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International review for spatial planning and sustainable development D: Planning Assessment, Vol.10 No.1 (2022), 167-182
ISSN: 2187-3666 (online)
DOI: http://dx.doi.org/10.14246/irspsd.10.1_167

Determinants of Luxurious Condominium Prices in Bangkok CBD: A Case study of Encouraging Housing Affordability in Bangkok, Thailand

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Received: *June 15, 2019* Accepted: *Nov 06, 2021*

Key words: Luxurious condominium prices, Hedonic pricing model, Central business district, Bangkok

Abstract: This study aims to find the factors influencing prices of luxurious condominiums within 1-km radius of urban rail transit stations in Bangkok CBD, where the property value rapidly increases since last decade. According to recorded data, the average price of condominiums in CBD is higher, nearly 28% during 2016-2019. Besides, the growth of luxurious condominium in these areas grows higher sharply. 52% of new condominiums are above Luxury class while housing affordability of Bangkok's largest population is too low. Also, urban policy cannot control the unpredictable price of condominiums in CBD. As a tool for urban planners, post-windfall gain tax would be collected from real estate developers who get uplift property values as result of public infrastructure planning. It would be used to fund infrastructure such as transit, affordable housing. This paper can recommend urban policy planners which factors influencing unpredictable price of luxurious condominium in CBD should be considered in condition of windfall profit taxation. In addition, results suggest developers to set more reasonable price of new luxurious condominiums near rail station in CBD. In this study, 55 luxurious condominiums constructed within 5 years are research samples. Hedonic approach is applied to study the effects of location, structural and neighborhood attributes of luxurious condominium price in Bangkok CBD. Results are shown 6 key attributes; the number of units, percentage of car parking space/unit, locating private recreation park within project area, rate of common area fee, location of building in street corner and distance to expressway are interrelated to luxurious condominium price near urban rail transit stations in Bangkok CBD.

1. INTRODUCTION

During the last 10 years, the average price of condominiums in Bangkok, especially in CBD, has grown higher because of an increase of land price in Bangkok. Moreover, some developers equip their projects with much more facilities and amenities and set the sale price higher. Some are necessary, but some are not needed among residents near rail services such as car parking space. This marketing strategy obviously contradicts to the concept of sustainable urban development near public transit station or transit-oriented development (TOD) which enhances real estate developers to design the surrounding area around transit station useful for rail ridership in the city, and for reducing car ownership and use by station-area residents. Low-and

middle-income people are the main target of station-area residents because they do not have more cars but tend to use more public transit service 6. So, the price of residences near public transportation system in Bangkok should be more reasonably and affordably fixed. However, in the present, most of condominiums in Bangkok CBD are above luxurious level. It means that developers usually invest in residential projects affordable mainly for high-income people but low-and middle-income people, the main group of Bangkok population, cannot afford them. Instead, they decide to move farther from an urban center where their workplaces are located in. Their travel cost becomes higher, then. This is one of the main reasons of urban sprawl problem in Bangkok Metropolitan Region. According to the recorded data, the annual growth of condominium price in CBD is higher, 8-10% but the growths of luxurious and super luxurious condominiums increases for 45% and 5%. To conclude, most developers aim to build luxurious condominiums (over 200,000 THB/sq.m. or 5,767.01 USD/sq.m.) in Bangkok CBD. In this study, the researcher focuses on finding the factors influencing a price of luxurious and super luxurious condominiums in Bangkok CBD. The groups of factors in this study are locational, structure and neighborhood characteristics of luxurious condominiums in CBD, an urban area within a city equipped with commercial activities such as office buildings, retail centers and hotels. In Bangkok, Central Business District (CBD) is the area in Sathorn, Silom, Ploenchit, Wireless, Rama I, Lumpini, Rajdamri and Sukhumvit district where eight urban rail stations of Bangkok Transit System (BTS Skytrain) and Mass Rapid Transit systems (MRT underground train) are operated; Siam, Chidlom, Phloen Chit, Nana, Asoke, Ratchadamri, Si Lom and Saladaeng stations (shown in *Figure 1*). It is expected that the study results would help developers set affordable price of the luxurious condominiums to serve the various income groups of people. In addition, this study is also useful for the urban policy planners to set either more practical policies or incentives for developers to increase mixed-income residences in Bangkok CBD.

