

# RESIDENTS' PERCEIVED PROPERTY PRICE FAIRNESS CONCERNING THE INFRASTRUCTURAL DEVELOPMENT IN GREATER KUALA LUMPUR

<sup>1</sup>Ng Xin Na, <sup>\*2</sup>Wee Siaw Chui, <sup>3</sup>Choong Weng Wai,  
<sup>4</sup>Low Sheau Ting & <sup>5</sup>Razlin Mansor

Faculty of Built Environment and Surveying  
Universiti Teknologi Malaysia

E-Mail: <sup>1</sup>ngxinna@graduate.utm.my, <sup>2</sup>scwee@utm.my, <sup>3</sup>cwengwai@utm.my,  
<sup>4</sup>sheauting@utm.my, <sup>5</sup>razlin@utm.my

## ABSTRACT

Residential property prices in Malaysia have been steadily rising in recent years, with bright prospects for the future. However, the prices of residential properties in Malaysia vary greatly depending on the level of infrastructure development in each area. This research aims to determine the adequacy of infrastructural development in Greater Kuala Lumpur and to examine residents' perceived property price fairness concerning the infrastructural development in this area. A questionnaire survey was distributed via Google Forms to collect approximately 400 responses from a sample of residents in Greater Kuala Lumpur, and the data was analysed using Statistical Package for Social Sciences (SPSS). Through Relative Importance Index analysis, this study evaluated the adequacy of infrastructural development such as railways, roadways and highways, airports, water and sanitation, telecommunications, educational infrastructures, retailers, health facilities and recreational facilities. This research then assessed the relationship between the adequacy of infrastructural development and residents' perceived property price fairness via Spearman correlation analysis. According to the findings, there is a positive significant relationship between the adequacy of infrastructural development and property price fairness perceived by the residents in Greater Kuala Lumpur. A positive correlation indicates that as the adequacy of any infrastructural development increases, the other variable, residents' perceived property price fairness, tends to increase or vice versa. The research findings will be valuable to real estate developers, agents, investors and owners in Greater Kuala Lumpur.

**Keywords:** *Greater Kuala Lumpur, adequacy of infrastructural development, residential property price fairness, relative importance index*

## 1. INTRODUCTION

Infrastructure is a critical driver of economic growth in any country. It includes the essential services that drive economic activity, such as electricity, roads, water systems, public facilities, airports, railways and telecommunications. However, infrastructural development refers to the establishment of the basic amenities and services required for a specific activity or pursuit. According to Oxford Business Group (2012), several critical infrastructure projects are being implemented in Malaysia as part of the Economic Transformation Programme (ETP). Consequently, the real estate market remains positive, while the construction sector in Malaysia is experiencing a comparatively active economic cycle.

Large infrastructure projects are a crucial part of Malaysia's construction industry development. Large infrastructure refers to the basic physical system of a business or country. For instance, new trunk roads, airports, ports, power plants, nuclear facilities and chemical industries are included in the large infrastructure projects. In addition, large infrastructure may also include transportation, communication, sewage, water and electric systems (Masrom et al., 2015). Multinational studies have shown that investments in transportation, electricity and telecommunications infrastructure have significant positive effects on GDP growth in the long run (Timilsina et al., 2023; Nisa & Khalid, 2024).

Tan (2012) stated that infrastructural developments necessitate the provision of sufficient accommodation in a high-standard and peaceable living environment for all Malaysians in need, regardless of race or religion. Therefore, the widespread assumption is that infrastructure provision in residential property will continue to attract potential home purchasers (Olujimi and Bello, 2009). According to Oduwaye (2009), the rising demand for residential property in a city will continue to pique the interest of real estate investors. Thus, the availability of infrastructural development in the residential property market is crucial and can be categorized into transport infrastructure, utility infrastructure and social infrastructure (Hardekar et al., 2018).

New infrastructure developments are likely to directly or indirectly impact residential property demand and market value. Thus, this research will examine the adequacy of infrastructural development and residents' perceived property price fairness in Greater Kuala Lumpur.

### 1.1 Background Study

The availability and adequacy of infrastructure are critical factors influencing the demand and choice of residential property. Individuals with good socioeconomic status often seek to reside in residential properties surrounded by a maximum supply of basic infrastructure at an affordable cost. In these circumstances, most residents in Greater Kuala Lumpur prefer to live near their workplaces, schools, shops, recreational areas and transport stations. Besides, most homeowners may prioritize neighbourhood characteristics like the standard of housing, the standard and expense of public utilities, the social environment, the omission of noise and pollution and any reputation associated with the region.

It is critical to provide infrastructural facilities that will enhance the living conditions of neighbourhood residents. Infrastructure and the provision of housing are closely related, whereby to provide sustainable housing, infrastructural facilities must also be provided (Otegbulu and Adewunmi, 2009). In Malaysia, about RM450 billion to RM500 billion is spent on infrastructure investments (Rashid, 2021). As a result, infrastructure services are expected to increase, leading to increased productivity and a higher standard of living.

Greater Kuala Lumpur is a key focus of Malaysia's Economic Transformation Program, aiming to develop a vibrant metropolitan area (Yau et al., 2016). Greater Kuala Lumpur is experiencing rapid urbanization and growth. In recent years, this area has shown significant progress in enhancing its infrastructure to support the growing population and economic activities. Infrastructure development significantly influences housing prices. Studies have shown that improved accessibility, road networks and availability of facilities like transportation, utilities and public services can lead to increased land and housing prices (Prabowo & Adiarto, 2022; Dabara et al., 2016). The adequacy of infrastructure in housing developments is crucial for improving the quality of life and ensuring sustainable housing environments (Ogunsanya et al., 2016). Also, properties with better infrastructure and physical conditions generally command higher rental values (Dabara et al., 2016).

According to Chung (2022), the average property prices in Greater Kuala Lumpur showed significant growth from 2000 until the first quarter of 2021. The Juwai IQI Malaysia Property Survey and Index Q3 2022 revealed that property prices are expected to increase significantly over the next 12 months. Due to the challenging economic situation, including rising interest rates and a higher cost of living, the housing market price in Greater Kuala Lumpur is climbing. Wong (2024) also mentioned that Malaysia's average sub sale and new property unit prices in the first quarter of 2024 are slightly higher than in 2023.

