香港社會科學學報

HONG KONG JOURNAL OF SOCIAL SCIENCES

最新第 64 期 (2024 年秋/冬季) **Vol. 64 Autumn/Winter 2024**

Available online at www.hkjoss.com

Research article https://doi.org/10.55463/hkjss.issn.1021-3619.64.29

Determinants of New Condominium Prices near MRT Orange Line Stations: Case study of Estimating Housing Affordability in Bangkok, Thailand

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Abstract:

This research aims to analyze the factors influencing the pricing of condominium projects along the Mass Rapid Transit (MRT) Orange Line, an electric train expected to start operations in 2025. As the main heavy rail line connecting the Eastern Bangkok suburbs with the city's New Central Business District (New CBD), the Orange Line has significant implications for urban development. To promote land development opportunities, Bangkok's city plan has undergone changes along the Orange Line corridor, particularly on the Ramkhamhaeng Road, which is anticipated to drive up land prices. This study examines how condominium prices may fluctuate when various factors are considered, such as proximity to MRT stations, main roads, expressway access points, private facilities, operator reliability, and the cost of common areas. The research equips real estate developers with a comprehensive understanding of these determinants to guide project development and pricing strategies aligned with market conditions. Condominium buyers can leverage

Keywords:
Central Business District (CBD),
Mass Rapid Transit (MRT) Orange Line,
condominium prices,
housing affordability,
Bangkok

Article History:
Received: October 14, 2024
Revised: November 12, 2024
Accepted: January 15, 2025
Published: February 6, 2025

accurate pricing information to make informed decisions, while real estate investors can incorporate these insights into their investment strategies. Additionally, the Revenue Department could use the data to inform land tax policies. The hedonic price model was used to determine the factors influencing the prices of condominiums along the Orange Line. The research samples are 28 brand-new condominium properties that are located only one kilometer away from the MRT stations of the Orange Line, and most of them are new condominiums that were constructed in less than 5 years. A total of 17 factors, grouped into three categories—locational, physical, and neighborhood characteristics—were evaluated using regression analysis. The findings reveal that three key factors significantly impact the prices of condominium units: floor level, distance from the train station, and distance from department stores.

地铁橙线站附近新公寓价格的决定因素：泰国曼谷住房负担能力评估案例研究

摘要：
本研究旨在分析影响地铁橙线沿线公寓项目定价的因素，地铁橙线是一条电动列车，预计于 2025 年开始运营。作为连接曼谷东部郊区和城市新中央商务区 (New CBD) 的主要重轨线，橙线对城市发展具有重要意义。为了促进土地开发机会，曼谷的城市规划在橙线走廊沿线进行了更改，特别是在兰甘亨路，这预计将推高土地价格。本研究考察了在考虑各种因素时公寓价格如何波动，例如距离地铁站、主要道路、高速公路出入口、私人设施、运营商可靠性以及公共区域成本的距离。这项研究使房地产开发商能够全面了解这些决定因素，以指导符合市场条件的项目开发和定价策略。公寓买家可以利用准确的定价信息做出明智的决策，而房地产投资者可以将这些见解纳入他们的投资策略中。此外，税务局可以使用这些数据来制定土地税政策。使用特征价格模型来确定影响橙线沿线公寓价格的因素。研究样本为 28 栋全新公寓，距离橙线地铁站仅一公里，其中大部分是新建时间不到 5 年的公寓。使用回归分析评估了共 17 个因素，分为三类——位置、物理和邻里特征。研究结果显示，三个关键因素显著影响公寓单元的价格：楼层、与火车站的距离和与百货公司的距离。

关键词：中央商务区 (CBD)、地铁橙线、公寓价格、住房负担能力、曼谷

1. Introduction

Residential development projects near transit stations have become a growing trend among developers in Bangkok, Thailand. They are also directly related to the government's urban development policies that promote transit-based communities along transit lines. These projects are expected to solve long-term traffic congestion and improve the availability of residences near mass transit systems. With the 2nd Bangkok Mass Rapid Transit Master Plan (M-MAP2), which is a comprehensive plan to promote mass transit development in the Bangkok Metropolitan Region (BMR) and help change the present car-oriented society to a public-transport-oriented society in the future and is slated to run until 2042, the number of urban rail lines in Bangkok will increase by up to 33 lines, adding 553 km of operating distance and almost 600 operating stations. The service area of the urban rail systems extends throughout Bangkok.

Currently, the metropolitan area of Bangkok is continuously expanding and evolving into a hub for national administration by leveraging cultural, economic, technological, and social factors. It has transformed into a metropolis that attracts migrants from across the country, seeking better employment opportunities and improved quality of life. Bangkok offers prospects for social welfare and education, thus making it a desirable destination. As of 2023, the city is home to 5,471,588 residents (National Statistical Office, 2023). However, the rapid influx of new residents has outpaced available space, causing the metropolis to expand and adapt in all directions. Coordinating urban development with a public rail transit system is considered the most efficient approach for managing this growth. Bangkok's public transportation system is expanding in all directions.

