MEASURING INFLUENCES OF RESIDENCE DECISION TO BUY FACTORS BY MODIFIED ANALYTIC HIERARCHY PROCESS

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Abstract

Although there have been several research works studying the factors in homebuyers' decisions to buy, the individual contribution of each factor in the decision to buy is yet to be measured. This information can help real estate developers compare all factors and determine how projects should be designed. This research aimed to study the factors affecting the decision to buy a residence in the Bangkok Metropolitan area, and the weights of the influences of each factor utilizing the Modified Analytic Hierarchy Process (Modified AHP). The research was conducted by acquiring data from 480 respondents who purchased various types of residences at various price levels by the Quota Sampling Method. Data were analyzed by Modified AHP, with the analysis ended when all factor weights were obtained. The results provide information regarding the key factors and their weights of affect in the decision to buy a residence in the Bangkok Metropolitan area. It was also found that the higher the residence price, the less concerned customers are about location and residence design. On the other hand, they will focus more on the project design, construction, after-sales service, and the common fee. Developers, therefore, should design their projects to match these influences in order to respond to their customers' demands, which will result in greater success in the long run.

Keywords: Decision to buy, Modified Analytic Hierarchy Process, Housing Project

1. INTRODUCTION

Thailand's real estate business faced a severe recession in 2020. During the first half of this year, new project launches were reduced by 50 percent. The supply of all types of residences for sale has risen to 221,192 units. There were merely 151 new project launches, a decrease of 32.3 percent compared to the same period in 2019. Only 30,028 new units were launched into the market, a decrease of 47.8 percent compared to the same period in 2019. The value of the residential projects was down to 124,429 million baht, a decrease of 45.3 percent compared to the same period in 2019 (Pornchokchai, 2020). This shrinking of the mentioned residential estate market was caused by various determinants, especially by the outbreak of Covid-19 which interrupted all economic activities and led to a postponement of the marketing plans of residential projects. Consumers delayed buying residences since their budget needs required a greater proportion of income to be

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set aside for daily necessities. Some groups of people were affected by temporary layoffs or job terminations, resulting in lower incomes. This affected their ability to purchase residences, which are high-value assets. In addition, the buying decisions of domestic buyers are under pressure from fragile purchasing power, resulting from tax measures and regulations, the reduced Loan to Value (LTV) ratio, and the new Land and Building Tax Act (Kasikorn Research Center, 2020).

For the reasons mentioned above, real estate developers must create strong points for each project, to encourage buyers to make positive decisions, as well as provide strategic schemes to maintain the company's stability. Project developers must present key selling points that satisfy their customers, such as potential locations, greater usable area than competitors' projects, living space design that focuses on usability and the lifestyles of customers, a design concept that stands out from other competitors in the market, use of modern construction technology, quality of materials and construction, attractive environment inside and around the project, a one-stop service, after-sales service, smart home, energy-saving home, and value for money (Rungruangphon, 2020). These are used to accelerate sales of housing units in stocks and reduce the opening of new housing projects to obtain cash inflows to enhance business liquidity and not to lose marketing opportunities to competitors.

The literature review found that the former studies of the influencing factors affecting the decision to buy a residence chose to use an analysis in the form of mean or range of influence level. The research analyzed data collected from questions that were mainly in the form of a Likert scale, such as Singharattanakorn & Chaiyasoonthorn (2018), Sirithap (2018), Tanaviboonchai (2016), Srisook (2016), Kumar & Khandelwal (2018), Singh, Gupta, & Dash (2018) and Suttiwongpan, Tochaiwat & Naksuksakul (2019). These studies provide detailed information for the multi-criteria decision-making for effective project design, for example, when considering alternatives that affect many different factors.