Nonetheless, the rapid urbanization of Greater Kuala Lumpur has led to significant urban management challenges, including land use changes, rural encroachment, and environmental degradation (Yasin et al., 2022). Flash floods have also hit Greater Kuala Lumpur in recent years due to the unsupported drainage system towards heavy downpours (Rajendra, 2021; Rodzi, 2022). Furthermore, the water disruption issue is another topic that has been frequently raised and discussed. A study estimated that property valued at RM459,041 million was at risk due to frequent water supply disruptions in Selangor and parts of Kuala Lumpur in 2020, with business losses amounting to RM2,053 million (Raihan et al., 2023). These rising issues led to the question of how adequate the infrastructure developments in Greater Kuala Lumpur are in supporting its growing population and economic activities.

With this question in mind, the fluctuations in residential property prices related to infrastructure development may raise concerns among residents regarding the fairness of these price shifts. Some residents may perceive the rising property prices as positive, indicating increased desirability and potential for future returns on investment. In contrast, some residents may view these price increases as unfair, especially if they result in affordability issues or socioeconomic disparities. Therefore, this research aimed to determine the adequacy of infrastructures in Greater Kuala Lumpur and examine its relationships with the residents' perceived property price fairness in Greater Kuala Lumpur.

## 1.2 Research Objectives

The objectives of the research are as follows:

- i. To determine the adequacy of infrastructural development in Greater Kuala Lumpur.
- ii. To examine residents' perceived property price fairness concerning the adequacy of infrastructural development in Greater Kuala Lumpur.

## **2. LITERATURE REVIEW**

### **2.1 Residential Property**

Residential properties, primarily houses used for living, are a crucial component of household assets and expenses (Balk et al., 2013). Adequate housing should consider factors such as good location, housing market choices and access to public services (Satterthwaite, 2020). Additionally, housing should incorporate essential amenities such as water, electricity and waste management systems to improve residents' quality of life (Gyimah & Gyimah, 2014). Furthermore, studies have shown that residents' satisfaction is influenced by the quality of facilities and maintenance services provided (Oluwunmi & Emoka, 2022; Sia et al., 2018). Providing adequate housing with necessary services is crucial for meeting residents' physical and biological needs.

### **2.2 Infrastructure**

Infrastructure is the fundamental facilities, structures, and systems that support the functioning and development of a society and its economy (Wafer, 2019). Besides, infrastructures constitute a network of structures and frameworks that connect emerging cities and metropolitan regions (Ijaiya and Akanbi, 2009). Infrastructure typically refers to the physical components of interconnected systems that provide commodities and services required to enable, sustain, or improve societal living conditions. It encompasses physical elements like roads, pipes, cables, and public goods and services essential for economic growth and quality of life (Wafer, 2019). The World Health Organisation (WHO) expanded this definition of infrastructure to include basic services, amenities, appliances and mechanisms required or preferred for physical and mental health and the group's and individual's social welfare.

### **2.3 Adequacy of Infrastructural Development**

Infrastructure development is crucial for sustainable economic growth and national development (Susantono & Berawi, 2018; Asaju, 2023). Adequate infrastructure for both physical and social components is essential for providing necessary public services and fostering growth (Berawi, 2017; Susantono & Berawi, 2018). The provision and maintenance of reliable infrastructure, including public utilities, works and transport systems are fundamental to increasing productivity, expanding trade, reducing poverty and improving living standards (Susantono & Berawi, 2018).

### **2.4 Relevance of Infrastructural Development to Residential Property**

By investigating the property market in hundreds of German cities, Belke and Keil (2018) discovered that local infrastructure was inextricably linked to residential property prices. According to Abidoye et al. (2021), the construction of new infrastructure will impact the surrounding area's property, economy, environment and housing value. Weisbrod et al. (1980) proposed that infrastructure construction in urban regions can potentially widen urban boundaries and impact residential property values in adjacent areas.

Access to good roads, drainage and electricity, among other things, increases property values (Oduwaye, 2009). Property and land values tend to rise more quickly in areas with expanding transportation networks and less quickly in areas without such improvements. According

to Chen et al. (2022), residential property values in the Yangtze River Delta have increased simultaneously with the fast infrastructural development. A considerable quantity of funds drifts into the Yangtze River Delta due to rapid infrastructural development, accelerating the flow of industrial components, extending the economic scale and rising geographical inhabitants. Different types of infrastructure are discussed in the following sections.

### **2.4.1 Transportation Infrastructure**

In particular, transportation infrastructures like roads and public transit systems are essential in improving efficiency and quality of life, especially in greater and crowded metropolitan regions like Greater Kuala Lumpur in Malaysia (Dziauddin, 2022). The provision of transportation, such as roads, railways, airports, seaways and waterways, facilitates the movement of people from one location to another.

#### **2.4.1.1 Railways**

According to Dziauddin (2019), rail transit investment increases the property's accessibility to key activity centers and, in most cases, increases the appeal of locations near transit stations. The train line increased access to the CBD for a catchment area of homes, likely to have increased the value of residential properties (Melser, 2020). According to Dziauddin (2022), since the mid-1990s, the Malaysian government has burnt billions of dollars for capitalizing on the establishment of various types of urban rail transit systems in Greater Kuala Lumpur, the latest of which is mass rapid transit (MRT).

Numerous studies have demonstrated that high-capacity transit stops, such as metro or light rail stations, significantly influence property prices. Because of the increased demand for goods from purchasers, the improved accessibility of urban transportation may raise the price of surrounding property. Studies in various cities, including Houston, Zhengzhou and Greater Kuala Lumpur, have found significant increases in property values near rail stations (Pan, 2019; Zhang & Jiao, 2019; Dziauddin, 2023). The impact varies with distance, with properties closer to stations generally experiencing higher premiums (Dziauddin, 2023; Zhang & Jiao, 2019).

#### **2.4.1.2 Roadways and Highways**

Roads are the country's primary mode of domestic transportation, accounting for well over 90% of all passenger and freight traffic. In his classical theory, Ratcliffe (1995) conceptualized that general access routes or road improvements influence residential property prices favorably.