Figure 1. Bangkok's current mass transit network
(Source: https://www.bangkokmetro.co.th/web/imgcontent/Image/ map17latest.jpg)

2. LITERATURE REVIEWS

In this study, the Hedonic Pricing Model (HPM) is used to investigate the factors affecting the prices of luxurious condominiums near urban rail stations in Bangkok CBD. Freeman (1979) said that estimating a property value by Hedonic approach usually depends on 3 attributes (Location, Structure and Neighborhood). Location attributes describe the area where the property is situated, proximity to transportation, etc. Structural attributes show the physical characteristics of property such as size, room quantity, parking space, common area, fee, etc. Neighborhood attributes are the physical spaces around a residence. In the relevant researches, it could be concluded that the access distance to rail transit station, distance to park (Bible & Hsieh, 2011), distance to school (Jud & Watts, 1981), distance to shopping mall (Des Rosiers et al., 1996), distance to hospital (Huh & Kwak, 1997) affect to the property prices. As for structural attributes, Lin and Hwang (2003)found some factors affecting a property price such as building age, floor space and project size. According to a previous research in Thailand, Laophairoj (2012) had studied factors influencing condominium prices in Bangkok, it was found that project location in the inner part of Bangkok, distance from residence to transit station, number of floors & units in condominium and common area's monthly fee beneficially affect a price of condominium. Pongpairoag (2013) studied the impact of the mass rail transit system on rental price and value of condominiums in the Bangkok Metropolis, concluding that a residence's rental price near rail transit system depends on distance to rail station, facilities in residential project and neighborhood surroundings design. Kulkosa (2016) found that there were 6 significant variables directly affecting a price of condominium near BTS stations. They are land price, proximity to BTS stations, surrounding areas along BTS line, a number of stories, car parking area, and common area fee. Samaksamarn (2015) investigated that the high-rise buildings, main road location, reliable developer, occupation and income of residents are the main factors to buy a condominium along MRT line.

2.1 Contextual Background

2.1.1 Urban rail systems in Bangkok

The mass transit system has been operated in Bangkok since 1999. Until now, there are 5 routes in 3 types of urban rail transit systems operated in the city (*Figure 1*). The first is Bangkok Transit System ("BTS skytrain", referred as "Green line sky train") of which the operation started in 1999. It is the elevated heavy rail system consisting of 2 lines (green and light green line) with 34 operational stations along 36.45 km. The second is the Mass Rapid Transit, MRT. It is an underground heavy rail system consisting of 2 lines (blue and purple). The operation started in the middle of 2004, with 18 operational stations along 20 km. Later, the new purple line had started its operation in September 2016, with 16 operational stations along 22 km. So, there are 34 stations on the operating distance of 42 kilometers in total. The third is Airport Rail Link system (ARL), referred as the "red line". It is a partly elevated, partly underground rail system with 8 operational stations along 28.6 km. It began its operation in 2010. The total number of mass transit stations in Bangkok is 76 (up to April 2018), covering 107.05 km. distance. However, according to the 20-Year Mass Rapid Transit Master

Plan of BMR (2009-2029), it plans to complete 12 urban rail routes and extend the total rail coverage around 508.4 km in Bangkok and its vicinities by 2029. Although the service area of mass transit system is expanded, the annual growths of BTS and MRT ridership gradually increases for 6.6% and 7% (BTS Group Holding PCL, 2015). Urban planners expect developers to invest in more residential projects near urban rail stations to serve residents using urban rail services in their daily route.

2.1.2 Current Situation of Bangkok Condominium and Condominium Classifications

Knight Frank (company, 2019) , one of the biggest real estate consultant firms in Thailand, announces that, in 2018, the proportions of new condominiums in the CBD, surrounding CBD and peripheral area of Bangkok are 18%, 33% and 49% respectively. An average selling prices per square meter of new condominiums in CBD and its surrounding areas are 250,000 baht/sq.m. (7,208.77 USD/sq.m.) and 120,000 baht/sq.m. (3,460.21 USD/sq.m.), increasing for up to 8% and 7%, compared to 2017. Collier International (Thailand, 2018), a real estate management company, also concluded that in the last quarter of 2018, the number of condominiums as residential supply in Bangkok showed the highest. 52% of them located in the core CBD and selling prices tend to be higher, while the low-price condominiums tend to be lower. Colliers Company still predicts that prices in 2019 would grow for up to 8-10% (Thailand, 2018). Moreover, CBRE Company (CBRE, 2018b) , the first real estate consultant firm in Thailand, revealed that the market situation of high price condominium in the Bangkok CBD is critical. 145,350 condominium units (29% of condominium supply in CBD in 2018) remain unsold. It is the ever-highest percentage of condominium supply in Bangkok. The main reason is a higher land price in Bangkok, 27.72% increase in 2016-2019. Panitchpakdi (Panitchpakdi, 2009) introduced that if the residence price rapidly grew higher, more people could not afford any residences in Bangkok.

In 2018, CBRE Company classified Bangkok Condominium into 6 categories based on price per sq.m. from the lowest to highest price as follows;

Class-1 - “Entry Level” is a price under 70,000 THB/sq.m. (under 2,018.45 USD/sq.m)

Class-2 - “Mid-range” is a price between 70,000-89,999 THB/sq.m. (2,018.45-2,595.13 USD/sq.m.)