For this reason, some advanced analysis techniques have been adopted in some research for the benefit of residential real estate developers, to formulate marketing strategies that appropriately respond to the buyers' needs for each type of housing. Rahman et al. (2015) applied Structural Equation Modeling (SEM) to study residents' satisfaction with facilities provided by private apartment companies in Bangladesh. In addition, Chang et al. (2015) also used the ANP-based TOPSIS approach, a technique integrating the Fuzzy Delphi Method and Analytic Network Process (ANP). The technique for order preference by similarity to ideal solution (TOPSIS) helps Taiwanese service apartments to effectively select optimal locations. In this study, the researchers were interested in studying the influence of factors affecting the decision to buy a residence in Bangkok and its perimeter using the Analytic Hierarchy Process: AHP. This process is based on the principle of multi-criteria decision-making in which criteria and alternatives can be prioritized by comparing them in pairs (Saaty, 1980).

Although several statistical techniques can determine the weights for multi-criteria decision-making, for example, the Fuzzy Set Qualitative Comparative Analysis, the Composite-based Structural Equation Modelling, the Artificial Neural Network, and the Analytic Network Process (ANP). However, the Analytic Hierarchy Process (AHP) was selected for the research due to its ability to provide a set of weights with the summation of all weights equal to one (100%). In addition, comparing the techniques that can standardize or normalize weights to 100% for all factors and sub-factors throughout a model, such as Composite-based SEM and AHP, AHP was selected as the analysis method because of its uncomplicated analysis process (Monsef, 2015; Rosli et al., 2014; Punthutaecha, Janmonta & Ratanachot, 2017). The

acquired weights will show how important each decision-to-buy factor is, compared with all factors.

In this study, the data were collected from consumers who purchased various residences at various price levels using the Quota Sampling Method. Data were then analyzed by the Modified AHP, in which the process was modified according to the weights obtained for all factors influencing the decision to buy a residence. These influence values were used to identify the effects of factors on the decision to buy residences in each type and price range.

2. LITERATURE REVIEW

2.1 Factors that Affect the Decision to Buy a Residence

Past literature reveals several studies which consider the factors affecting the decision to buy a residence (e.g., Larpcharoen, 2020; Rungruangphon, 2020; Tochaiwat, 2020; Singharattanakorn & Chaiyasoonthorn, 2018; Sirithap, 2018; Ingkhanisarn, 2016; Tanaviboonchai, 2016; Srisook, 2016; Thirasophon, 2015; Tseng, 2014; Kumar & Khandelwal, 2018; Singh, Gupta, & Dash, 2018; Rinchumphu et al., 2013; Hellberg et al., 2021; and Thaker & Sakaran, 2016). According to S-R Theory, several factors affect customers' responses: marketing stimuli (marketing mix), other stimuli (political, economic, social, and technology factors), the buyer's characteristics (cultural, social, personal, and psychological factors), and the buyer's decision process (Kotler & Keller, 2016). However, in this research, only the income of the buyer (reflected by the price range of residence) and the marketing mix from the real estate developer marketing mix were examined to simplify the scope of the study. A marketing mix is a set of marketing tools companies use to continuously achieve their marketing goals in the target market (Kotler & Keller, 2016). Therefore, the factors collected from this literature can be categorized according to the elements of concern within the marketing mix as follows:

1) Product refers to products or services that an agency or business organization offers to the target market in response to the needs of the target consumer group to achieve satisfaction (Kotler & Keller, 2016; Larpcharoen, 2020). The key components of residential real estate products consist of several sub-factors, such as location, construction quality, design, public utilities, and after-sales service.

2) Price refers to the amount customers pay to obtain the desired product (Kotler & Keller, 2016; Larpcharoen, 2020). The key components of price that influence the purchasing decision for a residential property include the unit price, the monthly installments, down payment conditions, reservation fee, the contract payments, and the common fee.

3) Distribution channel refers to an agency or business organization's activities in relation to the distribution or movement of products from the source of production to the market allowing potential customers to purchase the company's products (Kotler & Keller, 2016; Larpcharoen, 2020). The key components of the residential real estate distribution channel consist of many sub-factors such as home/show unit decoration, sales office decoration, the atmosphere in the house/show unit, organizing sales support activities within the project, and selling through online channels.

4) Marketing Promotion refers to activities that persuade potential customers to purchase the company's products (Kotler & Keller, 2016; Larpcharoen, 2020). This factor comprises 5 sub-factors, including the marketing promotional mix: advertising, public relations, personal selling, direct marketing, and sales promotion.