According to Langley (1981), prices for residential properties positioned too close and too far from the highways may be lower, whereas those located at a moderate distance may be higher. A study examined the impacts of highway noise on housing prices and discovered that every decibel of noise near the highways reduces residential property prices by up to 0.63% (Nelson, 1982). According to Riccioli et al. (2021), being too close to a rail

transit line's main road would cause severe traffic congestion and pollution, lowering housing prices.

#### **2.4.1.3 Airports**

According to Efthymiou & Antoniou (2013), while the negative externalities generated, such as noise, have a negative impact, the proximity to the airport implies higher residential property prices because of the increased accessibility. Cohen and Coughlin (2009) investigated the case of Atlanta International Airport and concluded that the estimation is biased when the accessibility variable is omitted.

### **2.4.2 Utilities Infrastructure**

Utility facilities encompass a variety of urban infrastructure and utilities like water supply, drainage and sewerage, waste disposal, street lighting, electricity, bus and truck terminals, and so on (Nahrin, 2018). The author also stated that the supply of utility infrastructure and firms to offer jobs in the emerging urban regions will make these locations appealing to the city people.

#### **2.4.2.1 Water and Sanitation**

Choumert et al. (2014) stated that purchasing residential property with existing water connections is a sound way for households who cannot afford the expense of installing a new connection to gain access to the water network. Therefore, connecting a residential property to the piped water network is likely to raise its property value (Choumert et al., 2014). Sohn and Kim (2020) examined the capitalization impact of rainwater treatment ponds on residential property prices in water supply and drainage infrastructure.

Ibrahim (2011) studied sanitation and solid waste disposal as infrastructures that promote healthy living by removing trash from the human environment, whether domestic, industrial or commercial. It consists of refuse collection facilities, treatment plants, incinerating plants, disposal facilities, landfills and other similar facilities.

#### **2.4.2.2 Telecommunications**

The cellular and internet segments will experience the most growth in the telecommunications sector. According to Bandias & Vemuri (2005), enhanced telecommunication may provide communities with benefits beyond greater communication capability. Telecommunication is a critical instrument for overall community development, positively affecting education, health, economy and social cohesion.

According to Akin and Margaret (2014), there is a relatively high correlation between staying around the telecommunication mast for an extended period and property value decline on the one hand and property patronage on the other. This correlation implies that prospective buyers prefer to stay elsewhere rather than in houses near the telecommunication mast.

### **2.4.3 Social Infrastructure**

Social infrastructures include amenities and services like health care, education and various government agencies, among others, frequently act as the drivers of social and economic activity (Ijaiya and Akanbi, 2009). According to Chulanova (2007), developing social infrastructure is critical in modern communities because education and health care are important variables for economic growth, social progress and a country's competitiveness in worldwide markets.

#### **2.4.3.1 Educational Infrastructure**

The desire of wealthy Chinese parents to equip their children with a high-standard education, in particular, boosts their willingness to pay high expenses for residential properties (Feng and Lu, 2013). Chan et al. (2020) stated that high-quality schools in a neighbourhood might result in a 14% rise in district residential property prices, a phenomenon common in urban China.

According to Ibrahim (2011), promoting far-reaching social and economic changes requires the nation to have a modern and progressive educational system. Sufficient infrastructure should be supplied from elementary schools like nursery or primary to secondary and higher institutions like polytechnics, universities and colleges of education to encourage a high standard of education and training.

#### **2.4.3.2 Retailers**

According to Wang and Li (2006), the convenience of daily goods shopping is an important factor for home ownership preferences in China. Mikelbank (2004) indicated that residential property prices increase due to transportation enhancements along the shortest-path routes connecting individual residences to the region's CBD or the local shopping centre. Interestingly, despite accessibility advantages to retailers, a high concentration of retailers might dissuade residents from buying specific locations because of overcrowding and noise pollution (Hurtubia et al., 2010).

#### **2.4.3.3 Health Facilities**

Cui et al. (2018) stated that hospital accessibility influences housing prices and rents. Even though hospitals are rarely considered and studied in terms of capitalization, the distance to areas with high-standard hospitals positively impacts housing prices in such areas (Yuan et al., 2018).

According to Ibrahim (2011), population and economic growth necessitate the provision of sufficient and enhanced healthcare infrastructures. This provision can be accomplished by placing sufficient and effective medical facilities, clinics, hospitals and maternity houses within an appropriate proximity of beneficiaries.

#### **2.4.3.4 Recreational Facilities**

According to Ibrahim (2011), some examples of social infrastructure include recreational infrastructures like playgrounds, sports facilities, gardens, geographical and zoological parks and natural recreational centres such as waterfalls, warm water springs, beaches, etc. These facilities have been designed to relieve stress, promote relaxation, see illusions and encourage a long and healthy life.

Studies showed that proximity to sports facilities and parks increases residential property values (Feng & Humphreys, 2018; Bottero et al., 2022). Furthermore, residential property units located close to green or recreational parks are extremely desirable and preferred by the residents (Lo & Jim, 2010). Accessible green spaces near residences have been demonstrated to increase residential property prices by 5–6% (Tajima, 2003).

### **3. RESEARCH METHODOLOGY**

#### **3.1 Data Collection**

Data collection is the most critical part and a prerequisite process before data analysis. The data can be collected from two main sources: primary sources and secondary sources. Primary data is obtained via a questionnaire survey designed specifically for the study. However, secondary data is obtained by reviewing relevant literature, journals and papers. To determine residents' perceived property price fairness towards the adequacy of infrastructures, a self-administered survey was carried out to obtain data needed for the research.

#### **3.2 Sampling**

Data is collected within a sample from a population. However, examining only a subset of the population is often preferable rather than the entire population. Therefore, this research mainly focused on respondents currently residing in Greater Kuala Lumpur. Based on Krejcie and Morgan's Table, a sample size of 400 residents in Greater Kuala Lumpur was required to investigate their perceived property price fairness towards the adequacy of infrastructural development. The questionnaire was generated using Google Forms. Then, the snowball sampling method was used to facilitate and broaden the process of questionnaire distribution to the relevant respondents through online platforms.