Class -3 - “Upper-Mid-Range” is a condominium price between 90,000-119,999 THB/sq.m. (2,595.13-3,460.21 USD/sq.m.)

Class-4 - “High-End” is a price between 120,000-199,999 THB/sq.m. (3,460.21-5,767.01 USD/sq.m.)

Class-5 - “Luxury” is a price between 200,000-299,999 THB/sq.m. (5,767.01-8,650.49 USD/sq.m.)

Class-6 - “Super Luxury” is a price above 300,000 THB/sq. m. (above 8,650.49 USD/sq.m.).

The level of luxurious condominiums low- and middle-income groups cannot afford are considered as class 5th (Luxury) and 6th (Super luxury) of which the prices are over 200,000 THB/sq.m. (over 5,767.01 USD/sq.m.) (CBRE, 2018a) . The exchange rate is referred from Bangkok of Thailand (Pongprasert & Kubota, 2017) on June 17, 2020 – 1 USD = 34.68 THB. (Source: https://www.bot.or.th)

2.1.3 The Average Household Income and Housing Affordability in Bangkok

There is an unbalance between demand and supply in residential market because of a higher growth of residential price, while the average household income in Bangkok is lower, 49,191, 45,572 and 45,707 baht per month (1,418.42, 1,314.07, 1,317.96 USD/month) in 2013, 2015 and 2017 (NESDC, 2018) . In 2019, NSO (NSO, 2019) presented that the average household income is 37,750 baht/month (1088.52 USD/month) or around 17.41% lower than in 2017. It can be implied that only high-income people can live in Bangkok, and that the rate of residence ownership among low- and middle-income people would reduce, too.

According to the role of 30-percent of income standard as a gauge of housing affordability (Herbert, Hermann, & McCue, 2018), the maximum spending of house rent is 30% of gross household income, the highest price of residence that the half of people in Bangkok can afford is only 1.415 million baht (40,801.61 USD.) , equivalent to the room size around 7.08 sq.m. of condominium in CBD area, and 20.21 sq.m of condominium in middle range class (CBRE, 2018a). Their starting prices ranked by CBRE (CBRE, 2018a) are 200,000 baht/sq.m. (5,767.01 USD./sq.m.) and 70,000 baht/sq.m. (2,018.45 USD/sq.m.). According to the Condominium Act of Thailand, the smallest size of every condominium unit is 20 sq.m. Therefore, they could not buy condominium in upper levels from middle-class projects in Bangkok. This can be said that the housing affordability of Bangkok people are not related to the land and property price in Bangkok. Developers who own the land near rail transit stations try to develop high-end condominiums (luxurious and super luxurious class) by setting higher price. They get more profit margin from benefits of proximity to public transport infrastructures but Bangkok Metropolitan Administration (BMA) and Thai government do not receive more revenue from these project owners such as special property tax.

2.1.4 Windfall Gains Tax in Bangkok

In 2018, Thai government has introduced tax collection on inflated property prices pushed by transport infrastructure projects, known as the windfall gain tax. However, it has not been used as fiscal tax policy in Thailand until now. As mentioned, the transport infrastructure projects made the higher value of land and property in the area near transit routes. It is beneficial for land developers who can get profit from higher sale price of property. The Thai government aims to collect this tax from land developers upon ownership transfer. Property developers with a project located near the transport infrastructure within 2.5 m-radius of station and valued higher than 50 million baht will be taxed at the fixed rate of 5% if the land is transferred after the infrastructure-related service is launched (Kietsarnpipob, 2018). However, the rate does not vary by distance between project location and rail transit station like in some developed countries where the tax is collected

based on zone or distance from transit stations such as Japan, UK and Australia (TfL, 2017). As for benefits for public use, the land windfall gain tax would be used to fund new infrastructure projects. In addition, the tax can be subsidized the high residential price for low-and mid-income people who cannot afford the residential cost but they must live and work near rail transit lines. This recommendation is the target of creating the sustainable city nowadays.

2.1.5 Incentives for Affordable Housing in Bangkok CBD

The concept of developing an affordable housing in high-rise building has been discussed in Bangkok over the last 10 years. Basically, low-income people usually live together so it is not a good environment in the city in the long term. Increasing a household of lower and higher income groups to live near each other would improve an economy, poverty alleviation, property values, and housing quality & services (Monsebraaten, 2013). In 2013, the special privileges or FAR Bonus system (Bonus of Floor Area Ratio) shown in the Bangkok Comprehensive Plan (B.E. 2556) are available for developers of housing for low-and middle-income people in Bangkok. However, only a few of developers joined this campaign because an affordable price of residence can give low benefit. Besides, several developers do not understand the incentive conditions (Paninee, 2016).

