstra, J. (2001). Values as determinants of preferences for housing attributes. *Journal of Housing and the Built Environment*, 16(3–4), 285–306.
- Darçın, M. (2014). Association between air quality and quality of life. *Environmental Science and Pollution Research*, 21(3), 1954–1959.
- Fellows, R., & Liu, A. (2008). *Research methods for construction* (3rd ed.). Oxford: John Wiley & Sons, Ltd., UK.
- Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). London: Sage Publications, Inc.
- Glaeser, E. L., Gyourko, J., & Saks, R. E. (2005). Why have housing prices gone up? *The American Economic Review*, 95(2), 329–333.
- Gu, P., He, D., Chen, Y., Christopher Zegras, P., & Jiang, Y. (2018). Transit-oriented development and air quality in Chinese cities: A city-level examination. *Transportation Research Part D: Transport and Environment*, In Press.  
<https://doi.org/10.1016/j.trd.2018.03.009>

- Gurran, N., & Whitehead, C. M. E. (2011). Planning and affordable housing in Australia and the UK: A comparative perspective. *Housing Studies*, 26(7–8), 1193–1214.
- Haddad, M., Judeh, M., & Haddad, S. (2011). Factors affecting buying behavior of an apartment an empirical investigation in Amman, Jordan. *Research Journal of Applied Sciences, Engineering and Technology*, 3(3), 234–239.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Upper Saddle River, NJ: Pearson.
- Henderson, J. R., & Ruikar, K. (2010). Technology implementation strategies for construction organisations. *Engineering, Construction and Architectural Management*, 17(3), 309–327.
- Husin, H. N., Nawawi, A. H., Ismail, F., & Khalil, N. (2011). Development of hierarchy for safety elements and its attributes for Malaysia's low cost housing. *Procedia Engineering*, 20, 71–79. <https://doi.org/10.1016/J.PROENG.2011.11.140>
- Hussain, M. R. M., Tukiman, I., Zen, I. H., & Shahli, F. M. (2014). The impact of landscape design on house prices and values in residential development in urban areas. *APCBEE Procedia*, 10, 316–320. <https://doi.org/10.1016/J.APCBEE.2014.10.059>
- Iman, A. H. B. H., Hamidi, N., & Liew, S. (2009). The effects of environmental disamenities on house prices. *Malaysian Journal of Real Estate*, 4(2), 31–44.
- Jang, M., & Kang, C. D. (2015). Retail accessibility and proximity effects on housing prices in Seoul, Korea: A retail type and housing submarket approach. *Habitat International*, 49(October), 516–528.
- Kaklauskas, A., Zavadskas, E. K., Radzeviciene, A., Ubarte, I., Podvezko, A., Podvezko, V., ... Bucinskas, V. (2018). Quality of city life multiple criteria analysis. *Cities*, 72(August 2017), 82–93.
- Kamal, E. M., Hassan, H., & Osmadi, A. (2016). Factors influencing the housing price: Developers' perspective. *International Journal of Humanities and Social Sciences*,

10(5), 1676–1682.

Kim, T. K., Horner, M. W., & Marans, R. W. (2005). Life cycle and environmental factors in selecting residential and job locations. *Housing Studies*, 20(3), 457–473.

Kushairi, A. (2017, February 8). Making cities more liveable. *New Stairts Times*. Retrieved from <https://www.nst.com.my/news/2017/02/210537/making-cities-more-liveable>

Li, H., Wei, Y. D., Yu, Z., & Tian, G. (2016). Amenity, accessibility and housing values in metropolitan USA: A study of Salt Lake County, Utah. *Cities*, 59(November), 113–125.

Li, R. Y. M. (2015). Generation X and Y's demand for homeownership in Hong Kong. *Pacific Rim Property Research Journal*, 21(1), 15–36.