Table 1 summarizes the factors affecting the decision to buy a residence in Bangkok or its perimeter according to the literature. It shows that many factors affect the decision to purchase a residence. However, factors relating to the products are the most

Table 1 Summary of Factors Affecting the Decision to Buy a Residence

Factors affecting the decision to buy a residence	Larpcharoen (2020)	Rungruangphon (2020)	Tochaiwat (2020)	Singharattanakorn & Chaiyasoonthorn (2018)	Sirithap (2018)	Ingkhanisarn (2016)	Tanaviboonchai (2016)	Srisook (2016)	Thirasophon (2015)	Tseng (2014)	Kumar & Khandelwal (2018)	Singh, Gupta, & Dash (2018)	Thaker & Sakaran (2016)
Product													
(1) Location	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓
(2) Quality of construction	✓	✓	✓	✓					✓	✓	✓	✓	✓
(3) Residence design	✓	✓	✓			✓			✓	✓		✓	
(4) Facilities	✓	✓	✓				✓	✓		✓	✓		✓
(5) After-sales service	✓	✓	✓	✓	✓		✓		✓	✓			
Price													
(1) Price of residence	✓	✓	✓	✓		✓	✓		✓	✓	✓		✓
(2) Monthly installment	✓			✓		✓	✓		✓	✓	✓		✓
(3) Down payment conditions	✓									✓			
(4) Payment for reservation and contract signing	✓			✓						✓			
(5) Common fee	✓		✓		✓					✓			
Distribution Channels (Place)													
(1) Showroom interior decoration	✓		✓										
(2) Sales office interior decoration	✓		✓										
(3) Atmosphere in the showroom	✓		✓										
(4) Sales promotion through exhibition booths	✓			✓									
(5) Online Sales Distribution	✓			✓									
Promotion													
(1) Advertising	✓		✓										
(2) Public relation	✓		✓										
(3) Personal Selling	✓		✓										
(4) Direct marketing	✓		✓										
(5) Sales promotion	✓		✓		✓					✓	✓		✓

influential ones, significantly affecting buying. These factors include location, quality of construction, residence design, facilities, and after-sales service. These acquired factors were used in developing the pairwise questions in the questionnaire.

From the information in Table 1, the theoretical research framework was developed as an AHP network, as shown in Figure 1.

2.2 Modified Analytic Hierarchy Process

Many researchers have formerly modified hierarchical analysis to suit their research problems. For example, some have used a Likert Scale instead of a Pairwise scale, such as Tochaiwat & Likitanupak (2012) or Kallas (2011), who conducted their research using the Modified Analytic Hierarchy Process through a Likert scale instead of a pairwise scale. The results suggested that the technique yielded a sequence of factors similar to the pairwise analysis, while the weights of the factors may be somewhat different. However, in this research, another Modified Analytic Hierarchy Process was used. The process was stopped when the weights of the major and minor criteria were obtained without including any alternative in the decision-making process. This is similar to Komchornrit (2021), who studied the location of logistic centers in Northeastern Thailand; Tochaiwat, Likitanupak & Kongsuk (2017) who studied a location selection model for condominium development in Bangkok; Sirithananonsakun (2017), who studied a location selection model for housing estate development in Bangkok; Sirithanyarat (2020), who studied a location selection model for dental clinic businesses; and Tochaiwat, Hankamolsiri & Larpcharoen (2021), who considered the development of a balanced scorecard for real estate development companies.

3. METHODOLOGY

This research adopted a quantitative approach, with data collection being conducted via a quota sampling method among respondents who had experience buying a residence. The sample was divided into different categories of interest: detached houses, semi-detached houses, townhouses, and condominiums. Each type of residence was classified into four price ranges: price not over $91,968, priced at $91,969 – $153,280, priced at $153,281– $306,560, and