3. RESEARCH METHODOLOGY

3.1 Data Collection and Analysis Methods

To estimate the Hedonic pricing model, the data on the prices of luxurious condominiums and attributes of each condominium project near rail stations in Bangkok CBD were collected from site-survey and reliable websites specializing in real estate market in Bangkok during January-March 2019. There are 8 urban rail stations in CBD; Siam, Chidlom, Phloen Chit, Nana, Asoke, Ratchadamri, Si Lom and Saladaeng stations (*Figure 1*). Among them, 4 stations (Chidlom, Ploen Chit, Nana and Asoke) are categorized as stations in the Core CBD area where over 70% of land are utilized for commercial activities. During the survey, 114 new condominiums constructed within 5 years (2014-2018) are used as the data. 55 condominiums (52%) are the “luxurious” and “super luxurious” classes, over 200,000 THB/sq.m (USD 6385.70 per sq.m.) (see *Figure 2*). It can be implied that over 50% of total new condominiums near rail stations in Bangkok CBD are specifically only for high-income people. In *Figure 2*, it shows that the percentage of high-end condominium (class-4) is high, 42%, while there found no condominiums in the entry level (class-1) in Bangkok CBD. However, this study focuses on condominiums above luxury class (class-5 and 6) because the average prices are much higher than any appraisal ones (around 4000 USD/sq.m.), the Department of Land in Thailand mentioned.

The characteristics of data samples (55 luxury condominiums) are analyzed by mean and standard deviation (SD.) but the factors influencing prices of luxurious condominiums near rail station in CBD were investigated by Hedonic pricing technique.

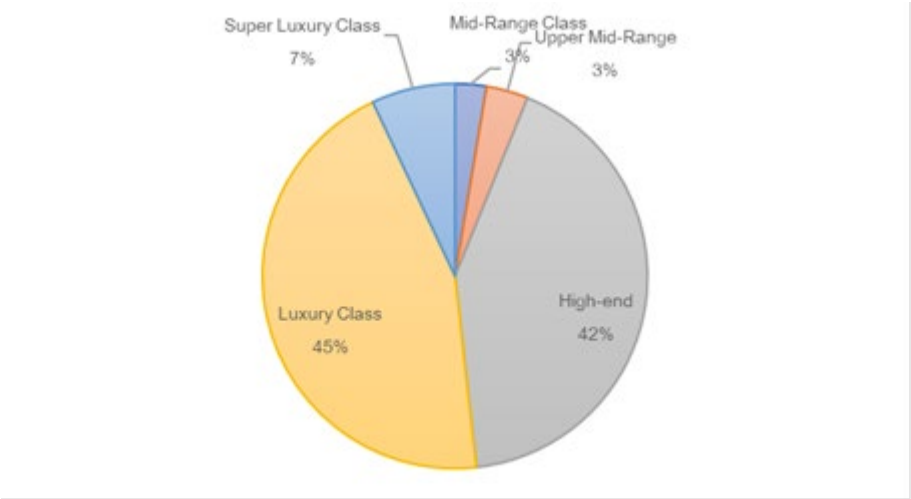

Figure 2. Percentages of new condominiums near urban rail stations in Bangkok CBD

3.2 Variable Definitions

Table 1 shows the description of variables in the study. There are 3 hedonic variables types; locational, structural and neighborhood characteristics as shown in the Literature Reviews. The variables could be dummy or continuous. The dependent variable is an average saleable price of luxurious condominium, but the others are independent. In terms of locational and neighborhood characteristics, the distances to rail stations, main road, expressway, department store, school and hospital are measured by Google maps based on the shortest route. As for expected sign of variables, distance to station, number of units and floors, total area of project, distance to school, distance to hospital are expected to show negative sign, while other are expected to be positive.

Table 1. Variables and the expected sign

Variable name	Variable Types	Variable code	Description and Variable measurement	Expected Sign
Condominium price per sq.m.	Dependent variable	Price	Condominium price per sq.m in Baht currency (1 USD = 34.68 THB)	
Distance to station	Location (Continuous)	DIST_TO_ST	Distances from condominium to nearest urban rail station (meter)	-
Core CBD	Location (Dummy)	CORE_CBD	Condominiums near 4 stations in core CBD area (1 = Yes, 0 = No)	+
Number of units	Structure (Continuous)	UNITS	Number of units in condominium (units)	-
Number of floors	Structure (Continuous)	FLOORS	Number of floors in condominium (floors)	-
Total area of project	Structure (Continuous)	AREA	Total area of condominium project (sq. wa) (1 sq.wa = 4 sq. m)	-