Liebelt, V., Bartke, S., & Schwarz, N. (2018). Hedonic pricing analysis of the influence of urban green spaces onto residential prices: the case of Leipzig, Germany. *European Planning Studies*, 26(1), 133–157.

Liew, C., & Nuzul, A. H. (2013). Factors influencing the rise of house price in Klang Valley. *International Journal of Research in Engineering and Technology*, 02(10), 261–272.

Liu, J., & Liu, J. (2011). Study on the new features of urban housing development and design in Xi'an. In *2011 International Conference on Electric Technology and Civil Engineering (ICETCE)* (pp. 1611–1613). <https://doi.org/10.1109/ICETCE.2011.5776377>

Livy, M. R. (2017). The effect of local amenities on house price appreciation amid market shocks: The case of school quality. *Journal of Housing Economics*, 36, 62–72.

Mallawaarachchi, H., & Senaratne, S. (2015). Importance of quality for construction project success. In *6th International Conference on Structural Engineering and Construction Management 2015* (pp. 84–89). Kandy, Sri Lanka.

Mandell, S., & Wilhelmsson, M. (2011). Willingness to pay for sustainable housing. *Journal of Housing Research*, 20(1), 35–51.

- Mazzotta, M., Besedin, E., & Speers, A. (2014). A meta-analysis of hedonic studies to assess the property value effects of low impact development. *Resources*, 3(1), 31–61.  
<https://doi.org/10.3390/resources3010031>
- Mohit, M. A., & Mahfoud, A.-K. A. (2015). Appraisal of residential satisfaction in double-storey terrace housing in Kuala Lumpur, Malaysia. *Habitat International*, 49(October), 286–293.
- Nelson, J. P. (2004). Meta-analysis of airport noise and hedonic property values. *Journal of Transport Economics and Policy*, 38(January), 1–28.
- Ng, S. L., Zhang, Y., Ng, K. H., Wong, H., & Lee, J. W. Y. (2017). Living environment and quality of life in Hong Kong. *Asian Geographer*, 35(1), 35–51.
- Nguyen, A. T., Tran, T. Q., Vu, H. Van, & Luu, D. Q. (2018). Housing satisfaction and its correlates: a quantitative study among residents living in their own affordable apartments in urban Hanoi, Vietnam. *International Journal of Urban Sustainable Development*, 10(1), 79–91.
- Opoku, R. A., & Abdul-Muhmin, A. G. (2010). Housing preferences and attribute importance among low-income consumers in Saudi Arabia. *Habitat International*, 34(2), 219–227.
- Pearson, A. L., Barnard, L. T., Pearce, J., Kingham, S., & Howden-Chapman, P. (2014). Housing quality and resilience in New Zealand. *Building Research and Information*, 42(2), 182–190.
- Performance Management and Delivery Unit. (2010). *Government Transformation Programme Annual Report 2010*. Putrajaya, Malaysia. Retrieved from [http://www.pemandu.gov.my/gtp/upload/GTP\\_AR2010\\_Eng.pdf](http://www.pemandu.gov.my/gtp/upload/GTP_AR2010_Eng.pdf)
- Prianto, E., & Depecker, P. (2003). Optimization of architectural design elements in tropical humid region with thermal comfort approach. *Energy and Buildings*, 35(3), 273–280.
- Prochorskaite, A., Couch, C., Malys, N., & Maliene, V. (2016). Housing stakeholder preferences for the “Soft” features of sustainable and healthy housing design in the UK.

*International Journal of Environmental Research and Public Health*, 13(1), 1–15.  
<https://doi.org/10.3390/ijerph13010111>

Rahadi, R. A., Wiryono, S. K., Koesrindartoto, D. P., & Syamwil, I. B. (2015). Factors influencing the price of housing in Indonesia. *International Journal of Housing Markets and Analysis*, 8(2), 169–188.

Rashid, S. T., Ngah, I., & Eluwa, S. E. (2013). Neighbourhood choice factors and residents satisfaction in old and new neighbourhoods of Slemani City, Kurdistan-Iraq . *Journal of Environment and Earth Science*, 3(2), 72–81.

