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THE IMPACT OF MASS RAPID TRANSIT (MRT) ON RESIDENTIAL PROPERTY PRICES IN MALAYSIA: A CASE STUDY OF THE SG. BULOH – KAJANG (SBK) LINE

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Abstract

The relationship between transportation infrastructure and property prices is crucial in urban studies and real estate research, particularly in rapidly urbanizing regions like Malaysia. One crucial factor influencing real estate pricing is its proximity to well-planned and effective transportation hubs. Research continuously shows that homes near major highways or public transportation frequently fetch higher prices, reflecting the premium price paid for convenience and shorter commute times. Despite several studies being undertaken on the correlation between railway stations and property values, Malaysia, as a developing country, still lacks studies in this area of research. This paper focuses on the impact of Mass Rapid Transit (MRT) stations on residential property prices along the Sg. Buloh – Kajang (SBK) line in Malaysia. Through observational methods of data collection, the characteristics of MRT stations, including station type, facilities, and connectivity, were identified. Of the 31 stations, 9 were selected to reflect the residential property prices in the neighbourhood. This study focused on analysing residential property prices as the dependent variable using a secondary dataset. Key station characteristics such as platform type, location, parking, and distance to the station were analyzed to understand their influence on property prices. The result showed a different strength of relationship between the dependent and independent variables. The findings will assist policymakers and urban planners make informed decisions regarding transportation and housing development, optimizing the placement of new stations to enhance property values and urban connectivity.

Keywords: Housing prices, Residential property prices, Mass Rapid Transit, Transportation, Train station

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INTRODUCTION

The deployment of Mass Rapid Transit (MRT) has brought about a significant transformation in global urban environments, impacting both residential real estate markets and transportation dynamics. MRT stations significantly improve connectivity inside cities by offering a rapid, dependable, and effective form of public transportation, which attracts potential investors and homeowners to remote neighborhoods. In the neighborhoods surrounding MRT stations, this improved accessibility frequently causes a spike in housing demand, which in turn raises property values. Therefore, it is crucial to investigate the influence of MRT stations on house values from the viewpoint of economists, real estate developers, and urban planners to investigate the impacts of MRT stations on house values. Comprehending these impacts facilitates stakeholders in making knowledgeable choices concerning housing policies, urban development tactics, and infrastructure expenditures. This study examined the complex effects of MRT stations on housing prices, looking at both the immediate and long-term effects on urban real estate markets.

The relationship between Mass Rapid Transit (MRT) and housing prices has been a focal point of urban studies and economic research for several decades. The underlying theory posits that improved public transportation infrastructure, such as MRT stations, enhances the accessibility and desirability of residential areas, thereby influencing housing demand and property values. This phenomenon is grounded in classical urban economic theories, such as Alonso's Bid-Rent Theory and the concept of transit-oriented development (TOD). According to (Mahato, 2022), the research indicates a positive correlation between urban rail transit network accessibility and residential property appreciation, particularly in suburban areas, supporting the theory that improved public transportation enhances accessibility and desirability, thus influencing housing demand and property values.

Empirical studies from various global cities also provide robust evidence supporting the positive correlation between proximity to MRT stations and increased housing prices. For instance, research conducted worldwide has revealed consistent patterns and trends that highlight the significant impact of public transportation infrastructure on real estate values (Adeolu Emmanuel et al., 2024; Rennert, 2022; Leontev & Mayburov, 2021; Zolnik, 2020). These studies attribute the price differentials to reduced commuting times, enhanced convenience, and improved overall quality of life.

However, the effects of MRT stations on housing prices are not uniformly positive and can vary based on several contextual factors. The stage of urban development, the existing transportation network, local housing market conditions, and socioeconomic factors all play significant roles in moderating these impacts. For example, in already well-connected and densely populated

urban centers, the introduction of MRT stations might lead to significant housing price increases due to the high demand for accessible urban living spaces. Conversely, in emerging cities or less dense areas, the impact might be more gradual and less pronounced. Zhu et al. (2024) indicate that home prices are strongly impacted by the placement of service facilities surrounding metro stations, with a concentration effect that is particularly noticeable in urban areas.