Snowball sampling is a purposeful method used in qualitative research to study hard-to-reach populations (Naderifar et al., 2017). This method involves identifying initial respondents who refer researchers to other potential participants, creating a chain of referrals (Atkinson and Flint, 2001). It has been successfully applied in various fields, including real estate development and housing studies (Sari & Prayogi, 2019). In this study, the questionnaire survey started with distribution to the targeted respondents who were known to be living in Greater Kuala Lumpur by researchers. After that, the respondents were asked to help further distribute the questionnaire to their friends and families who live in Greater Kuala Lumpur or referred to the next eligible respondents to the researcher to form a chain of referrals to collect the necessary data.

### 3.3 Data Analysis

Data analysis was carried out after data collection from the respondents and inserted into Microsoft Excel to proceed with data analysis. Descriptive, content and Spearman correlation analyses used the Statistical Package for Social Sciences (SPSS) to analyse the collected data and obtain relevant findings.

#### 3.3.1 Descriptive Analysis

Descriptive analysis refers to a constructive way of describing and summarizing data. At the same time, descriptive analysis converts the data into a more understandable and interpretable format to facilitate data analysis. After data collection, descriptive analysis is carried out to calculate the number of respondents to each category of the demographic background. The results of descriptive analysis can be presented in tabular and histogram form with relevant explanations.

Frequency distribution is one of the descriptive analyses that can summarize the data in graphical forms that are simple to understand and interpret. The frequency distribution is a graphical representation of the number of individuals in each group on a measurement scale. It is capable of effectively summarizing a large amount of raw data. The component with the highest percentage or frequency in the data analysis indicates the highest favoured responses from the targeted population.

#### 3.3.2 Relative Importance Index Analysis (RII)

Relative Importance Index Analysis (RII) is a non-parametric method commonly applied to identify which determinants are essential based on respondent responses and an appropriate tool for prioritizing indicators rated on the Likert scale. The result obtained from the first phase is applied as input in the second phase, which is then assessed using the RII to identify the most significant determinants. The highest index value implies that the respondents place a high value on the determinants under consideration. Ranking of the determinants in terms of their significance as assessed by the respondents can be calculated using the RII formula as follows:

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

Where:

W = Weightage given to each determinant by the respondents

A = Highest weight

N = Total number of respondents

#### 3.3.3 Content Analysis

Content analysis is a versatile methodology for studying human communication in various forms, including written texts, images, and audio (Baxter, 2020; Bengtsson, 2016; Neuendorf & Kumar, 2015). Content analysis is a unique method in that it contains both quantitative and qualitative methodologies and can be applied in an inductive or deductive way. In quantitative content analysis, details from the contents are reported in the form of frequency stated as a percentage or actual numbers

of major classifications (Neuendorf & Kumar, 2015). Such an approach summarizes rather than presents all information about a message set; the researcher is looking for answers to how many there are. However, in qualitative content analysis, data is given in words and themes, leading to further interpretation of the findings. This content analysis was used to analyse the data collected from the open-ended questions in the questionnaire survey.

### 3.3.4 Spearman Correlation Coefficient Test

Spearman's rank-order correlation refers to a non-parametric form of the Pearson product-moment correlation. According to Artusi et al. (2002), the Spearman correlation coefficient is typically applied if the assumption of bivariate normal distribution is not viable. This transformation allows it to transfer data from the original scales to the same scale, such as rankings. The Spearman's correlation coefficient ( $\rho$ , also signified by  $r_s$ ) is a statistical measure of the strength of a monotonic relationship between two data sets.

The explanation of Spearman's correlation coefficient is similar to that of Pearson's, namely that the closer  $r_s$  is to  $\pm 1$ , the stronger the monotonic relationship. If they are close to 1, there is a strong positive correlation; if they are close to -1, there is a strong negative correlation. If they are close to zero, that means there is no association. A positive correlation indicates that as one variable increases, the other variable also tends to increase. A negative correlation, on the other hand, indicates that as one variable increases, the other variable tends to decrease.

## 4. DATA ANALYSIS AND FINDINGS

### 4.1 Demographics of Respondents

According to the data collected, 400 respondents responded to the questionnaire survey. This section is to identify the demographic background of the respondents who are residents of Greater Kuala Lumpur. The demographic background includes the general information of the respondents, such as gender, age, educational level, employment status, monthly household income, and residential property ownership. This section also includes the respondents' opinions on whether the residential property price is affected by its infrastructural development. Moreover, their perception of the residential property price and the existing infrastructural development in Greater Kuala Lumpur and their intention to purchase are involved in this section as well. Table 1 shows the descriptive analysis used to analyse the demographic data and identify the frequency of the choices selected by the respondents based on the questions in the questionnaire. Table 2 shows the results of the content analysis, which are the key comments of the respondents regarding residential property price fairness in Greater Kuala Lumpur, as well as infrastructure development.

**Table 1: Demographic Analysis – Respondents' Profile**

|                                      |                                        | <b>Frequency</b> | <b>Percentage (%)</b> |
|--------------------------------------|----------------------------------------|------------------|-----------------------|
| Gender                               | Male                                   | 181              | 45.3                  |
|                                      | Female                                 | 219              | 54.8                  |
| Age                                  | Below 18                               | 4                | 1.0                   |
|                                      | 18 - 24                                | 255              | 63.7                  |
|                                      | 25 - 34                                | 105              | 26.3                  |
|                                      | 35 - 44                                | 25               | 6.3                   |
|                                      | 45 - 54                                | 7                | 1.8                   |
|                                      | 55 - 64                                | 1                | 0.3                   |
|                                      | 65 and above                           | 3                | 0.8                   |
| Educational Level                    | SPM                                    | 78               | 19.5                  |
|                                      | Foundation/ STPM/<br>A- Level/ Diploma | 53               | 13.3                  |
|                                      | Bachelor's Degree                      | 251              | 62.7                  |
|                                      | Master's degree                        | 15               | 3.8                   |
|                                      | Doctor of Philosophy                   | 3                | 0.8                   |
| Employment Status                    | Full-Time Employment                   | 168              | 42.0                  |
|                                      | Part-Time Employment                   | 50               | 12.5                  |
|                                      | Self-employed                          | 55               | 13.8                  |
|                                      | Unemployed                             | 127              | 31.8                  |
| Household Income                     | Less than RM2,500                      | 196              | 49.0                  |
|                                      | RM2,501 - RM3,170                      | 52               | 13.0                  |
|                                      | RM3,171 - RM3,970                      | 67               | 16.8                  |
|                                      | RM3,971 - RM4,850                      | 24               | 6.0                   |
|                                      | RM4,851 - RM5,880                      | 21               | 5.3                   |
|                                      | RM5,881 - RM7,100                      | 18               | 4.5                   |
|                                      | RM7,101 - RM8,700                      | 15               | 3.8                   |
|                                      | RM8,701 - RM10,970                     | 5                | 1.3                   |
|                                      | RM10,971 - RM15,040                    | 0                | 0.0                   |
|                                      | More than RM15,041                     | 2                | 0.5                   |
| Residential Property                 | Yes                                    | 87               | 21.8                  |
| Owning                               | No                                     | 313              | 78.3                  |
| Residential Property                 | Yes                                    | 388              | 97.0                  |
| Price Affected by<br>Infrastructural | No                                     | 12               | 3.0                   |
| Development                          |                                        |                  |                       |
| Residential<br>Property              | Yes                                    | 228              | 57.0                  |
| Purchasing                           | No                                     | 172              | 43.0                  |