Salleh, A. G. (2008). Neighbourhood factors in private low-cost housing in Malaysia. *Habitat International*, 32(4), 485–493.

Saw, L. S., & Tan, T. H. (2014). Factors affecting the purchase decision of investors in the residential property market in Malaysia. *Journal of Surveying, Construction and Property*, 5(2), 1985–7527.

Shahli, F. M., Hussain, M. R. M., Tukiman, I., & Zaidin, N. (2014). The importance aspects of landscape design on housing development in urban areas. *APCBEE Procedia*, 10, 311–315. <https://doi.org/10.1016/J.APCBEE.2014.10.058>

Shuid, S. (2016). The housing provision system in Malaysia. *Habitat International*, 54(3), 210–223.

Sirmans, G. S., MacDonald, L., Macpherson, D. A., & Zietz, E. N. (2006). The value of housing characteristics: A meta analysis. *Journal of Real Estate Finance and Economics*, 33(3), 215–240.

Streimikiene, D. (2015). Quality of life and housing. *International Journal of Information and Education Technology*, 5(2), 140–145.

Tan, T.-H. (2011). Neighborhood preferences of house buyers: the case of Klang Valley, Malaysia. *International Journal of Housing Markets and Analysis*, 4(1), 58–69.

- Tan, T. H. (2010). The impact of neighborhood types on the prices of residential properties. *Sunway Academic Journal*, 7, 77–88.
- Tan, T. H. (2012). Meeting first-time buyers' housing needs and preferences in greater Kuala Lumpur. *Cities*, 29(6), 389–396.
- Tan, T. H. (2013). Affordable housing for first-time homebuyers: Issues and implications from the Malaysian experience. *Pacific Rim Property Research Journal*, 19(2), 199–210.
- Thaker, H. M. T., & Sakaran, K. C. (2016). Prioritisation of key attributes influencing the decision to purchase a residential property in Malaysia. *International Journal of Housing Markets and Analysis*, 9(4), 446–467.
- Usman, M., & Wan Zahari, W. Y. (2017). The influence of housing components on prices of residential houses: A review of literature. *The Social Sciences*, 12(4), 625–632.  
<https://doi.org/10.3923/sscience.2017.625.632>
- Wang, J., & Yuan, H. (2011). Factors affecting contractors' risk attitudes in construction projects: Case study from China. *International Journal of Project Management*, 29(2), 209–219.
- Wang, Y., Ran, R., & Deng, G. (2012). Neighborhood quality and housing value: Evidence from urban micro data. *Journal of Management and Sustainability*, 2(1), 128–136.  
<https://doi.org/10.5539/jms.v2n1p128>
- Wen, H., Xiao, Y., & Zhang, L. (2017). School district, education quality, and housing price: Evidence from a natural experiment in Hangzhou, China. *Cities*, 66(February 2012), 72–80.
- Weziak-Białowolska, D. (2016). Quality of life in cities - Empirical evidence in comparative European perspective. *Cities*, 58, 87–96.
- Winston, N. (2017). Multifamily housing and resident life satisfaction in Europe: an exploratory analysis. *Housing Studies*, 32(7), 887–911.