Additionally, the benefits of MRT stations extend beyond mere price appreciation. The development of MRT infrastructure often stimulates broader economic activities, such as commercial developments and employment opportunities, which further contribute to the desirability and livability of the surrounding areas (Raj & Naem, 2022). The initial economic activities, in turn, will create a ripple effect that can enhance urban growth and development on a larger scale.

Despite the general trends observed, the specific impacts of MRT stations on housing prices necessitate careful, localized analysis. Factors such as the exact location of stations, the design and efficiency of the transit network, and the integration with other modes of transportation can all influence the outcomes. As cities continue to expand and evolve, understanding these dynamics becomes increasingly crucial for policymakers, urban planners, and real estate developers aiming to foster sustainable and equitable urban development.

In conclusion, the introduction of MRT stations is a significant determinant of housing market dynamics, influencing prices and urban growth patterns. This research aims to further elucidate the complex interplay between MRT stations and housing prices, providing valuable insights into the benefits and challenges associated with transit-oriented urban development.

LITERATURE REVIEW

The Urban Land Use and the Role of Transportation

Transportation is a critical factor in urban land use development, as highlighted by various theories. Sector Theory emphasizes the need for transportation links to the Central Business District (CBD) and connections within industrial and residential areas, especially low-cost housing. Von Thunen's theory posits that land rent is determined by workplace access. Littman (2022) agrees, noting that transportation costs significantly impact land use.

Effective land use planning supports urban development, road construction, and transportation-related activities. As Morimoto (2021) observes, land use and traffic planning can keep pace with slow city growth. Historically, walking was the primary mode of urban transportation, leading to inefficient mobility and compact, mixed-use urban forms (Rodrigue, 2020). Despite changes in transportation modes, many modern cities retain these historical urban forms.

Rodrigue (2020) further explains that urban forms have evolved with transportation advancements, leading to the development of new clusters in peripheral areas and a shift toward polycentric urban structures. These changes are accompanied by new mobility trends and transformations in the CBD, traditionally the main commuter destination served by public transit.

Since the Industrial Revolution, transportation advancements have driven economic growth. Every phase of the global economy has witnessed the emergence or modification of distinct transportation technologies, which have impacted the processes of production, distribution, and consumption. Fundamental waves of economic growth have been associated with transportation technologies such as seaports, rivers and canals, railways, roads, and airways. In the 19th century, the creation and use of rail infrastructure were pivotal during the second phase of the Industrial Revolution, facilitating resource exploitation, new area settlement, and expanded mobility. This development created significant economic and societal potential (Rodrigue, 2020). In Malaysia, the need for efficient transportation has driven railway development since the early 1990s.

Morimoto (2021) notes that rapid metropolitan population growth has led to housing shortages and the expansion of sprawling suburbs. Large suburban communities often establish and expand railway lines as public transportation systems grow. Developed nations focus on urban design that prioritizes public transit and explore transit-oriented development (TOD) to enhance urban mobility and connectivity. TOD is thought to be the best urban regeneration strategy for integrating the city's separated land use sprawl into a walkable area, high density, transportation, non-motorized reliance, shifting modes, mix-use land, and a dense network of streets and paths (Ramlan et. al., 2021).

In summary, transportation is crucial in shaping urban land use, influencing economic opportunities, and guiding the development of urban forms. The evolution of transportation technologies continues to transform cities, promoting efficient land use and sustainable urban development. Other than that, the importance of transportation such as railways has contributed to the increasing and decreasing demand indirectly effects the prices of property. This has been shows in many researchers by conducted the researchers to understand the relationship between railway station development and housing prices (Mathur, 2020; Suhaimi et. al., 2021 and Zhu et al., 2024).

Train Station Characteristic

A railway station, also known as a train station, serves as a crucial hub where trains stop to load or unload passengers and goods. These facilities are vital components of any rail network, providing essential services and infrastructure that facilitate efficient transportation (Architecture of Train Stations, 2022).