- **North**: The Green Line to Khu Khot opened in 2020 and the Red Line to Rangsit began operations in 2021.
- **West**: The Purple Line to Bang Yai was completed in 2016, while the Red Line to Taling Chan became operational in 2021.
- **South**: The Green Line to Samutprakarn opened in 2017, the Yellow Line to Samrong opened in 2023, and the Purple Line to Phrapradaeng is scheduled to

open in 2027.

- **East**: The Pink Line to Min Buri launched in 2024, with the Orange Line set to open in 2025 (Figure 1).

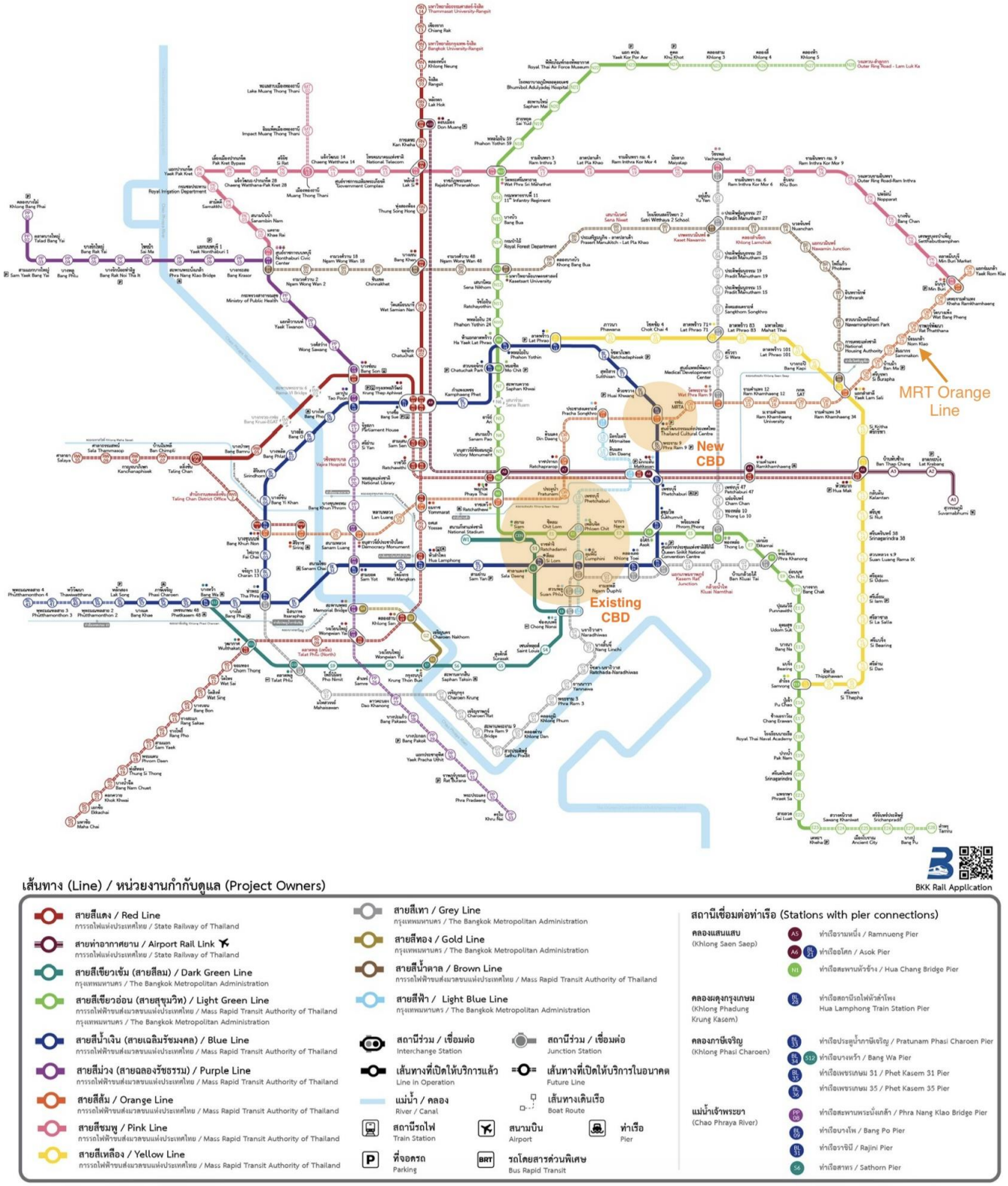

Figure 1. Bangkok Rail Transit Map (Updated in November 2023)

Source: https://www.eg.mahidol.ac.th/dept/clare/en/component/content/article/14-research/bangkok-metro-enhancement/104-bangkok-mass-trasit.html?Itemid=141