- Wu, F. (2010). Gated and packaged suburbia: Packaging and branding Chinese suburban residential development. *Cities*, 27(5), 385–396.
- Wu, F. (2010). Housing environment preference of young consumers in Guangzhou, China: Using the analytic hierarchy process. *Property Management*, 28(3), 174–192.
- Yap, J. B. H., & Goh, S. V. (2017). Determining potential and requirements of transit oriented development (TOD): The case of Malaysia. *Property Management*, 35(4), 394–413.
- Yap, J. B. H., & Lock, A. (2017). Analysing the benefits, techniques, tools and challenges of knowledge management practices in the Malaysian construction SMEs. *Journal of Engineering, Design and Technology*, 15(6), 803–825.
- Yap, J. B. H., Low, P. L., & Wang, C. (2017). Rework in Malaysian building construction: Impacts, causes and potential solutions. *Journal of Engineering, Design and Technology*, 15(5), 591–618.
- Yap, J. B. H., & Ng, X. H. (2018). Housing affordability in Malaysia: perception, price range, influencing factors and policies. *International Journal of Housing Markets and Analysis*, 11(3), 476–497.
- Yap, J. B. H., & Skitmore, M. (2018). Investigating design changes in Malaysian building projects. *Architectural Engineering and Design Management*, 14(3), 218–238.
- Yeoh, T. (2014, June 4). Push for a better quality of life. *The Sun Daily*. Retrieved from <http://www.malaysia-today.net/2014/06/04/push-for-a-better-quality-of-life/>
- Yvonne, C. (2014, October 17). QCLASSIC way to better homes. *New Strait Times Online*. Retrieved from <https://www.nst.com.my/news/2015/09/qclassic-way-better-homes>
- Zhang, F., Zhang, C., & Hudson, J. (2018). Housing conditions and life satisfaction in urban China. *Cities*, 81(November), 35–44.



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**Table 1.** Quality attributes of a residential house

Ref.	Factors	Authors									
		(Mohit & Mahfoud, 2015)	(Husin, Nawawi, Ismail, & Khali, 2011)	(Salleh, 2008)	(Tan, 2012)	(Prochorskaite, Couch, Malys, & Maliene, 2016)	(Liu & Liu, 2011)	(Chia, Harun, Abdul Wahid, Martin, & Kepal, 2016)	(Usman & Wan Zahari, 2017)	(Opoku & Abdul-Muhmin, 2010)	(Tan, 2010)
A	<u>Housing features</u>										
A1	House layout	x	x	x	x	x	x	x	x	x	x
A2	House ventilation	x			x		x				
A3	House appearance	x			x	x		x	x		
A4	Quality of finishes								x	x	
A5	Landscape design					x	x				
A6	New materials and technologies				x		x				
A7	Housing support services by developer	x	x	x							
B	<u>Social environment</u>										
B1	Sense of calmness	x		x	x			x	x		
B2	Guarded community	x								x	
B3	Safety considerations	x		x	x	x			x		
B4	Neighbourhood relations	x									x
B5	Air quality			x				x	x	x	
B6	Choice of location		x						x	x	

**Table 1.** Continued

Ref.	Factors	Authors									
		(Mohit & Mahfoud, 2015)	(Husin et al., 2011)	(Salleh, 2008)	(Tan, 2012)	(Prochorskaite et al., 2016)	(Liu & Liu, 2011)	(Chia et al., 2016)	(Usman & Wan Zahari, 2017)	(Opoku & Abdul-Muhmin, 2010)	(Tan, 2010)
C	<u>Availability of public amenities</u>										
C1	Medical and wellness cluster	×		×			×				×
C2	Educational facilities	×		×			×	×			×
C3	Place of worship	×		×				×			
C4	Recreation park	×		×			×		×		×
C5	Accessibility of transportation services			×			×	×			
C6	Retail outlets	×		×			×				×
D	<u>Other factors</u>										
D1	Close to mature townships	×			×	×		×	×	×	×
D2	Developer brand				×		×	×			

**Table 2.** Respondents' demographic profile

Parameter	Categories	No. of respondents (N)	Frequency (%)
Gender	Male	45	44.1
	Female	57	55.9
Ethnicity	Chinese	88	86.3
	Malay	9	8.8
	Indian	3	2.9
	Others	2	2
Age group	18-23 (Generation Z)	31	30.4
	24-38 (Generation Y)	30	29.4
	39-53 (Generation X)	21	20.6
	54-72 (Baby Boomer)	20	19.6
Own a house now	Yes	35	34.3
	No	67	65.7
Housing preference	Apartment blocks/ Condominium	40	39.2
	Landed property	62	60.8
Affordable housing price range	RM100-300k	44	43.1
	RM300k-500k	42	41.2
	RM500k-700k	12	11.8
	RM700k-1mil	4	3.9