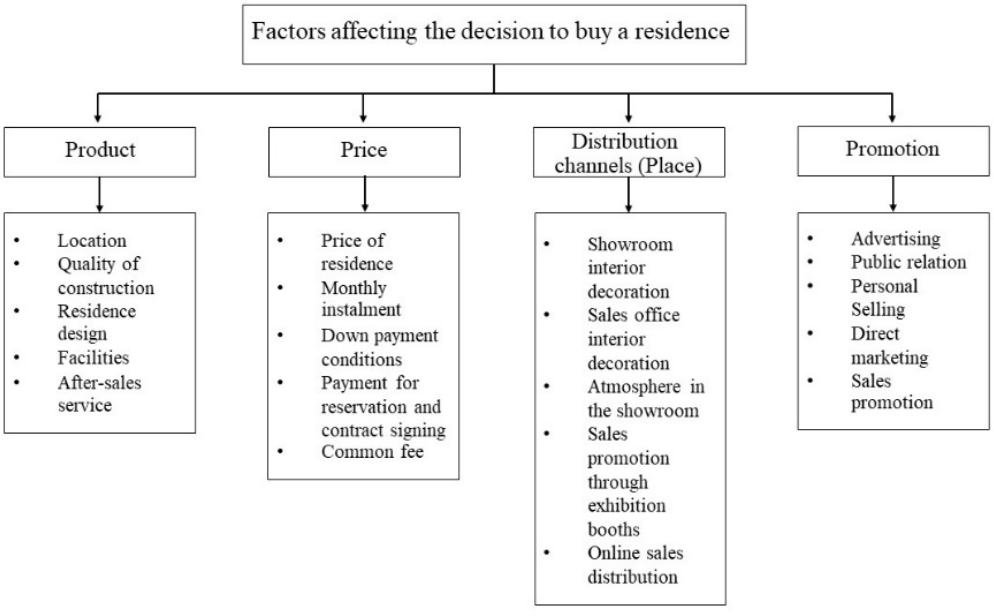


Figure 1 AHP Network for this Research

price over $306,560, totaling 16 residential groups. A sample of 30 data set were collected for each group, totaling 480 responses. It should be noted that the price ranges were converted from Thai Baht to US Dollar using 32.62 Baht/US Dollar (Bank of Thailand, 2021). However, the size of the sample collected for each group was 30 respondents, the smallest sample size suggested by Student (1908).

The tool used for data collection was a questionnaire which asked respondents to compare the effects of each of the main factors and their subfactors in pairs. The questionnaires were developed from the factors acquired from the literature review, with the questionnaires then being examined for content validity. The questionnaires were presented to 3 experts to check each question's Index of Item-Objective Congruence (IOC), which must not be less than 0.5 (Tirakanunt, 2007), before being used to collect data from the respondents. In addition, the questionnaires used AHP pairwise questions, which have scoring criteria as shown in Table 2.

The researchers analyzed the data by applying a Modified Analytic Hierarchy Process as follows:

(1) Comparing the importance of the main factor and sub-factor affecting the decision to buy a residence in pairs. If criterion A influences the decision to buy more than criterion B, the value in cell aAB will be the score as guided in Table 1. On the other hand, if A has less influence than B, the reciprocal of the guided score would be used. For example, if criterion A influences the decision to buy compared to criterion B, the score will be 9. On the other hand, if criterion A has the least influence on the decision to buy compared to criterion B, the score will be 1/9.

(2) Determining the weight of each criterion on the decision to buy by dividing the mean of the scores obtained from step (1) of all respondents by the sum of all values in the same column. Then, find the mean of all values in the same row, as shown in Figure 2.