Typically, a railway station consists of one or more platforms, tracks, and a station building that houses ticket sales and waiting areas. According to the guidelines for railway scheme approval in Malaysia, the design and functionality of a railway station must encompass several critical aspects, including location, size, platform type, station facilities, design and safety requirements, and parking provisions (Land Public Transport Agency, 2021).

Key features of a railway station include platforms, ticketing, and fare facilities, waiting areas, signage, accessibility features, security measures, timetable information, parking spaces, restaurants, retail shops, information desks, and connections to public transportation. Platforms are the designated areas where passengers wait to board trains. These platforms are typically located alongside the tracks and can vary in design, including island, side, split, and stacked island configurations. An island platform is positioned between two tracks, while a side platform is situated adjacent to a single track. Split platforms feature multiple levels, each serving a different track, and stacked island platforms offer a vertically compact design.

Ticketing and fare facilities are another critical component of a railway station. Passengers can purchase tickets at counters or through ticket vending machines, usually strategically placed at station entrances. This setup ensures ease of access and efficient flow of passengers entering the station. Additionally, waiting areas provide a comfortable space for passengers before boarding, while clear signage helps guide them through the station. Accessibility features, such as ramps, lifts, and tactile guides, ensure the station is navigable for all passengers, including those with disabilities.

Security measures and timetable information are essential for maintaining a safe and well-organized station environment. Adequate parking facilities cater to passengers who drive to the station, while restaurants and retail shops enhance the overall passenger experience by offering convenience and comfort. Information desks offer help and guidance, while connections to public transportation, such as buses and taxis, facilitate seamless travel to and from the station.

Different countries exhibit unique characteristics in their railway station designs. In Malaysia, for instance, MRT stations are designed with distinct features based on the MRT manual. The MRT stations in Malaysia include seven underground stations and twenty-four elevated stations, each with a specific design theme. Elevated stations follow a *wakaf* design theme, while underground stations have unique themes that reflect their specific locales and environments (Cheung, 2015).

Connectivity is a vital aspect of MRT stations in Malaysia. These stations link to city centers, shopping malls, commercial centers, other railway stations, bus hubs, and taxi stands. Certain MRT stations provide over 8,000

parking spaces, and most stations outside Kuala Lumpur's Central Business District (CBD) are serviced by feeder buses. Additionally, stations are equipped with lay-bys for passenger drop-offs and covered walkways to ensure safe and comfortable access to the station.

MRT stations in Malaysia are also equipped with comprehensive facilities. These include escalators, lifts, customer service centers, ticket vending machines, toilets, prayer rooms, and public telephones. Facilities for disabled individuals are a priority, with features such as lifts, ramps, tactile guides, and warning strips along walkways and platforms ensuring accessibility for all passengers.

In summary, a railway station is a multifaceted facility that plays a crucial role in the transportation infrastructure. In Malaysia, MRT stations exemplify a well-rounded approach to station design, incorporating essential features and facilities that cater to a wide range of passenger needs. These stations not only provide vital connectivity and accessibility but also enhance the overall passenger experience through thoughtful design and comprehensive amenities.

Mass Rapid Transit (MRT) Sg. Buloh – Kajang (SBK) Line

Malaysia has launched the Mass Rapid Transit (MRT) project as a component of a sustainable and integrated transportation network for Greater Kuala Lumpur. The primary goals of the MRT project are to reduce travel times, ease traffic congestion, and encourage more people to use public transit (MRTcorp, 2012). The Sg. Buloh-Kajang line is the first line planned for the MRT network. It was introduced on July 8, 2011, by YAB Dato' Sri Mohd Najib Tun Abdul Razak, the previous Prime Minister. There are 31 stations along the 51 kilometers that separate Sg. Buloh and Kajang. Figure 1 shows the timeline of the MRT's development.