**Table 3.** Evaluation scale

Range	Category of significance
$0.143 \leq RII \leq 0.286$	Not significant (NS)
$0.286 < RII \leq 0.428$	Somewhat significant (SS)
$0.428 < RII \leq 0.571$	Moderate significant (MS)
$0.571 < RII \leq 0.714$	Significant (S)
$0.714 < RII \leq 0.857$	Very significant (VS)
$0.857 < RII \leq 1.0$	Extremely significant (ES)

**Table 4.** Perception towards housing characteristics and price

Parameter	Categories	No. of respondents (N)	Frequency (%)
Satisfaction with the quality attributes of current housing	Very unsatisfied	3	2.9
	Unsatisfied	7	6.9
	Neither	34	33.3
	Satisfied	44	43.1
	Very satisfied	14	13.7
Quality attributes of a house affect the housing price	Strongly disagree	2	2.0
	Disagree	2	2.0
	Undecided	17	16.7
	Agree	40	39.2
	Strongly agree	41	40.2
Willingness to pay more for a new house with better quality attributes	Definitely not	1	1.0
	Probably not	4	3.9
	Possibly	19	18.6
	Probably yes	42	41.2
	Definitely yes	36	35.3

**Table 5.** Ranking of housing quality attributes based on age group

Considerations	Generation Z (N = 31)		Generation Y (N = 30)		Generation X (N = 21)		Baby Boomer (N = 20)		Overall (N = 102)		CoS
	RII	Rank	RII	Rank	RII	Rank	RII	Rank	RII	Rank	
Safety considerations	0.890	2	0.920	1	0.943	1	0.860	1	0.904	1	ES
Air quality	0.897	1	0.887	2	0.876	3	0.840	2	0.878	2	ES
Choice of location	0.832	3	0.860	3	0.876	3	0.790	10	0.841	3	VS
House ventilation	0.819	4	0.840	6	0.895	2	0.800	9	0.837	4	VS
Accessibility of transportation services	0.794	7	0.840	6	0.857	7	0.810	6	0.824	5	VS
Quality of finishes	0.755	12	0.860	3	0.838	10	0.820	4	0.816	6	VS
Guarded community	0.774	8	0.853	5	0.857	7	0.750	12	0.810	7	VS
House appearance	0.774	8	0.800	11	0.867	6	0.810	6	0.808	8	VS
Sense of calmness	0.806	6	0.827	8	0.790	13	0.790	10	0.806	9	VS
Housing support services by developer	0.723	14	0.800	11	0.876	3	0.820	4	0.796	10	VS
House layout	0.813	5	0.820	9	0.771	16	0.700	17	0.784	11	VS
Close to mature townships	0.774	8	0.813	10	0.810	11	0.710	15	0.780	12	VS
Availability of retail outlets	0.703	17	0.760	14	0.857	7	0.840	2	0.778	13	VS
Landscape design	0.768	11	0.740	16	0.781	15	0.810	6	0.771	14	VS
Availability of medical and wellness cluster	0.748	13	0.793	13	0.790	13	0.740	13	0.769	15	VS
Availability of educational facilities	0.716	15	0.747	15	0.762	17	0.680	18	0.727	16	VS
Neighbourhood relations	0.684	19	0.713	17	0.800	12	0.740	13	0.727	16	VS
Availability of recreation park	0.710	16	0.700	19	0.752	18	0.710	15	0.716	18	VS
New materials and technologies	0.697	18	0.693	20	0.714	20	0.680	18	0.696	19	S
Availability of place of worship	0.600	21	0.713	17	0.743	19	0.560	21	0.655	20	S
Developer brand	0.613	20	0.680	21	0.619	21	0.650	20	0.641	21	S