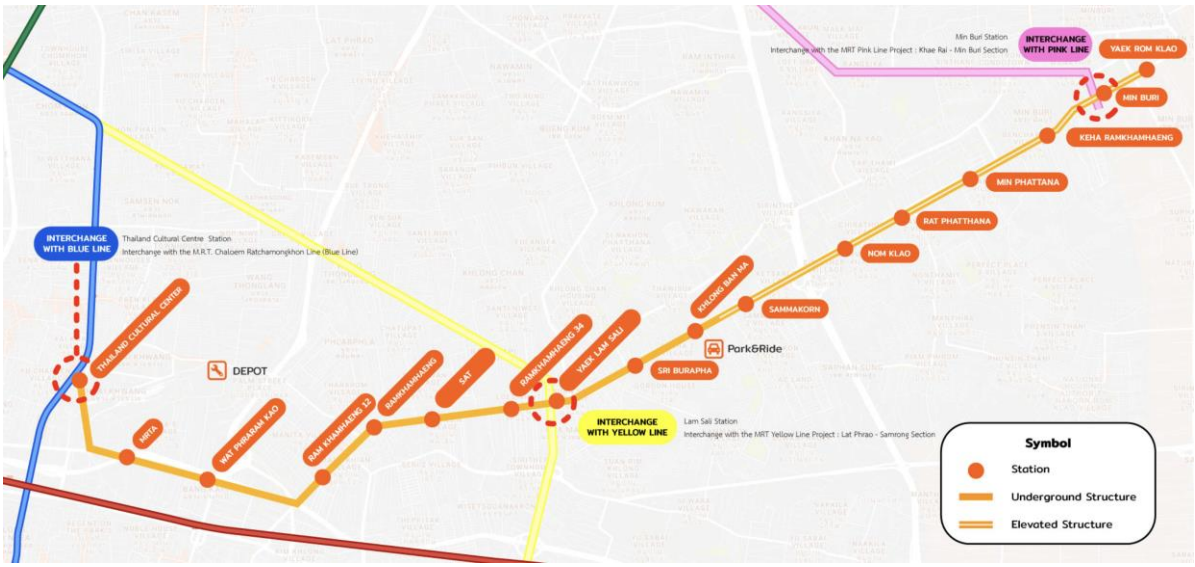

Figure 2. MRT Orange Line Map
Source: https://www.mrta-orangelineeast.com/en/home_progress

Among these developments, the Mass Rapid Transit (MRT) Orange Line (Thailand Cultural Centre, Min Buri), scheduled to begin operations in 2025, will play a pivotal role in eastern Bangkok. As the newest heavy rail system, it was designed to serve as Bangkok's primary rail connection between the eastern suburbs and the New Central Business District (CBD). This development highlights the importance of the Orange Line for facilitating urban expansion and enhancing regional connectivity. The MRT Orange Line spans approximately 22.75 km and features both underground and elevated sections. The alignment began as an underground system at the Thailand Cultural Center, transitioning to an elevated section near Sammakorn Village. The line integrates several key transit systems, including the MRT Chalermratchamongkol Line (Blue Line), MRT Yellow Line, MRT Pink Line, and Bangkok expressway network. This transit line comprises 10 underground stations, 7 elevated stations, 11 intervention shafts, a depot, and Park and Ride facilities (see Figure 2).

The opening of the new MRT Orange Line project in the areas of Rama 9 Road, Ramkhamhaeng Road, and Ratchadaphisek Road spurred significant real estate activity. A total of 28 brand-new condominium developments are now available for purchase, starting in the Rama 9 area near the New Central Business District (New CBD), which serves as a key hub linking the Orange and Blue Lines (Figure 3). The Ramkhamhaeng area and the Lam Sali junction serve as connection points for the Yellow Line, whereas Min Buri acts as the connecting point for the Pink Line.

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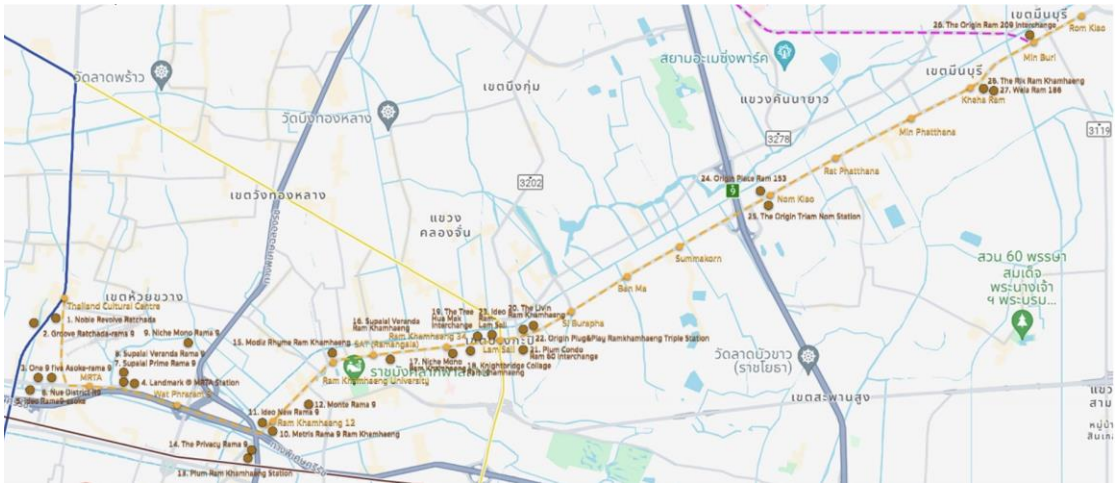

Figure 3. 28 brand-new condominium projects along the orange line (Developed by the authors)

This development has also influenced Bangkok's city plan, increasing the potential for land development along the Eastern Orange Line Corridor. Land prices, particularly along the Ramkhamhaeng Road, have risen significantly. Researchers are particularly interested in understanding how the combination of rising land development potential and property prices along the Orange Line, along with factors utilized by developers, such as proximity to train stations, main roads, expressway entrances and exits, privacy

features, operator reliability, and facility management fees, affects the pricing of condominium real estate.