Variable name	Variable Types	Variable code	Description and Variable measurement	Expected Sign
Common facilities	Structure (Dummy)	FACILITY	pool, exercise room and sauna room at least. (1 = Yes, 0 = No)	+
Reliable developer	Structure (Dummy)	DEVELOPER	Condominium company/ owners/ developers is in the list of Stock Exchange of Thailand (SET) (1 = Yes, 0 = No)	+
Percentage of car parking per unit	Structure (Continuous)	CAR_PARK	Percentage of car parking lots per unit provided in condominium	+
Common area fee (baht/sq.m)	Structure (Continuous)	FEE	Common area fee per square meter	+
Recreation park	Neighborhood (Dummy)	PARK	Providing private park in the condominiums. (1 = Yes, 0 = No)	+
Corner	Structure (Dummy)	CORNER	Condominium location in the corner of street (1 = Yes, 0 = No)	+
Distance to main road	Neighborhood (Continuous)	MAIN_RD	Total distance from condominium to nearest main road	+
Distance to expressway	Neighborhood (Continuous)	EXPWAY	Total distance from condominium to nearest expressway	+
Distance to department store	Neighborhood (Continuous)	DEPART	Total distance from condominium to nearest department store	+
Distance to school	Neighborhood (Continuous)	SCHOOL	Total distance from condominium to nearest school/university/academic institute	-
Distance to hospital	Neighborhood (Continuous)	HOSP	Total distance from condominium to nearest hospital	-

3.3 Hedonic Pricing Model (HPM)

Hedonic pricing model is used to express the relationship between condominium price and its characteristics. The regressions with ordinary least square (OLS) are used to estimate the attributes influencing condominium price in the model. Generally, HPM is in a form of eq.1

$$P = f(Z) \quad (1)$$

Where P is market price of housing and Z is independent variables (explanatory variables), which represents location, structure, and neighborhood characteristics (Ridker & Henning, 1967). In this study, 16 variables were chosen as Hedonic price indices as shown in the *Table 1*.

Rosen (1974) suggested that the relationship between price and residence attribute is not a liner but instead, it should be an exponential form. Therefore, this study uses a function form together with logarithmic and semi-logarithmic form presented as equations (2), (3) and (4) as Linear, Semi-log and Double-log models.

Model 1: Linear model: $$P = P_0 + \sum_{k=1}^{N} Z + \varepsilon \quad (2)$$

Model 2: Semi-log model: $$Log\ P = P_0 + \sum_{k=1}^{N} P_k + \varepsilon \quad (3)$$

Model 3: Double-log model: $$Log\ P = P_0 + \sum_{k=1}^{N} P_k Log\ Z_k + \varepsilon \quad (4)$$

Where P_0 and P_k are the intercept term and characteristics parameters to be estimated, P is the dependent variable and Z_k are the independent variables (explanatory variables). This study uses 3 groups of independent variables (Z), which are location (L), structural (S) and neighborhood (N) attributes as seen in the *Table 1*. The regression results of the models by applying the 3 functional are summarized in the *Table 3*.

4. RESEARCH FINDINGS

4.1 Descriptive Data

According to the data of new condominiums within 1-km radius of rail stations in CBD during 2014-2018, it can be said that the growth of condominium units (rooms) continuously grows higher since 2015. The growth rates are 27.40%, 23.65%, 21.70% and 27.50%. In 2018, the number of condominium units sold to customers is at 8,778 units, which is the highest (see *Figure 3*). It implied that both the high-rise residential market in CBD was blooming and its demand was increasing. Moreover, most of new condominiums are luxurious residences. Over the last 5 years, new condominiums in CBD are designed with more luxurious design as seen in the growth rate of luxurious-class condominium (class-5), 13% to 62%. Similarly, the growth rate of super luxurious condominiums (class-6) was higher, 4% to 7% but the growth rate of lower-price condominiums, a high-end condominium (class-4) in particular, reduced. It rarely grows, 70% to 28% within 5 years (see *Figure 4*). It can be implied from these data that developers tend to build high-price condominiums near urban rail station in CBD then, their market price are set higher. Consequently, low-and middle-income people cannot possess their own condominium near public rail service in CBD where most workplaces are located in.