Note: ES, VS, and S denote extremely significant, very significant, and significant respectively

**Table 6.** Ranking housing quality attributes based on affordable housing price

Considerations	RM100k-300k (N = 44)		RM300k-500k (N = 42)		RM500k-700k (N = 12)		RM700k-1mil (N = 4)		Overall (N = 102)		CoS
	RII	Rank	RII	Rank	RII	Rank	RII	Rank	RII	Rank	
Safety considerations	0.900	1	0.910	1	0.933	1	0.800	15	0.904	1	ES
Air quality	0.864	2	0.890	2	0.900	2	0.850	8	0.878	2	ES
Choice of location	0.832	6	0.838	3	0.867	4	0.900	3	0.841	3	VS
House ventilation	0.859	4	0.824	4	0.800	9	0.850	8	0.837	4	VS
Accessibility of transportation services	0.864	2	0.781	11	0.817	6	0.850	8	0.824	5	VS
Quality of finishes	0.832	6	0.795	7	0.867	4	0.875	5	0.816	6	VS
Guarded community	0.795	11	0.795	7	0.883	3	0.900	3	0.810	7	VS
House appearance	0.809	10	0.805	6	0.817	6	0.800	15	0.808	8	VS
Sense of calmness	0.823	8	0.795	7	0.800	9	0.938	1	0.806	9	VS
Housing support services by developer	0.836	5	0.767	13	0.783	11	0.875	5	0.796	10	VS
House layout	0.764	16	0.814	5	0.733	15	0.850	8	0.784	11	VS
Close to mature townships	0.768	14	0.786	10	0.783	11	0.850	8	0.780	12	VS
Availability of retail outlets	0.814	9	0.748	14	0.783	11	0.875	5	0.778	13	VS
Landscape design	0.773	13	0.781	11	0.733	15	0.938	1	0.771	14	VS
Availability of medical and wellness cluster	0.795	11	0.729	15	0.817	6	0.750	17	0.769	15	VS
Availability of educational facilities	0.750	18	0.705	16	0.683	19	0.850	8	0.727	16	VS
Neighbourhood relations	0.768	14	0.686	17	0.767	14	0.750	17	0.727	16	VS
Availability of recreation park	0.759	17	0.676	18	0.733	15	0.750	17	0.716	18	VS
New materials and technologies	0.727	19	0.667	19	0.700	18	0.813	14	0.696	19	S
Availability of place of worship	0.723	20	0.590	21	0.667	20	0.688	21	0.655	20	S
Developer brand	0.659	21	0.633	20	0.567	21	0.750	17	0.641	21	S

Note: ES, VS, and S denote extremely significant, very significant, and significant respectively

**Table 7.** Factor profile

Housing dimensions	Factor loading	Variance explained %
<b>Factor 1: Locational qualities</b>	-	17.18
Choice of location	0.774	-
Air quality	0.729	-
Accessibility to transportation services	0.712	-
Safety considerations	0.667	-
Quality of finishes	0.504	-
<b>Factor 2: Values and lifestyles</b>	-	16.34
Availability of retail outlets	0.760	-
Housing support services by developer	0.677	-
Landscape design	0.633	-
Developer brand	0.613	-
New materials and technologies	0.604	-
House appearance	0.545	-
<b>Factor 3: Availability of public amenities</b>	-	14.11
Availability of medical and wellness cluster	0.782	-
Availability of place of worship	0.744	-
Availability of educational facilities	0.688	-
Neighbourhood relations	0.543	-
<b>Factor 4: Surrounding environment and product uniqueness</b>	-	11.57
Sense of calmness	0.762	-
House layout	0.761	-
House ventilation	0.558	-
<b>Factor 5: Accessibility</b>	-	6.57
Close to mature townships	0.761	-
<b>Total variance explained</b>		<b>65.78</b>