Real estate developers can use this research to identify trends in condominium sales prices for projects in areas where they plan to invest. This includes understanding the land costs necessary to support real estate development and thereby facilitating informed investment decisions. Buyers, whether acquiring property for residential use or speculative investment, can ensure that they make reasonable purchases by evaluating the market prices and potential of their chosen properties.

This study offers insights into profitability trends for investors in real estate development companies, based on project companies. Additionally, the Revenue Department can leverage these findings to identify the factors influencing land prices and the cost of high-rise residential projects located along the Orange Line.

2. Literature Review

2.1 The Trend in Residential Development along the Mass Transit Lines

According to Con-Centric characteristics, Bangkok's growth has been proposed, with the inner city serving as the hub for employment and service activities due to New Development and Redevelopment taking the place of deteriorating old buildings that are being redeveloped for private sector companies and government services. In the five provinces that border Bangkok, known as the Urban Fringe, housing was developed to accommodate population expansion and migration from Bangkok's central areas to its periphery. For social services, employment opportunities, and shopping, buses and private vehicles travel to the city center. An appealing residential area should provide affordable services and infrastructure to encourage sustainable urban growth around public-transportation hubs. Near bus stations, a city with a high population density and a range of building types should be developed within the easy walking distance of the station. (Calthorpe, 1993) There are currently ten electric rail lines in Bangkok, which have been divided into four heavy rail metro lines (the light green, dark green, blue, and purple lines), three commuter lines (the dark red, light red, and airport rail link), and two monorail metro lines (the yellow and pink lines). Furthermore, the Orange Line, a heavy-rail metro line, is scheduled to begin service by 2025. These electric train lines facilitate transit from outside the city to the inner areas. Consequently, there are two types of housing distributions in Bangkok: horizontal housing, which is mostly found in suburban areas on both the western and eastern sides. High-rise residences or condominiums are mostly found in the city center's business district and expand into the residential district, especially around the upcoming pink, yellow, and orange lines. (Bangkok Metropolitan Administration, 2018) The expansion of train routes and incentive regulations in the Bangkok City Planning Law, which provide developers the right to raise the Floor Area Ratio (FAR) for newly developed high-rise building projects surrounding train stations, have also contributed to the growth of condominium residential projects surrounding train stations. (Bangkok Metropolitan Administration, 2006)

2.2 Previous Research Related to Factors Affecting Residential Prices

Freeman (1979) states that estimating a property value using the hedonic approach usually depends on three variable groups: locational, structural, and neighborhood attributes. Location attributes include the area where the property is situated, proximity to transportation, etc. Structural attributes show the physical characteristics of a property, such as size, room quality, parking space, common area, and fee. Neighborhood attributes are the physical spaces around residential projects. In the relevant previous studies, it could be concluded that the access distance to the rail station, distance to the park (Bible & Hsieh, 2011), distance to shopping malls (Des Rosiers et al., 1996), and distance to the hospital (Huh & Kwak, 1997) are influential factors in property prices. As for structural attributes, Lind and Hwang (2003) found that building age, floor space, and project size affect condominium prices. Thamrongsrisook (2011) studied the determinants of condominium price offers and confirmed that room size, number of floors, and building age are significant determinants of condominium prices in Bangkok. In addition, Pongprasert (2022) found that six key attributes–the number of condominium units, percentage of car parking space/unit, location of private recreation park within the project area, rate of common area fee, location of building in street corner, and distance to expressway—are interrelated to the luxury condominium price near urban rail transit stations in Bangkok CBD. Laophairoj (2012) studied the factors affecting condominium prices in Bangkok and found that the project location in the inner part of Bangkok was the distance from residence. Kulkosa (2016) found that there were six significant factors affecting the price of condominiums near (Bangkok Mass Transit System or Bangkok Skytrain). These are land price, proximity to BTS stations, surrounding areas around the BTS line, several stories, car parking areas, and common area fees.

2.3 Growth of High-Rise Condominium Prices in Bangkok

In addition to the fact that more new high-rise buildings are being constructed around train stations, the quantity of condominium units near train stations has resulted in an increase in the price of condominiums along Mass Rapid Transit Lines, which

is brought on by population movement into the aforementioned area. There is a limited supply of available land and growing demand for land. Property has become more expensive than results. The selling price and rental price are negatively correlated with the distance between the land's location and the bus station. The selling price of a detached house and the rental price of a building decrease as the distance from a bus station increases (Boarnet and Crane, 1995). In addition, Transit-Oriented Development (TOD) theory explains that changes in land prices are associated with reduced travel times. People pay higher prices for land if their travel time is reduced. This makes properties near the station more desirable, and commands higher prices than areas further from the station. The average price of land next to a train station is always rising, particularly if it is five kilometers or less away (Phaophoo, 2015). The average cost per square meter is approximately 50,000 baht (approximately 1,433.77[1] USD), and the price dropped significantly in places more than 5 km away from a train station (Anantsuksomsri and Tontisirin, 2015). Other factors also affect condominium prices. Santiya (2014) found that a condominium with a more usable area on a higher floor would have a safety system and a more beautiful view. Condominium prices will rise, and the average price will be greater.