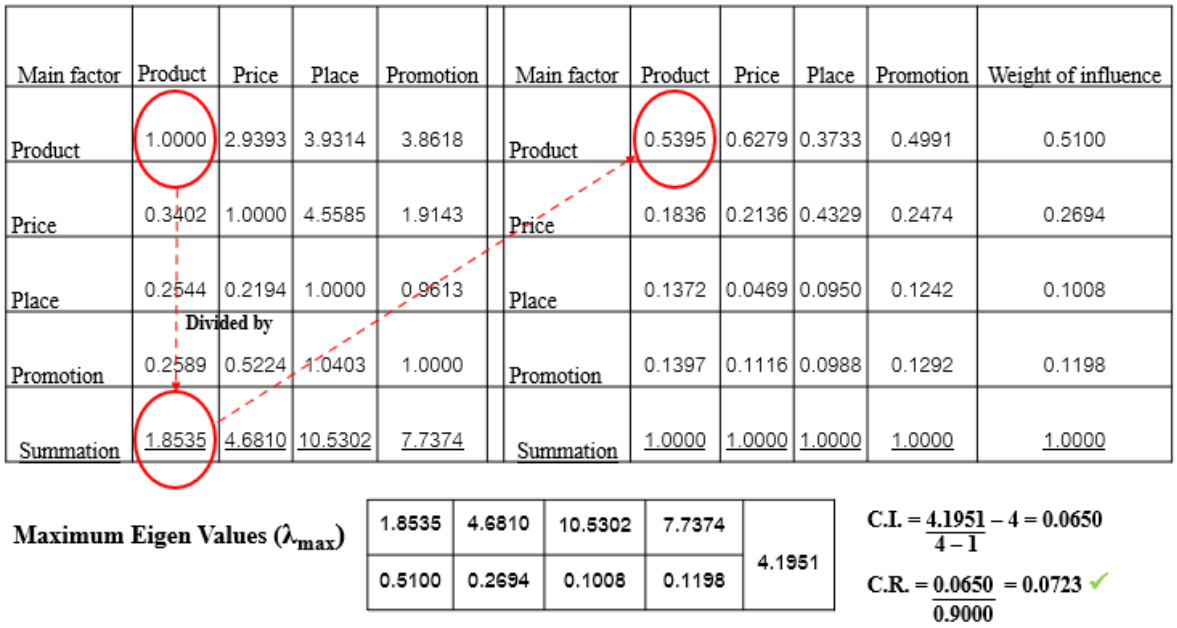
(3) Determining the Consistency Index (C.I.) from the formula C.I. = $(\lambda_{max} - n) / (n - 1)$, when λ_{max} is the Maximum Eigen Value which can be calculated by finding the sum of the multiples between each factor's mean of sum scores, from step (2), and its weight, as shown in Figure 1. It should be noted that n is the value of the number of criteria.

(4) Determining the Consistency Ratio (C.R.) by dividing the Consistency Index, acquired from step (3), by the Random Consistency Index (R.I.). The result C.R. should be at most 0.1000, as suggested by Saaty (1994).

Table 2 Weight of Criterion in Pairwise Comparison

Score	Definition	Description
1	Have the same influence on the decision to buy	Criterion A and Criterion B have equal influence on the decision to buy.
3	Has slightly more or less influence on the decision to buy	Criterion A has slightly more or less influence on the decision to buy than Criterion B.
5	Has moderately more or less influence on the decision to buy	Criterion A has moderately more or less influence on the decision to buy than Criterion B.
7	Has significantly more or less influence on the decision to buy	Criterion A has significantly more or less influence on the decision to buy than Criterion B.
9	Has the most or least influence on the decision to buy	Criterion A has the most or least influence on the decision to buy compared to Criterion B.

Source: Adapted from Saaty (1980)



Main factor	Product	Price	Place	Promotion
Product	1.0000	2.9393	3.9314	3.8618
Price	0.3402	1.0000	4.5585	1.9143
Place	0.2544	0.2194	1.0000	0.9613
Promotion	0.2589	0.5224	1.0403	1.0000
Summation	1.8535	4.6810	10.5302	7.7374

Divided by

Main factor	Product	Price	Place	Promotion	Weight of influence
Product	0.5395	0.6279	0.3733	0.4991	0.5100
Price	0.1836	0.2136	0.4329	0.2474	0.2694
Place	0.1372	0.0469	0.0950	0.1242	0.1008
Promotion	0.1397	0.1116	0.0988	0.1292	0.1198
Summation	1.0000	1.0000	1.0000	1.0000	1.0000

Figure 2 An Example of Data Analysis by the Modified Analytic Hierarchy Process

4. RESEARCH RESULTS

The effect of each factor and its sub-factors are summarized in Table 3. The numbers shown in Table 3 are in percentage form indicating the extent to which that factor or sub-factor contributes to the decision to buy a residence of a particular type and a price range. The main sub-factors, highlighted in grey, were identified by the selection of the sub-factors in descending order until the sum of their weights was not less than 50%.