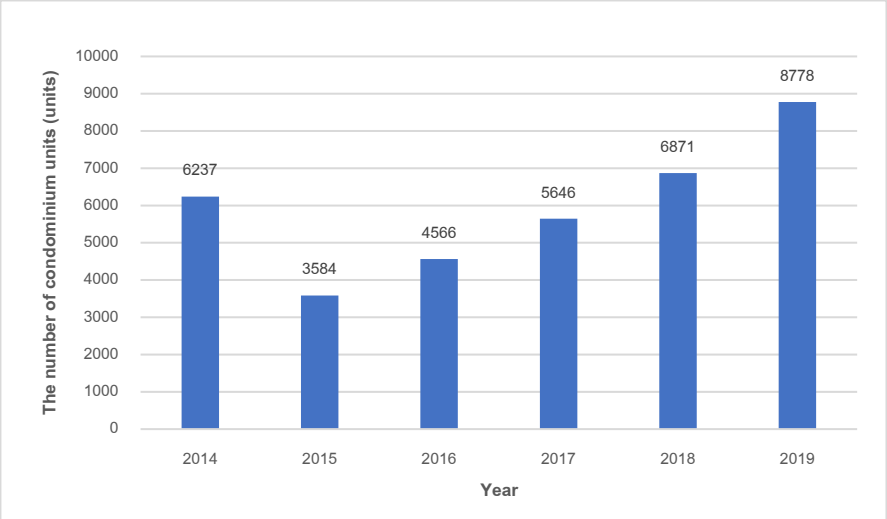

Figure 3. The number of new condominium units near rail station in CBD during 2014-2019

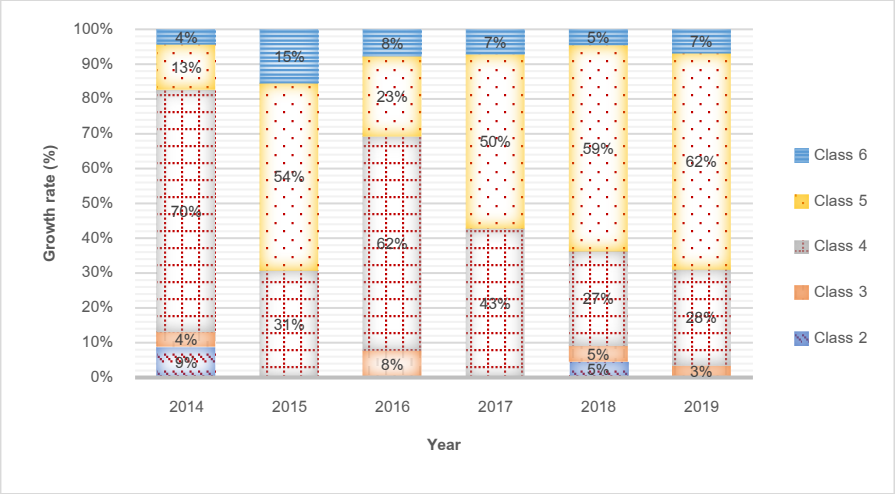

Figure 4. The growth of new condominiums in each class

In *Table 2*, the total price (P) of 55 samples as luxurious condominiums (class-5&6) in the CBD ranges from 200,000 to 652,893 baht per square meter (around 5,767.01-18,826.21 USD per sq.m.) with the mean price of 276,897 baht per sq.m. (7,984.34 USD/sq.m.). In the locational characteristics of luxurious condominiums, the average distance from condominium to the nearest station is 431 m. The shortest distance is at only 43 m. 24 luxurious condominiums (44%) are in the core CBD Bangkok. In terms of the condominium's structural characteristics, the average number of rooms and levels/stories, project area and car parking percentage are 334 rooms, 34 levels, 4,378 sq.m, with 92% car parking spaces available in the luxurious condominiums in Bangkok CBD. Obviously, most of them provide the high percentage of car parking space even though their locations are located close to urban rail stations, 431 m. In terms of project facilities, 33 condominiums (60%) were equipped with common facilities (pool, fitness room and sauna room at least). 31 condominiums (56%) have a private park inside. 41 luxurious condominiums (75%) are developed by reliable developers whose companies are in the list of Stock Exchange of Thailand (SET). In terms of a common area fee or maintenance fee which the room

owners pay every month, the average fee is quite high, 85 THB/sq. m. (2.45 USD/sq.m.), compared to a fee rate of condominiums near rail stations in the surrounding CBD area. The locations of 26 condominiums (47%) are in the corner of streets. According to the data on the neighborhood characteristics of the condominiums, an average distance to main road, expressway, department store/mall, school and hospital are 221, 1444, 561, 598 and 746 m. It implies that most luxurious condominiums are located near a main road, department store/mall and school.