2.4 Boundary Area of Research

The scope of the study area in this research examines condominium projects that are within a radius of not more than 1 km from the Orange Line MRT station, because the average acceptable walking distance and time to access the mass transit stations of people in Bangkok are 494 meters and 9.29 minutes (Pongprasert and Kubota, 2017a). In addition, people in the lower-income group seem to walk longer distances to transit stations than those in the middle-income (Pongprasert and Kubota, 2018). Calthorpe (1993) suggested that a bus station's surroundings should be developed to encourage public transportation use, stating that the development boundary should be 400 m for the bus station and 800 m for the rail public transportation station. It has been discovered that rail passengers in Canada must walk up to 1,200 m (Stringham, 1982). In Thailand, the walking distance to stations accepted by residents near BTS stations is not more than 500 m. However, Pongprasert and Kubota (2017b) found that the walking distance depends on the geography, weather conditions, land use characteristics, and walking preferences of people who live near bus stations in each country. Therefore, this research used a study boundary of 1,000 m around a train station to collect sample data.

[1] Based on the exchange rate of 1 USD = 34.8730 THB. (Source: Bank of Thailand (BOT) on November 25, 2024. https://www.bot.or.th)

3. Research Methodology

In this study, the data were primary and secondary data. Hedonic pricing methods were used to analyze the factors affecting the prices of condominium projects along the MRT Orange Line. The research samples were 28 new condominium properties that were located only one kilometer away from the MRT stations of the Orange Line, and most of them were new condominiums that were constructed in less than five years. Primary data are acquired by measuring the distance between the project and various locations specified as factors and visiting the project to inspect the facilities and determine whether they are as described. Secondary data are information acquired by reviewing paperwork announcing the sale of each of the 28 condominium developments along the Orange Line train and comparing it with information from relevant websites and project evaluation articles.

The study uses Regression Analysis as a tool to analyze data based on the theory of the Hedonic Pricing Method to find the relationship between condominium prices and various characteristics and factors such as locational features, such as proximity or distance from a train station, proximity or distance from the main road, proximity or distance from the expressway entrance and exit point, proximity or distance from the new central business district (New CBD), proximity or distance from department stores, proximity or distance from convenience stores, proximity or distance from the market, proximity or distance from the hospital, proximity or distance from the police station, and proximity or distance from the fire station. The number of floors, number of units, and percentage of parking spaces relative to the total number of units and facilities are some of the features of the project. The status of the project owner firm, common fees, and floor-to-area ratio of condominium projects along the Orange Line are further features. To determine the correlations between features and sales prices of all condominiums sold in the same period, we used a linear model with the following predicted direction signs for the relevant factors:

Such variables change in the same direction as the price that variables change increasing or decreasing, causing the price of condominiums to always increase or decrease in the same direction. These variables usually have coefficient direction signs that match or coincide with price variables when the coefficients are determined.

The dependent variable was the average selling price of condominiums along the MRT Orange Line. The symbol representing the variable is price, with units in Baht. The price of a condominium is either high or low, depending on various features or factors.

The independent variables are various characteristics that affect the prices of condominiums. In this study, there were 17 characteristics in the 3 variable groups, as shown in Table 1.

Table 1: Summary of variables, definition and expected direction (compiled by the authors)

No.	Independent variables	Var.	Definition	Unit	Expected direction
1	Distance from the Train Station	Dist. Train	Distance from the nearest Orange Line train station to the front of the condominium	Meter	According to Price (+)
2	Distance from the Main Road	Dist. Road	Distance from the nearest Main Road to the front of the condominium.	Meter	According to Price (+)
3	Distance from the Expressway	Dist. Exp	Distance from the nearest Expressway to the front of the condominium	Meter	According to Price (+)
4	Distance from the New CBD	Dist. New CBD	Distance from the New CBD to the front of the Condominium	Meter	According to Price (+)
5	Distance from the Department Store	Dist. Dep	Distance from the nearest Department Store to the front of the condominium	Meter	According to Price (+)
6	Distance from the convenience store	Dist. Con	Distance from the nearest Convenience Store to the front of the condominium	Meter	According to Price (+)
7	Distance from the market	Dist. Market	Distance from the nearest market to the front of the condominium	Meter	According to Price (+)
8	Distance from the hospital	Dist. Hospital	Distance from the nearest hospital to the front of the condominium	Meter	According to Price (+)
9	Distance from the police station	Dist. Police	Distance from the nearest police station to the front of the condominium	Meter	According to Price (+)
10	Distance from the fire station	Dist. Fire	Distance from the nearest fire station to the front of the condominium	Meter	According to Price (+)
11	Number of units	No. Unit	Number of units in the condominium	Unit	According to Price (+)
12	Number of floors	No. Floor	Number of floors in the condominium	Floor	According to Price (+)
13	Proportion of parking spaces	Car Park	Proportion of parking spaces in the project compared to the total number of units	Percentage	According to Price (+)
14	Facilities	Facilities	Common areas include a fitness center, a swimming pool, and a co-working space	-	According to Price (+)
15	Project owner	Brand	The project owner company is a listed company	-	According to Price (+)
16	Common fee	Fee	Common fee per square meter per month	The baht	According to Price (+)
17	Floor Area Ratio	FAR	Floor Area Ratio according to the city plan	-	According to Price (+)