4.1 The Factors that Affect the Decision to Buy a Detached House

The key factor that has the greatest effect on buying a detached house in all price ranges is the product factor (with 51%-54% effects). Other sub-factors influencing the decision to buy a detached house in all price ranges in Bangkok and its perimeter were found to be project design (10%-14%), construction (10%-13%), after-sales service (9%-20%), and price (8%-9%). In addition, it was also found that the project and residence location also impact the decision to buy a detached house priced up to $306,560 (8%-15%). The common fee was a factor that also affected the decision to buy a detached house priced over $91,968 (8%).

4.2 The Factors that Affect the Decision to Buy a Semi-Detached House

The product factor has the key and greatest effect (46%-53%) on the decision to buy a semi-detached house in all price ranges, with the price factor as the secondarily important factor influencing the decision to buy a residence, precisely a semi-detached house in all price ranges, except for those of the $153,281 – $306,560 price level (20%-29%). Other sub-factors that also impacted the decision to buy a semi-detached house in all price ranges included the project design (12%-14%), construction (9%-12%), after-sales service (7%-14%), and price (7%-9%). In addition, the findings also suggested that: (1) the project and residence location is one of the factors influencing the decision to buy a semi-detached house in all price ranges lower than $153,280 in Bangkok and its perimeter (8%-16%); (2) the design/management of the common area was also a factor affecting the decision to buy a semi-detached house in the price ranges over $153,280 (7%); (3) the common fee was also shown to have an effect

Table 3 Percentages of the Effects on the Decision to Buy a Residence for Each Factor and Sub-Factor

Residence type	Price ranges (Million baht)	Main factors				Sub-factors of product					Sub-factors of price					Sub-factors of place						Sub-factors of promotion			
		Product	Price	Distribution channel	Marketing promotion	Project and residence location	Building design	Construction quality	Design/management of the	After-sales service	Price	Common fee	Down payment	Monthly installment	Payment for reservation and contract signing	Showroom interior decoration	Sales office interior decoration	The atmosphere in the	Sales distribution through off-site booths	Online sales distribution	Advertising	Press release and public	Sales by salespersons	Direct marketing	Sales promotion
Detached house	Not over $91,968	51	27	10	12	15	13	10	4	9	9	7	6	3	2	2	2	2	2	2	2	3	2	1	4
	$91,969 - $153,280	53	27	9	11	10	14	13	6	10	8	8	5	4	2	2	2	2	2	1	2	2	2	1	4
	$153,281 - $306,560	54	26	9	11	8	13	13	7	13	8	8	5	3	2	2	2	2	2	1	2	2	2	1	4
	Over $306,561	53	27	10	10	6	10	10	7	20	8	8	5	4	2	3	2	2	2	1	1	2	2	1	4
Semi-detached house	Not over $91,968	49	20	7	24	16	12	9	5	7	7	5	4	2	2	2	2	1	1	1	4	5	5	2	8
	$91,969 - $153,280	47	29	11	13	8	12	11	6	10	9	8	6	4	2	5	2	2	2	2	2	2	2	2	5
	$153,281 - $306,560	53	25	10	12	6	14	12	7	14	8	7	5	3	2	3	2	2	2	1	2	2	2	1	5
	Over $306,561	46	22	16	16	4	14	11	7	10	7	6	4	3	2	5	3	3	3	2	3	4	2	2	5
Townhouse	Not over $91,968	46	22	8	24	14	11	9	5	7	7	6	5	2	2	2	2	2	1	1	4	5	5	2	8
	$91,969 - $153,280	48	29	11	12	8	12	12	7	9	10	8	6	3	2	3	2	2	2	2	2	2	2	1	5
	$153,281 - $306,560	44	25	14	17	4	11	11	6	12	8	7	5	3	2	4	3	3	2	2	3	3	3	2	6
	Over $306,561	40	22	20	18	4	11	10	6	9	7	6	4	3	2	6	4	4	3	3	3	4	3	2	6
Condominium	Not over $91,968	44	24	8	24	15	11	8	5	6	7	6	6	3	2	2	2	2	1	1	4	5	5	3	7
	$91,969 - $153,280	49	31	10	10	7	11	12	7	2	10	9	6	4	2	3	2	2	1	2	1	2	2	1	4
	$153,281 - $306,560	40	27	15	18	5	10	10	5	10	9	7	5	4	2	5	3	3	2	2	2	4	3	2	7
	Over $306,561	37	30	16	17	4	9	10	5	9	10	8	6	4	2	5	3	3	3	2	2	4	3	2	6