Table 2. The characteristics of the sample luxurious condominium units

Attributes	Variable codes (unit)	Min	Max	Mean	Std. Deviation (S.D.)
	Price (THB/sq.m)	200,000	652,893	276,897.58	74623.15
Location	DIST_TO_ST (Jud & Watts)	43	1000	431.71	231.91
	CORE_CBD	0	1.00	.44	.50
Structure	UNITS (units)	49	1444	334	270.78
	FLOORS (floors)	7	77	34	15.55
	AREA (sq.m)	992	14,770	4,377.96	3,074.49
	FACILITY	0	1.00	.69	.47
	DEVELOPER	0	1.00	.71	.46
	CAR_PARK (Wang & Research)	41	240	92.02	47.56
	PARK	0	1.00	.56	.50
	FEE (THB/sq.m)	50	150	84.09	21.73
	CORNER	0	1.00	.47	.50
Neighborhood	MAIN_RD (m)	10	1,000	220.64	235.70
	EXPWAY (m)	200	3,800	1,444.35	846.65
	DEPART (m)	90	2,800	561.35	490.90
	SCHOOL (m)	62	1,430	598.44	326.35
	HOSP (m)	140	2,500	746.53	421.15

4.2 Empirical Results

In *Table 3*, the regression result shows that R square is 0.805 but adjusted R square is 0.722 by the linear model, R square is 0.861 and adjusted R square is 0.802 by semi-log model. The last one, double log model shows that R square and adjusted R square are 0.830 and 0.758. The results of all 3 models show that factors affecting the prices of luxurious condominiums in Bangkok CBD can be clearly understood from these models. According to the 16 variables put into 3 models, the researcher found that the model 2 (semi-log) fits for predicting the prices of luxurious condominiums in Bangkok CBD because it finds the most statistically significant factors. In model 2, the 6 variables are significantly affecting prices of luxurious condominiums while model 1 and 3 give only 5 and 3 significant factors interrelated to condominium prices. As for significant factors in model 2, "UNIT" shows a statistical significance at $p<0.1$ and "CORNER" shows a statistical significance at $p<0.05$. "CAR_PARK", "PARK", "FEE" and "EXPRESSWAY" show a statistical significance at $p<0.01$. Among the significant factors, "UNIT", "CAR_PARK", "PARK", "FEE" and "CORNER" show positive signs of coefficient and are the almost same sign as expected except "UNIT". The expectation shows the negative. While "EXPRESSWAY" shows the negative sign, but the expectation is the positive one. As for the result, it means that if there are larger numbers of

units, higher number of available car parking spaces, locating private recreation park in the project, setting higher common area fee and location of building in the corner of street, the sale prices of luxury condominiums would be higher.

Table 3. The regression coefficients of 3 functional forms

Variables	Model 1 Linear functional form	Model 2 Semi-log functional form	Model 3 Double-log functional form
DIST_TO_ST	14.93413	.00001	-.00781
	(0.521)	(-.355)	(-.267)
CORE_CBD	2640.75367	-0.0400	-.00833
	(.191)	(-.258)	(-.216)
UNITS	69.28454*	.00008*	.03358
	(1.786)	(1.767)	(.513)
FLOORS	-483.23396	-.00038	-.04395
	(-.861)	(-.600)	(-.935)
AREA	-4.16441	-.00001	-.01511
	(-1.378)	(-1.522)	(-.329)
FACILITY	-13592.16403	-.01804	-.00618
	(-.921)	(-1.089)	(-.136)
DEVELOPER	13892.27443	.01976	.05353
	(.881)	(1.117)	(1.163)
CAR_PARK	528.34177***	.00060***	.10543
	(3.070)	(3.085)	(1.447)
PARK	46997.97505***	.06900***	.15030***
	(3.115)	(4.076)	(3.525)
FEE	1530.39732***	.00189***	.38470***
	(4.336)	(4.773)	(4.360)
CORNER	25253.07083	.04489**	.07695
	(1.59)	(2.277)	(1.519)
MAIN_RD	15.79588	.00001	-.00219
	(.542)	(.288)	(-.193)
EXPWAY	-24.97502***	-.00003***	-.08183***
	(-2.734)	(-2.760)	(-2.855)
DEPART	.55753	.00001	.00861
	(.041)	(.361)	(.350)
SCHOOL	5.20411	.00001	.00813
	(.261)	(.298)	(.308)
HOSP	6.90188	.00002	.03615
	(.421)	(.961)	(1.176)
Constant	88577.789**	5.18966***	10.57771***
	(2.168)	(113.200)	(15.153)
Observations	55	55	55
R^2	0.805	0.861	0.830
Adjusted R^2	0.722	0.802	0.758
F-statistic	9.777 (Sig. 0.00)	14.669 (Sig. 000)	11.593 (Sig. 000)

Note: The number in the table is the coefficients of variables but the number in parentheses is t-statistic