1) Locational features in terms of distance from the Orange Line MRT station. The unit is meters. Variable symbol: Dist. The train represents the distance from the front of the condominium to the nearest Orange Line MRT stations.

2) Locational features in terms of distance from Main Road. The unit is meters. Variable symbol: Dist. Road represents the distance from the front of the condominium to the nearest main road, such as Ratchadapisek Road, Rama 9 Road, and Ramkhamhaeng Road.

3) Locational features in terms of distance from expressway. The unit is meters. Variable symbol: Dist. Exp represents the distance from the front of the condominium to the nearest expressway entrance and exit point.

4) Locational features in terms of distance from New Central Business District (CBD). The unit is meters. Variable symbol: Dist. The New CBD is a variable that represents the distance from the front of the condominium to the New Central Business District or the Rama 9 area.

5) Locational features in terms of distance from Department Store. The unit is meters. Variable symbol: Dist. Dep represents the distance from the front of the condominium to the nearest departmental store.

6) Locational features in terms of distance from Convenience Store. The unit is meters. Variable symbol: Dist. Con, is a variable that represents the distance from the front of the condominium to the nearest Convenience store.

7) Locational features in terms of distance from the market. The unit is meters. Variable symbol: Dist. The market represents the distance from the front of the condominium to the nearest market.

8) Locational features in terms of distance from the hospital. The unit is meters. Variable symbol: Dist. The hospital represents the distance from the front of the condominium to the nearest hospital.

9) Locational features in terms of distance from the hospital. The unit is meters. Variable symbol: Dist. The hospital represents the distance from the front of the condominium to the nearest hospital.

10) Locational features in terms of distance from the hospital. The unit is meters. Variable symbol: Dist. The hospital represents the distance from the front of the condominium to the nearest hospital.

11) Privacy features in terms of the number of units. The unit is units. Variable symbol: Dist. The unit is a variable that represents the number of units the condominium has for sale.

12) Privacy features in terms of the number of floors. The unit has floors. Variable symbol: Dist. Floor is a variable that represents the number of floors a condominium has for sale.

13) Facility features in terms of parking space proportions. The unit is percentage. Variable symbol: Dist. A car Park is a variable that represents the proportion of parking spaces in a project relative to the total number of units.

14) Facilities are featured in terms of facilities in the condominium. Variable symbol: Dist. Facilities represent the condominium's facilities, including fitness centers, swimming pools, and co-working spaces. If they are complete, they have a value of one. If they are incomplete, they will have a value of 0.

15) Other features in terms of the developer. Variable symbol: Dist. Brand represents confidence in the project owner. If it is a listed company, it will have a value of 1, but if it is not, it will have a value of 0.

16) Other features in terms of common fees. Variable symbol: Dist. Fee is a variable that represents the project charges a monthly common fee for one square metre.

17) Other features in terms of floor area ratio (FAR). Variable symbol: Dist. The FAR is a variable that represents the ability to build a project based on the number of usable areas per land area based on the Bangkok city plan.

The model used in the study using the Linear Model is as follows:

$$\text{Price} = C + \beta_1 \text{Dist. Train} + \beta_2 \text{Dist. Road} + \beta_3 \text{Dist. Exp} + \beta_4 \text{Dist. New CBD} + \beta_5 \text{Dist. Dep} + \beta_6 \text{Dist. Con} + \beta_7 \text{Dist. Market} + \beta_8 \text{Dist. Hospital} + \beta_9 \text{Dist. Police} + \beta_{10} \text{Dist. Fire} + \beta_{11} \text{No. Unit} + \beta_{12} \text{No. Floor} + \beta_{13} \text{Car Park} + \beta_{14} \text{facilities} + \beta_{15} \text{brand} + \beta_{16} \text{fee} + \beta_{17} \text{FAR}$$

where C is Constant, β_n is the coefficient, and there are 17 independent variables.

The linear model is a method of finding the coefficients of various variables to study the relationship between the characteristics of variables that have a positive or negative effect on the price by looking at the coefficients of each variable characteristic and using the said model to estimate the value hidden price.

Statistical testing was performed to find simulated images consisting of coefficients, standard errors, and T-statistics, using statistical values to help decide on a simulation model. The R-squared correlation value was between 0 and 1. Considering the R-squared value, the closer the R-squared value is to 1, the better.

The ordinary least squares method is an estimation of the regression line that can be obtained by minimizing the sum of squares that deviate from the regression line of the observed values of the variables.