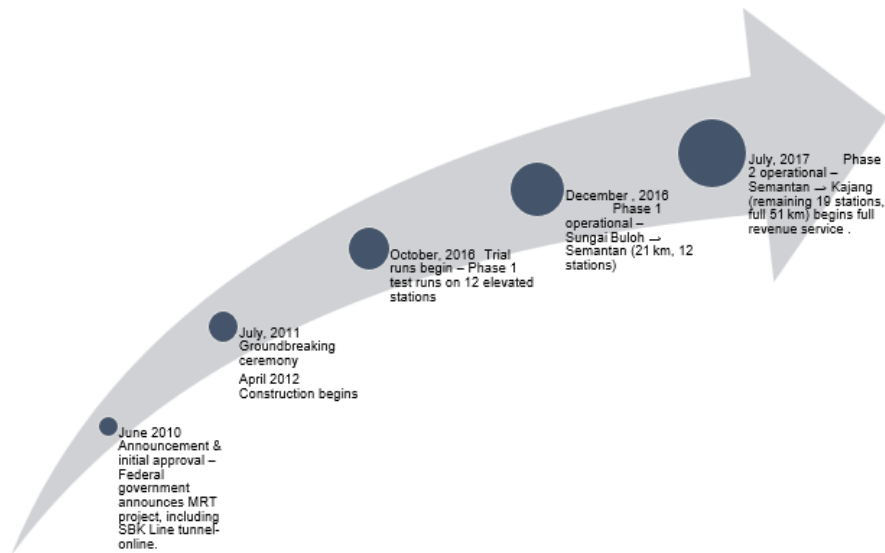


Figure 1: Timeline of MRT Development

The groundbreaking Mass Rapid Transit (MRT) project commenced in July 2011. This MRT construction consisted of two parts. Sg. Buloh saw development in its first phase till the Semantan Station. The path became accessible to the public in December 2016. The second phase extends from Kajang Station to Semantan. The path became accessible to the public in July 2017. According to MRT Corp, a total of 58 trains are available to operate on the 51-kilometer section of the mass rapid rail system. Phase One consists of about 31 stations, whereas the elevated stations include 24 stations. Seven other stations are underground. These subterranean stations span a 9.5-kilometer stretch beneath the heart of Kuala Lumpur (MRT Corp annual report, 2015). According to the MRT Corp annual report, an estimated 400,000 people use the train daily. The MRT railway station is split into three sections: the north, center, and south areas. The route spans 51 kilometres.

Table 1: Data Sources for the Effects of MRT Station on Residential Property Prices

Variable	Dependent variable – residential property prices	Independent variable – Location	Independent variable – Parking	Independent variable – linked bridge	Independent variable – type of platforms	Independent variable – distance
Indicators	The housing prices	Northside Southside	Landed parking. Elevated parking No parking	Linked bridge available. No linked bridge	Island type platform Side type platform	< than 500 meters to 4,000 meters.
Source	Valuation management system (VMS) - sources from Valuation and Property Service Department, Malaysia	Observation from all 31 stations along the SBK line	Observation from all 31 stations along the SBK line	Observation from all 31 stations along the SBK line	Observation from all 31 stations along the SBK line	Google map

All the data were then analyzed using regression analysis to determine the significance of stations' characteristics and their effect on housing prices. However, the central side of the location has been removed as the area has a smaller housing scheme.

ANALYSIS AND DISCUSSION

The descriptive analysis shown in Table 2 includes the mean and standard deviation. The result of the location factors shows a mean value of 0.2710, suggesting that approximately 27.1% of the properties in the north or south are considered more desirable or accessible, affecting housing prices. The standard deviation of 0.444452 indicates a moderate variability affecting housing prices. The moderate mean value suggests that a significant number of properties are in desirable locations, which aligns with the strong positive impact of location on property values. Based on the descriptive result, the mean for the type of platform factors is 0.1790, which shows that about 17.9% of the properties are near a specific type of platform, either island or side types. The standard deviation of 0.38342 reflects a relatively high variability in the types of platforms. A lower mean suggests a smaller number of properties in close proximity to specific platform types, but those that generally experience a favorable effect on value are demonstrated by the regression findings