**Table 2:** Content Analysis – The Key Comments of the Respondents

| Residential Property Price in Greater Kuala Lumpur                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Infrastructural Development in Greater Kuala Lumpur                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>▪ Extremely high and expensive</li><li>▪ Overpriced for small spaces</li><li>▪ Quite high for certain areas if nearby infrastructural and center zone</li><li>▪ Getting more expensive in recent years until it is not affordable to an employee</li><li>▪ Will increase again after the completion of the MRT line and post-economic recovery</li><li>▪ Valuable and worth for it as its surrounding infrastructures and facilities provided</li><li>▪ Affordable and in an expected price range</li></ul> | <ul style="list-style-type: none"><li>▪ Convenient and satisfied</li><li>▪ Developing and significantly improving</li><li>▪ Advanced and relatively well-established compared to other states</li><li>▪ Poor density management due to high population and insufficient infrastructure</li><li>▪ Traffic jams on the highway, especially during peak hours</li><li>▪ It can be more user-friendly</li><li>▪ Public transportation is less reachable and last-mile connectivity is non-existent in the public transport network</li><li>▪ Lack of public transport stations and less frequency of LRT</li><li>▪ Always under maintenance and having poor maintenance</li><li>▪ Water shortage is always happening</li><li>▪ Quite enough retailers, but refurbishment is needed for some old shopping malls</li></ul> |

**4.2 Relative Importance Index (RII) Analysis of Residents’ Perceived Adequacy of Infrastructural Development in Greater Kuala Lumpur**

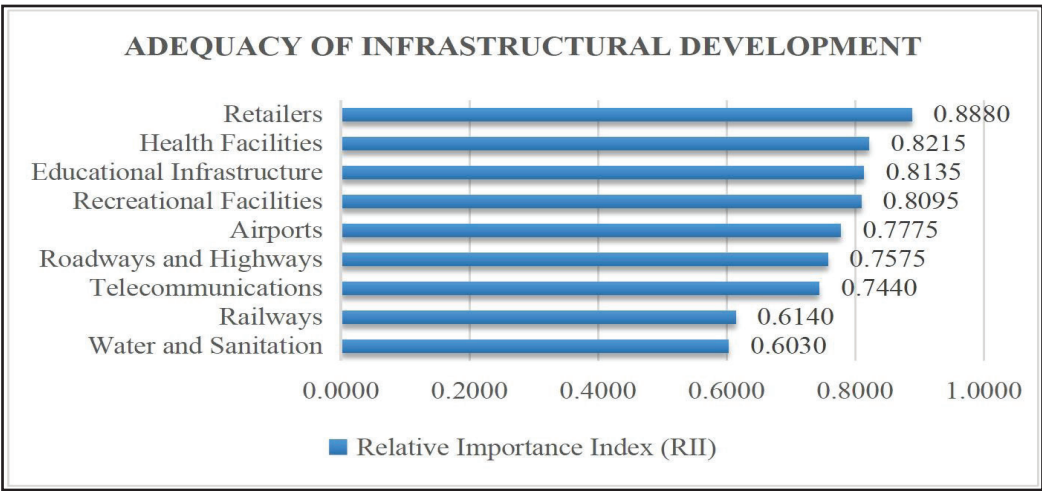
Table 3 and Figure 1 show the ranking of the adequacy of infrastructural development in Greater Kuala Lumpur perceived by the residents according to RII value. The retailer has obtained the highest RII of 0.8880 in the quantitative survey. This score means the adequacy of Greater Kuala Lumpur retailers is highly sufficient and significant based on the respondents’ perceptions. From the questionnaire, the respondents have revealed that the retailers in Greater Kuala Lumpur are enough, but refurbishment is needed for some old shopping malls or retailers.

The water and sanitation infrastructure possesses the lowest RII, which is 0.6030. Ahmed et al. (2014) pointed out that Selangor has increasingly frequent dry spells and water crises. The water demand is rising with population increase, urbanization, industrialization, and irrigation. From the questionnaire, the respondents have also complained that the water shortage is always happening in Greater Kuala Lumpur. The respondents also commented that the water supply system in such areas should be enhanced and managed well.

**Table 3:** Relative Importance Index by Ranking for Adequacy of Infrastructural Development in Greater Kuala Lumpur

| Variables                  | Relative Importance Index (RII) | Remarks | Rank |
|----------------------------|---------------------------------|---------|------|
| Retailers                  | 0.8880                          | High    | 1    |
| Health Facilities          | 0.8215                          | High    | 2    |
| Educational Infrastructure | 0.8135                          | High    | 3    |

| Variables               | Relative Importance Index (RII) | Remarks     | Rank |
|-------------------------|---------------------------------|-------------|------|
| Recreational Facilities | 0.8095                          | High        | 4    |
| Airports                | 0.7775                          | High Medium | 5    |
| Roadways and Highways   | 0.7575                          | High Medium | 6    |
| Telecommunications      | 0.7440                          | High Medium | 7    |
| Railways                | 0.6140                          | High Medium | 8    |
| Water and Sanitation    | 0.6030                          | High Medium | 9    |



**Figure 1:** Relative Importance Index by Ranking for Adequacy of Infrastructural Development in Greater Kuala Lumpur

#### 4.3 Spearman Correlation Analysis of Residents' Perceived Property Price Fairness Concerning the Infrastructural Development in Greater Kuala Lumpur

Table 4 shows the relationship between the adequacy of infrastructural development and residents' perceived property price fairness in Greater Kuala Lumpur. Water and sanitation recorded the highest correlation coefficient, 0.788, which means there is a strong positive correlation between the adequacy of water and sanitation and the residents' perceived property price fairness in Greater Kuala Lumpur. The positive correlation shows that as the adequacy of water and sanitation is lower, the other variable, residential property price fairness, will tend to be lower.