Variance Inflation Factors (VIF) can be used to measure the severity of a problem, and a multicollinearity issue can be assumed if the computed VIF value is greater than 10 (Chatterjee and Simonoff, 2013).

The Dublin-Watson is value is used to determine whether the model has an autocorrelation problem. If the D.W. value is close to 2 (Durbin & Watson,1951), the model under consideration does not have an autocorrelation problem.

4. Research Findings

The research project aims to evaluate the importance of several variables or factors that affect how the construction and launch of the Orange Line Train impacts the value of real estate. Regression analysis was used to analyze and evaluate the statistical values derived from the data obtained to meet the goals of the study. The study findings are as follows:

4.1 Descriptive Data

Data were collected from a sample of Orange Line condominium. For use in data analysis in the Hedonic Price model, a total of 28 projects that were not more than one kilometer from the Orange Line station and had a project duration of no more than five years were selected. The mean, standard deviation, maximum, and minimum values are summarized in Table 2.

It was found that spatial characteristics of the sample group were as follows: the closest sample group was located 0 meters from the Orange Line MRT station and the farthest was 950 meters; the closest was 0 meters from the main road such as Ratchadapisek Rd., Rama 9 Rd. and Ramkhamhaeng Rd. and the farthest was 900 meters; the closest was 0 meters from Expressway and the farthest was 6 Kilometers; the closest was 230 meters from New CBD or Rama 9 and the farthest was 20.7 Kilometers, the closest was 150 meters from Department Store and the farthest was 4.5 Kilometers, the closest was 0 meters from Convenience Store and the farthest was 900 meters, the closest was 300 meters from market and the farthest was 3.4 kilometers, the closest was 70 meters from Hospital and the farthest was 4.7

kilometers, the closest was 150 meters from Police Station and the farthest was 4.2 kilometers, the closest was 120 meters from Fire Station and the farthest was 4 kilometers, the closest was 120 meters from Fire Station and the farthest was 4 kilometers, the minimum number of units was 196 units and the maximum number of units was 1,942 units, the minimum number of floors was 8 floors and the maximum number of floors was 61 floors, the minimum number of carpark was 30 percents and the maximum number of floors was 55 percents, facilities include a fitness center, swimming pool, and co-working space and not include, the project owner is a listed company and a non-listed company, the minimum fees was 33 baht per sq.m. per month (around 0.95 USD per sq.m. per month) and the maximum fees was 60 baht per sq.m. per month (around 1.72 USD per sq.m. per month), the Floor Area Ratio (FAR) in the land maps range from 2.5 to 7.

Table 2. Summary of descriptive data (compiled by the authors)

No.	Variable codes (unit)	Mean	S.D.	Min	Max
1	Dist. Train (m.)	324.64	317.25	0.00	950.00
2	Dist. Road (m.)	65.54	188.22	0.00	900.00
3	Dist. Exp (m.)	2,378.93	1,682.80	280.00	6,000.00
4	Dist. New CBD (m.)	7,397.50	6,050.26	230.00	20,700.00
5	Dist. Dep (m.)	1,143.21	1,183.19	150.00	4,500.00
6	Dist. Con (m.)	262.50	247.81	0.00	900.00
7	Dist. Market (m.)	933.93	648.93	300.00	3,400.00
8	Dist. Hospital (m.)	2,204.29	1,200.21	70.00	4,700.00
9	Dist. Police (m.)	2,691.07	960.91	150.00	4,200.00
10	Dist. Fire (m.)	2,332.88	949.70	120.00	4,000.00
11	No. Unit (units)	991.54	562.68	196.00	1,942.00
12	No. Floor (floors)	27.04	13.48	8.00	61.00
13	Car Park (percentage)	43.89	7.93	30.00	55.00
14	Facilities	0.93	0.26	0.00	1.00
15	Brand	0.71	0.46	0.00	1.00
16	Fee (the baht)	47.50	8.88	33.00	60.00
17	FAR	5.46	1.41	2.50	7.00

4.2 Empirical Results

To determine condominium pricing, the researcher collected data on three variables: the number of floors and distance from the MRT station. and the distance from the retail centers. Using the ordinary least squares method (OLS), a sample of 28 projects was analyzed to determine the statistical significance of each variable. The following equation was used in this study:

$$\text{Price} = C + \beta_1 \text{Floor} + \beta_2 \text{Dist. Train} + \beta_3 \text{Dist. Dep}$$

Table 3. The result of the regression analysis (compiled by the authors)

Variables	Coefficient			t	VIF
	Un. Std. B	Std. Error	Std. B		
Constant	-862,990.71	867,065.95		-1.00*	1.03
Physical characteristics of buildings					
Floor	113,861.30	24,185.98	0.57	4.71**	
Location Features					
Dist. Train	4,313.71	1,019.81	0.51	4.23**	1.01
Dist. Dep	640.05	274.31	0.28	2.33*	1.02
Note: R-Square = 0.66, Adjusted R-Square = 0.62; F = 5.44, Durbin-Watson (D.W.) 2.30 *p-value < 0.05, **p-value < 0.01					