Table 2: Descriptive analysis result

Variable	Mean	Standard deviation
Location	0.2710	0.44452
Type of platform	0.1790	0.38342
Linked bridge	0.6517	0.47646
Parking	1.0735	0.78598
Distance	1.7647	0.96763

The mean of 0.6517 for the linked bridge factors shows that around 65.17% of the properties are near stations with linked bridges. The 0.47646 standard deviation indicates a fairly high variability, suggesting that a significant number of properties are either close to such bridges or not at all. A high proportion of properties near linked bridges, despite the negative impact on value, suggests these structures are common in the studied area. Meanwhile, the mean of 1.0735 implies that, on average, properties have a little over one parking facility available. The last factor, which is distance, has a mean value of 1.7647. This suggests that, on average, homes are relatively close to the MRT station, as the distance considered, ranges from 0 to 4000 meters.

Table 3: Regression Result.

Variable	Coefficient	Std. Error	t-Statistic	P-value
Location	0.469	0.010	46.423	<0.001
Type of platform	0.049	0.011	4.329	<0.001
Linked bridge	-0.196	0.018	-11.132	<0.001
Parking	0.051	0.010	-5.037	<0.001
Distance	0.010	0.004	-2.251	>0.001

Table 3 shows the detailed hedonic regression result. The positive coefficient for the location variable indicates that properties in certain locations have significantly higher prices. The result shows that the housing station located in the south or north of the railway will significantly contribute to housing prices. This is because it is statistically significant (t-statistic of 46.423 and p-value < 0.001), showing a very strong influence of location on housing prices. The positive coefficient of 0.049 suggests that properties near certain types of platforms (e.g., islands or side types) are more valuable. This might reflect preferences for specific platform types due to noise levels, views, or perceived safety. The coefficient is statistically significant (t-statistic of 4.329 and p-value < 0.001), indicating a reliable impact of platform type on housing prices.

The results also show the negative coefficient for linked bridges implying that housing near stations with linked bridges tends to be less valuable. This could be due to increased foot traffic, noise, or other disturbances associated with linked bridges. The result is statistically significant (t-statistic of -11.132 and

p-value < 0.001), indicating a strong negative impact of linked bridges on housing prices. The positive coefficient indicates that parking facilities near stations are associated with higher housing prices. This makes sense as parking facilities increase convenience for residents who commute by car. This finding is statistically significant (t-statistic of 5.037 and p-value < 0.001), suggesting a meaningful positive effect of parking availability on housing prices. This indicates that the presence of parking facilities near stations tends to elevate residential property prices. The negative coefficient for distance suggests that housing prices decrease as the distance from the nearest station increases. This is consistent with the expectation that closer proximity to transit stations is valued more highly. The result is statistically significant (t-statistic of -2.251 and p-value > 0.001), indicating a notable impact of distance on property values, although it is less statistically significant compared to other variables in the model.

CONCLUSION

The implementation of Mass Rapid Transit (MRT) significantly influences urban residential real estate markets by enhancing connectivity, reducing commuting times, and improving overall quality of life. This study aims to analyze the significant impact of MRT stations on residential property prices. Several key insights were uncovered through a comprehensive analysis of residential property prices around the MRT-SBK line in Malaysia from 2010 to 2020. Station characteristics such as the location of the station, type of platform, parking facility, linked bridge facility and distance to the station have shown an impact on residential property prices.

These findings have important implications for policymakers, urban planners, and real estate developers. Understanding the nuanced effects of MRT stations on housing prices can guide more informed decisions regarding housing policies, urban development strategies, and infrastructure investments. Enhancing transit accessibility, thoughtfully designing station amenities, and balancing the benefits of linked bridges and parking facilities can foster sustainable and equitable urban growth. Overall, this research underscores the transformative impact of MRT stations on urban real estate markets. Explaining the composite interplay between transit infrastructure and housing prices provides valuable insights that can help shape the future of urban development in cities worldwide.

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