**Table 4:** Relationship between Adequacy of Infrastructural Development and Residents' Perceived Property Price Fairness in Greater Kuala Lumpur

| Adequacy of Infrastructural Development | Residential Property Price Fairness |                 |                   | Rank |
|-----------------------------------------|-------------------------------------|-----------------|-------------------|------|
|                                         | Correlation Coefficient             | Sig. (2-tailed) | Remark            |      |
| Water and Sanitation                    | 0.788                               | <0.001          | Strong Positive   | 1    |
| Telecommunications                      | 0.647                               | <0.001          | Strong Positive   | 2    |
| Railways                                | 0.631                               | <0.001          | Strong Positive   | 3    |
| Educational Infrastructure              | 0.584                               | <0.001          | Moderate Positive | 4    |
| Airports                                | 0.544                               | <0.001          | Moderate Positive | 5    |
| Roadways and Highways                   | 0.536                               | <0.001          | Moderate Positive | 6    |
| Recreational Facilities                 | 0.516                               | <0.001          | Moderate Positive | 7    |
| Health Facilities                       | 0.508                               | <0.001          | Moderate Positive | 8    |
| Retailers                               | 0.458                               | <0.001          | Moderate Positive | 9    |

The respondents consider the residential property prices in Greater Kuala Lumpur unreasonable due to insufficient water and sanitation infrastructure. Purchasing houses with established water connections is a potential way for households that cannot afford the cost of establishing a new connection to gain access to the water network. Therefore, it is reasonable to expect that connecting a residential property to the piped water network will increase its property value (Choumert et al., 2014).

In contrast, retailers recorded the lowest correlation coefficient, 0.458, which means it has the weakest positive correlation between the adequacy of retailers and residents' perceived property price fairness in Greater Kuala Lumpur. In this case, the positive correlation shows that as the adequacy of retailers is higher, the other variable, residential property price fairness, will tend to be higher.

Meanwhile, the respondents consider residential property prices reasonable relative to the sufficiency of retailers in Greater Kuala Lumpur. However, the lowest correlation coefficient means that the respondents are less concerned about the adequacy of retailers towards the fairness of residential property prices in Greater Kuala Lumpur, resulting in the weakest correlation between the variables. Despite the advantages of being close to retailers, Hurtubia et al. (2010) revealed that a high concentration of retailers may discourage households from buying a specific location due to overcrowding and noise pollution.

## 5. CONCLUSION

The development of infrastructures in Malaysia now seems to be a part of the features of the housing industry. Throughout the research, evidence indicated that the adequacy of infrastructural development was one of the factors contributing to the increase in residential property prices. The value added could be explained by the satisfied and adequate infrastructures in the study area.

According to the research findings, there is a positive significant correlation between residents' perceived property price fairness and the adequacy of infrastructural development in Greater Kuala Lumpur. Residents considering the infrastructural development in Greater Kuala Lumpur adequate tend to view property prices as more reasonable. They are probably aware of the value that well-developed infrastructure brings to the area regarding improved accessibility, connectivity and overall quality of life.

To address these concerns and enhance residents' perceptions of property price fairness, continued efforts from local authorities and developers are needed. These efforts include transparent communication regarding infrastructural development initiatives, their impacts on the community, and how they contribute to residential property prices. Lastly, incorporating public feedback and integrating residents in decision-making can also build a sense of ownership and inclusivity to raise property price fairness in the community.

## ACKNOWLEDGMENTS

The author acknowledges the Fundamental Research Grant Scheme (FRGS), grant number FRGS/1/2023/SS10/UTM/02/3, funded by the Ministry of Higher Education (MOHE), Malaysia, and the part of this research is supported by the UTM Encouragement Research, grant number Q.J130000.3852.31J22 Universiti Teknologi Malaysia.

## REFERENCES

- Abidoye, R. B., Fam, F., Oshodi, O. S., & Oyetunji, A. K. (2021). Impact of light rail line on residential property values—a case of Sydney, Australia. *International Journal of Housing Markets and Analysis*.
- Akin, A. O., & Margaret, A. (2014). Location adequacy of telecommunication masts and residents livability in Osogbo, Nigeria. *IMPACT: International Journal of Research in Applied, Natural and Social Sciences*, 2(11), 7-16.
- Artusi, R., Verderio, P., & Marubini, E. (2002). Bravais-Pearson and Spearman correlation coefficients: meaning, test of hypothesis and confidence interval. *The International journal of biological markers*, 17(2), 148-151.
- Asaju, K. (2023). Infrastructural development and development administration: A retrospective. *Journal of Foresight and Thought Leadership*.
- Atkinson, R., and Flint, J. (2001). Accessing hidden and hard-to-reach populations: Snowball research strategies. *Social Research Update* 33, 1-4.
- Balk, Bert; Diewert, Walter Erwin; Fenwick, David; Prud'homme, Marc; de Haan, Jan. *Handbook on residential property prices indices (RPPIs)* (English). (2013). Eurostat methodologies and working papers Washington, D.C. : World Bank Group.
- Bandias, S., & Vemuri, S. R. (2005). Telecommunications infrastructure facilitating sustainable development of rural and remote communities in Northern Australia. *Telecommunications Policy*, 29(2-3), 237-249.
- Baxter, J. (2020). Content Analysis. *International Encyclopedia of Human Geography*, 391–396.
- Belke, A., & Keil, J. (2018). Fundamental determinants of real estate prices: A panel study of German regions. *International Advances in Economic Research*, 24(1), 25-45.
- Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus open*, 2, 8-14.
- Berawi, M.A. (2017). Fostering Partnership and Strategic Alliances in Sustainable Infrastructure Development. *International Journal of Technology*, 8, 568.
- Bottero, M., Caprioli, C., Foth, M., Mitchell, P., Rittenbruch, M., & Santangelo, M. (2022). Urban parks, value uplift and green gentrification: An application of the spatial hedonic model in the city of Brisbane. *Urban Forestry & Urban Greening*, 74, 127618.
- Chan, J., Fang, X., Wang, Z., Zai, X., & Zhang, Q. (2020). Valuing primary schools in urban China. *Journal of Urban Economics*, 115, 103183.
- Chen, H., Zhang, Y., Zhang, N., Zhou, M., & Ding, H. (2022). Analysis on the spatial effect of infrastructure development on the real estate price in the Yangtze River Delta. *Sustainability*, 14(13), 7569.