Based on the data analysis findings in accordance with Table 3, the research results of the variables influencing condominium prices reveal hidden costs that have an impact on the price of condominiums in Orange Line real estate developments. The predicted R-Square value of the linear model for this instance is 0.66 or 66.1%, reliable at explaining changes in price. It can be described as the price of a condominium increases by 113,861.30 baht (3,265.03 USD) as the number of floors increases by one. The project's distance from the MRT station was one meter longer but not more than 1 km, which resulted in a 4,313.71 baht (123.70 USD) rise in the price of the condominium. The price of the condominium increased by 640.05 baht (18.35 USD) because of a one-meter increase in the distance between the department store and the condominium. This can be expressed as follows:

Price = -862,990.71 + (β_1=113,861.30) Floor + (β_2=4,313.71) Dist. Train + (β_3=640.05) Dist. Dep

In addition, condominium prices can be estimated using the following equation, which substitutes for the average of several factors:

Price = -862,990.71 + 113,861.30 (27.04) + 4,313.71 (324.64) + 640.05 (1,143.21)

The price = 4,347,933.22 baht (124,679.07 USD)

This can be explained by the fact that condominium Projects along the Orange Line generally have 27.04 floors, are located 324.64 meters from the MRT station, and are located 1,143.21 meters from the department stores. The price per unit is expected to be 4,347,933.22 baht (124,679.07 USD). The exchange rate was obtained from the Bank of Thailand (BOT) on November 25, 2024, : :1 USD = 34.8730.

Furthermore, the Durbin-Watson (D.W.) value is 2.30, falling between 1.5 and 2.5, meaning that autocorrelation is not an issue for this linear model (Durbin and Watson, 1951).

The level or magnitude of the correlation can be determined by examining the data in the Correlation Analysis table, which studies the relationship between two or more variables. If the correlation coefficient is closer to 1 or 1, indicating a strong degree of relationship, the number of correlation coefficients is used. On the other hand, if the value is around zero, it indicates little to no relationship. When the correlation coefficient for every subject was less than 0.8, it was considered acceptable to conduct additional analyses. The Variance Inflation Factor (VIF) estimator's variance, which is used to determine the severity of the issue, is displayed in the table based on the data. Because none of the three exceeded 10, they all fell within the set of parameters that could have been used in the research.

Compared to previous studies, this study found the same findings as those of Lind and Hwang (2003) and Thamrongsrisook (2011), that the number of floors in the condominium project has a positive impact on the prices of condominium units. Similarly, the key research outcomes of Des Rosiers et al. (1996), Bible and Hsieh (2011), and Kulkosa (2016) are that the significant factor of the distance between the condominium project and the MRT station affects the price of the condominium. In addition, this research outcome found a similar significant factor of distance between the condominium project and department store, which affects the price of condominium units (Kulkosa, 2016).

5. Conclusion and Recommendations

The growth in condominium prices along the mass transit station in Bangkok, Thailand, is continuously increasing. Prices tend to grow rapidly, and they are difficult to predict, especially the prices of condominiums in the proximity of urban rail transit stations in Bangkok CBD. If they are much higher, fewer people can afford to rent or purchase to live near the transit stations. This study aims to identify the factors affecting the prices of condominiums along the MRT Orange Line, the newest urban transit line in Bangkok. In the research outcome, it is found that 3 variables affecting to the price of condominiums along the MRT Orange Line. These are the floor levels in the condominium project, the distance between the condominium project and MRT station, and the distance between the condominium project and department store. All of these factors have a positive impact on condominium prices.

If condominiums along the MRT Orange Line have a lower number of floors (low-rise condominium projects), are not located at the closest distance to the MRT station (but within walkable distance), and are located farther from the department store, the price would be cheaper, and more people can afford the price of residences located near MRT stations.

Additionally, real estate developers interested in developing high-rise residential projects along the Orange Line train, such as Rama 9, Ramkhamhaeng, Lam Sali, and Min Buri, can use these research findings as a guide to determine the preliminary selling price and conduct marketing strategy analysis. Planning includes determining the best site for the project, calculating how many stories the building will need, and effectively marketing and pricing condominiums to meet demand. Customers who want to buy condominiums near the Orange Line train for speculative purposes or habitation will benefit from this. The research outcomes can be used as a basis for choosing a project that best fits their financial situation, and can provide them with the current market prices for the condominiums along the Orange Line train, allowing them to compare them properly to other projects. The ability to use the data to analyze trends in the reasonableness of the company's profits through the costs that the company has expected to invest and the sales revenue that the company expects to receive is advantageous to investors who spend shares of real estate development companies that have plans to invest in real estate projects along the Orange Line. To collect land taxes, the Revenue Department will benefit from using the data to examine the value of condominiums along the Orange Line.

Authors' Contributions

Conceptualization, P.P.; methodology, P.P.; software, R.B.; validation, P.P.; formal analysis, P.P.; investigation, C.N.; resources, A.C.; data collection, R.B.; data curation, R.B.; writing—original draft preparation, all authors contributed equally; writing—review and editing, P.P.; visualization, R.B.;

supervision, P.P.; project administration, P.P. All authors have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Data Availability Statement

The data presented in this study are available on request from the corresponding author.

Conflicts of Interest

The authors declare no conflicts of interest.

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