*** Significance level at 0.01; **Significance level at 0.05 and *Significance level at 0.1

5. CONCLUSION AND RECOMMENDATIONS

Bangkok is now one of the most expensive cities in Asia in terms of residential property price (Group, 2021), with a lack of available affordable housing. The lack of sufficient financial tools for ensuring new housing is truly affordable for low and middle incomes (the largest group of population in Bangkok). According to the data of average household income in Bangkok in 2019, it can be concluded that half of people from middle-class and below cannot afford to live in condominium because of their low housing affordability. The biggest size of condominium they could afford is only 20-sq.m. (smallest as required by law) in the middle range class and only 7.08 sq.m. (smaller than required by law) in luxury class condominium of which most developers prefer to launch the construction project near urban rail routes and set the high price. The prices tend to grow rapidly and they are difficult to predict. In addition, more speculators or real estate investors buy and sell condominium rooms in higher prices for their own benefit at the same time. The market pays no attention to residents needing to live near transit station in CBD area. In this situation, the inequality problem becomes critical. Low-and mid-income people cannot live near areas of employment, recreation and public mass transit systems in Bangkok CBD. Several people say, “You could not live in an urban area of Bangkok (especially in CBD area) unless you are rich”. This contradicts to the direction of sustainable urban development in the city as mentioned in the Sustainable Development Goal (SDG) no.11 as to make cities and human settlements inclusive, safe, resilient and sustainable.

In 2018, The Thai government initially discussed how to increase the housing affordability among most people and how to manage the greater prices of residential property, including land speculation in Bangkok CBD. The Windfall Gains Tax was introduced and planned to use in Bangkok in the near future. It is a tool of urban policy planners to control unpredictable land and property prices and to create more sustainable urban development. The approach is to collect increment land value tax from land owners and real estate developers gaining profits from the transport infrastructure projects invested by government. First, the ceiling for the windfall gain tax is at 5% of the inflated value of property from infrastructure projects. As for benefits, this tax revenue is used by government to fund the new transit infrastructure and useful for the creation of more affordable housing and suppress the growth in land value when affordability is a critical. The inflated value of residential property is exactly affected from transport infrastructure projects. However, in fact, there are many factors related to unpredictable prices of luxurious condominiums like locational, structural and neighborhood attributes. These could be used in criteria of charging either the windfall gains tax system or other property tax systems in Bangkok. In this paper, the factors influencing the luxurious condominium prices in Bangkok CBD have been investigated. The expected outcomes should bring benefits to 3 groups of people; urban policy planners, developers and customers. Policy planners will deeply understand condominium attributes directly affecting to the inflated prices of luxurious condominium. The expected results would be their guidance to plan the policies such as property tax policy and sustainable urban development policy. At least, the factors can be set in the criteria of charging the higher rate of windfall gains tax from developers. When the city government gets more tax revenues, the infrastructure and affordable housing projects in a new town/village near urban rail stations would be subsidized in Bangkok

CBD more. The developers whose perspective is to develop high-rise residential properties in CBD can estimate reasonable prices of luxurious condominiums. The price would be set reasonably high. Moreover, any customers tending to buy luxurious condominiums near urban rail transit stations in Bangkok CBD can predict the residence's reasonable price.

In this study, 55 luxurious condominiums (over 200,000 baht/sq.m.) in Bangkok CBD within 2013-2018 are the research samples. Three hedonic pricing models are used to describe the factors influencing the higher price of luxurious condominiums near urban rail transit stations of Bangkok CBD. Three main variable groups used in the model estimation are locational, structural, neighborhood attributes of these condominiums. According to the investigated results, the factors interrelated to a price of luxurious condominium near transit station are divided into the 6 significant variables. Higher number of units, available car parking spaces, locating private recreation park in the project, setting higher common area fee and location of building in the corner of street show a positive sign with statistical significance but a closer distance of project to expressway has negative effects on a price of luxurious condominiums in Bangkok CBD.

To recommend, if condominiums around transit stations in CBD have the lower number of units, provide less car parking spaces, does not locate private recreation park inside and set a lower rate of common area fee, the price would be cheaper. Furthermore, if the position of building is not located in the corner of street and near expressway entrances, the selling prices would reduce, too. However, the city government should support the developers in luxurious condominium market by providing public parking area (on- and off-street parking), build more and large public spaces, park or recreation areas in an area around urban rail stations in CBD. Moreover, the practical tax policies should be seriously implemented. The windfall gain taxes should be collected in the higher rate with developers who are building the luxurious condominiums with the larger number of units, or over 100% car parking space per unit, or any developers providing private recreation parks or locating a condominium on street corner or nearer expressway entrances. Although the mentioned attributes could add property values to developers, but they give no benefits of sustainable urban development. Parking a car in a condominium near transit station dissuades people to use transit service as expected in the current city plan. Moreover, providing a private recreation park inside shows a sign of inefficient land use near public transit services as recommended in the Transit-Oriented Development (Woodruff & BenDor) concept. If the price of luxurious condominiums near rail transit station is set in an affordable level, the economic growth would be better once much more people (workforces) live near workplace. They do not pay daily travel cost in a high rate and, hopefully, the inequality problem in city would be lessened.

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