- Choguill, C. L. (1996). Ten steps to sustainable infrastructure. *Habitat International*, 20(3), 389-404.
- Choumert, J., Stage, J., & Uwera, C. (2014). Access to water as determinant of rental values: A housing hedonic analysis in Rwanda. *Journal of Housing Economics*, 26, 48-54.
- Chulanova, Z. (2007). Poverty reduction in developing countries via infrastructure development and economic growth: Mutual impact in Kazakhstan. *Asian Development Bank Institute Discussion Paper no. 62*.
- Chung, Y. Y. (2022, February 25). Residential property market recorded substantial price increases over 20 years to 1Q2021. *The Edge Malaysia*. <https://theedgemalaysia.com/article/residential-property-market-recorded-substantial-price-increases-over-20-years-1q2021>
- Cohen, J. P., & Coughlin, C. C. (2009). Changing noise levels and housing prices near the Atlanta airport. *Growth and Change*, 40(2), 287-313.
- Cui, N., Gu, H., Shen, T., & Feng, C. (2018). The impact of micro-level influencing factors on home value: A housing price-rent comparison. *Sustainability*, 10(12), 4343.
- Dabara, D. I., Omotoso, L., Akinyemi, A., Anthony, A., & Jonathan, G. (2016). Infrastructural facilities and the rental values of residential properties in Osun, Nigeria. *International Journal of Business and Management Studies*, 5(01), 87-96.
- Dziauddin, M. F. (2019). Estimating land value uplift around light rail transit stations in Greater Kuala Lumpur: An empirical study based on geographically weighted regression (GWR). *Research in Transportation Economics*, 74, 10-20.
- Dziauddin, M. F. (2022). Estimating the Impact of Mass Rapid Transit (MRT) on Residential Property Prices in Greater Kuala Lumpur, Malaysia. *Journal of Asian Geography*, 1(1), 40-47.
- Dziauddin, M. F. (2023). Quantifying the Impact of Light Rail Transit on Commercial Property Values: New Evidence From Greater Kuala Lumpur, Malaysia. *Transportation Research Record*, 2677(6), 673-686.
- Efthymiou, D., & Antoniou, C. (2013). How do transport infrastructure and policies affect house prices and rents? Evidence from Athens, Greece. *Transportation Research Part A: Policy and Practice*, 52, 1-22.
- Feng, H., & Lu, M. (2013). School quality and housing prices: Empirical evidence from a natural experiment in Shanghai, China. *Journal of Housing Economics*, 22(4), 291-307.
- Feng, X., & Humphreys, B. (2018). Assessing the economic impact of sports facilities on residential property values: A spatial hedonic approach. *Journal of Sports Economics*, 19(2), 188-210.
- Gyimah, K.A., & Gyimah, A.B. (2014). The Use of Building Services to Enhance the Quality of Life. *International Journal of Research*, 1, 702-711.
- Hardekar, D., Chakraborty, S., Syal, M., & Mollaoglu, S. (2018). Role of Infrastructure in the Success of a Residential Development. *Housing Education and Research Initiative*. Michigan State University.

- Hurtubia, R., Gallay, O., & Bierlaire, M. (2010). Attributes of households, locations and real estate markets for land use modelling. *SustainCity Deliverable*, 2(1).
- Ibrahim, T. (2011). A Survey of Infrastructural Facilities and their Effects on Rental Values of Residential Properties in Ilorin Metropolis. *Journal of Environmental Sciences and Resource Management*, 3, 36-41.
- Ijaiya, G. T., & Akanbi, S. B. (2009). An empirical analysis of the long-run effect of infrastructure on industrialization in Nigeria. *Journal of International Economic Review*, 2(1-2), 135-149.
- Karas, O. (2019). The concept and role of infrastructure in economic development of country. Scientific development of new Eastern Europe.
- Langley, C. J. (1981). *Highways and property values: the Washington Beltway revisited*. Department of Marketing and Transportation, University of Tennessee.
- Lo, A. Y., & Jim, C. Y. (2010). Willingness of residents to pay and motives for conservation of urban green spaces in the compact city of Hong Kong. *Urban Forestry & Urban Greening*, 9(2), 113-120.
- Mabogunje, A. L. (1993). Infrastructure: The crux of modern urban development. *Urban age*, 3, 3-3.
- Masrom, M. A. N., Abd Rahim, M. H. I., Mohamed, S., Chen, G. K., & Yunus, R. (2015). Successful criteria for large infrastructure projects in Malaysia. *Procedia Engineering*, 125, 143-149.
- Mulley, C. (2014). Accessibility and residential land value uplift: Identifying spatial variations in the accessibility impacts of a bus transitway. *Urban Studies*, 51(8), 1707-1724.
- Naderifar, M., Goli, H., & Ghaljaie, F. (2017). Snowball sampling: A purposeful method of sampling in qualitative research. *Strides in development of medical education*, 14(3).
- Nahrin, K. (2018). Urban development policies for the provision of utility infrastructure: a case study of Dhaka, Bangladesh. *Utilities Policy*, 54, 107-114.
- Nelson, J. P. (1982). Highway noise and property values: a survey of recent evidence. *Journal of transport economics and policy*, 117-138.
- Neuendorf, K. A. (2017). *The content analysis guidebook*. Sage.
- Nisa, M. U., & Khalid, F. (2024). Impact of Infrastructure on Economic Growth: A Comparative Analysis of Developed and Developing Countries. *Journal of Asian Development Studies*, 13(1), 1161-1173.
- Oduwaye, L. (2009). Spatial variations of values of residential land use in Lagos Metropolis. *African Research Review*, 3(2).
- Ogunsanya, O., Fanu, M.O., & Oladipo, D. (2016). Assessing the Adequacy of Public Housing Infrastructures in Lagos, Nigeria.
- Olujimi, J. A. B., & Bello, M. O. (2009). Effects of infrastructural facilities on the rental values of residential property. *Journal of social sciences*, 5(4), 332-341.

- Oluwunmi, A. O., & Emoka, F. N. (2022). Residents' Perception of the Quality of Facilities and Services at "The Residence", Festac Town, Lagos. *Nigerian Journal of Environmental Sciences and Technology (NJEST)* Vol, 6(2), 428-438.
- Otegbulu, A., & Adewunmi, Y. (2009). Evaluating the sustainability of urban housing development in Nigeria through innovative infrastructure management. *International Journal of Housing Markets and Analysis*, 2(4), 334-346.
- Oxford Business Group (2012). Key Success for Large Infrastructure Project.
- Pan, Q. (2019). The impacts of light rail on residential property values in a non-zoning city. *Journal of Transport and Land Use*, 12(1), 241-264.
- Prabowo, C.H., & Adiinto, J. (2022). Analysis of the Effect of Infrastructure Development on Land Prices in Cinere and Beji Districts, Depok City. Konfrontasi: *Jurnal Kultural, Ekonomi dan Perubahan Sosial*.
- Raihan, A., Pereira, J. J., Begum, R. A., & Rasiyah, R. (2023). The economic impact of water supply disruption from the Selangor River, Malaysia. *Blue-Green Systems*, 5(2), 102-120.
- Rajendra, E. (2021, December 18). Selangor Floods: Over 2,800 people evacuated from their homes in Klang. *The Star*. <https://www.thestar.com.my/news/nation/2021/12/18/selangor-floods-over-2800-people-evacuated-from-their-homes-in-klang>
- Rashid, F. (2021, November 24). Malaysia needs to spend up to RM500bil on infrastructure development. *New Straits Times*. <https://www.nst.com.my/business/2021/11/748247/malaysia-needs-spend-rm500bil-infrastructure-development>
- Ratcliffe, J. (1995). The Valuation of Development Properties, *Journal of Valuation*. Vol. 1.
- Riccioli, F., Fratini, R., & Boncinelli, F. (2021). The impacts in real estate of landscape values: Evidence from Tuscany (Italy). *Sustainability*, 13(4), 2236.
- Rodzi, N. H. (2022, March 7). Malaysia's Klang Valley hit by flash floods again after heavy downpour. *The Straits Times*. <https://www.straitstimes.com/asia/se-asia/parts-of-kuala-lumpur-flooded-after-non-stop-downpour>
- Satterthwaite, D. (2020). Getting housing back onto the development agenda: the many roles of housing and the many services it should provide its inhabitants. *Environment and Urbanization*, 32(1), 3-18.
- Sari, Y., & Prayogi, L. (2019). Application of Value Management by Real Estate Development Practitioners: A Review of Enticing Factors. *International Journal of Built Environment and Scientific Research*, 3(1), 15-20.
- Sia, M. K., Yew, V. W. C., Lim, Z. Y., & Dongqing, Y. (2018). Facilities and maintenance services for sustainable high-rise living. *Facilities*, 36(7/8), 330-348.
- Sohn, W., Kim, H. W., Kim, J. H., & Li, M. H. (2020). The capitalized amenity of green infrastructure in single-family housing values: An application of the spatial hedonic pricing method. *Urban Forestry & Urban Greening*, 49, 126643.

- Susantono, B., & Berawi, A.R. (2018). Improving the Sustainable Infrastructure Development through Innovative Approaches in Technology, Management and Financial Aspects. *CSID Journal of Infrastructure Development*.
- Tajima, K. (2003). New estimates of the demand for urban green space: Implications for valuing the environmental benefits of Boston's big dig project. *Journal of Urban affairs*, 25(5), 641-655.
- Tan, T. H. (2012). Meeting first-time buyers' housing needs and preferences in greater Kuala Lumpur. *Cities*, 29(6), 389-396.
- Timilsina, G.R., Stern, D.I., & Das, D.K. (2023). Physical infrastructure and economic growth. *Applied Economics*, 56, 2142 - 2157.
- Wafer, A. (2020). Infrastructure in South African Cities. Urban geography in South Africa: Perspectives and theory, 85-96.
- Wang, D., & Li, S. M. (2006). Socio-economic differentials and stated housing preferences in Guangzhou, China. *Habitat International*, 30(2), 305-326.
- Weisbrod, G., Lerman, S. R., & Ben-Akiva, M. (1980). Tradeoffs in residential location decisions: Transportation versus other factors. *Transport Policy and Decision Making*, 1(1), 13-26.
- Wong, J. (2024, May 22). Property prices hit a new high. KL Property Talk. <https://www.klpropertytalk.com/2024/05/property-prices-hit-a-new-high/>
- Yasin, M. Y., Zain, M. A. B. M., & Hassan, M. H. B. (2022). Urbanization and growth of Greater Kuala Lumpur: Issues and recommendations for urban growth management. *Southeast Asia: A Multidisciplinary Journal*, 22(2), 4-19.
- Yau, K.A., Lau, S.L., Chua, H.N., Ling, M.H., Iranmanesh, V., & Kwan, S.C. (2016). Greater Kuala Lumpur as a smart city: A case study on technology opportunities. *2016 8th International Conference on Knowledge and Smart Technology (KST)*, 96-101.
- Yuan, F., Wu, J., Wei, Y. D., & Wang, L. (2018). Policy change, amenity, and spatiotemporal dynamics of housing prices in Nanjing, China. *Land Use Policy*, 75, 225-236.
- Zhang, D., & Jiao, J. (2019). How does urban rail transit influence residential property values? Evidence from an emerging Chinese megacity sustainability. 11(2), 534.