Remark: The highlighted cells show the main factors and sub-factors that contribute to 50% of weight

on the decision to buy a semi-detached house in the price ranges over $91,968 (6%-8%); while (4) sales promotion also had an impact on the decision to buy a semi-detached house in the price ranges lower than $91,968 (8%).

4.3 The Factors that Affect the Decision to Buy a Townhouse in Bangkok and the Perimeter

The product factor has the greatest effect on buying a townhouse in all price ranges (40%-48%), with the price factor as the secondarily most important factor influencing the decision to buy a townhouse in price ranges over $91,968 (22%-29%). The marketing promotion factor is the next key factor affecting the decision to buy a townhouse in price ranges over $91,968 (24%). Other sub-factors that impact the decision to buy a townhouse in all price ranges include project design (11%-12%), construction (9%-12%), after-sales service (7%-12%), and price. In addition, it was also found that: (1) the project and residence location was amongst the sub-factors influencing the decision to buy a townhouse in price ranges lower than $153,280 (8%-14%); (2) the design and management of the common area was also a factor that affects the decision to buy a townhouse in the price ranges over $153,280 (6%); (3) the common fee affects the decision to buy a townhouse in price ranges over $91,968 (6%-8%); (4) showroom interior decoration also had an impact on the decision to buy a townhouse in price ranges over $306,560 (6%); and (5) the sales promotion also affected the decision to buy a townhouse in the price range of lower than $91,968 (6%-8%).

4.4 The Factors that Affect the Decision to Buy a Condominium in Bangkok and Its Perimeter

The product factor also has the greatest effect on the decision to buy a condominium in all price ranges (37%-49%), with the price factor as the secondarily most important factor (24%-31%). However, for condominiums priced lower than $91,968, the sales promotion factor was also as important as the price factor (24%, the same weight of importance). Other sub-factors that also impact the decision to buy a condominium in all price ranges include the project design (9%-11%), construction (8%-12%), price (7%-10%), and the common fee (6%-9%). In addition, the findings also suggested that: (1) the project and residence location is also amongst the sub-factors that influence the decision to buy a condominium in price ranges lower than $153,280 (7%-15%); (2) The design and management of the common area is also a factor that affects the decision to buy a condominium in the price range of $91,969 - $153,280 (7%); (3) the after-sales service also has an effect on the decision to buy a condominium in almost all price ranges, except for condominiums priced at $91,969 - $153,280 (6%-10%); (4) the required down payment also has an impact on the decision to buy a condominium in the price ranges of lower than $91,968 and over $306,560 (6%); and (5) sales promotions also affect the decision to buy a condominium in almost the all price ranges except for condominiums priced at $91,969 - $153,280 (6%-7%).

5. DISCUSSION

5.1 Conclusion

This research used the Modified Analytic Hierarchy Process to measure the factors influencing the decision to buy a residence. From the research results, the product factor, i.e., project and residence location, building design, construction, after-sales service, and design and management of common areas, respectively, is the main and the most influential in the decision to buy a residence. This matches the findings of Sirithap (2018), Srisook (2016), Tseng (2014), and Tanaviboonchai (2016). In addition, the price factor, especially the selling price and common fee, is another main factor and the second most influential factor for all residence types. Meanwhile, several research works, i.e., Sirithap (2018), Ingkhanisarn

(2016), Kumar & Khandelwal (2018), and Thaker & Sakaran (2016), ranked the price factor as the most important factor. The research results show the weights of all factors and sub-factors, which are important, providing objective information for project developers to design their projects to match these influences in response to consumer demands, resulting in greater success in the long run.

For further study, it is highly recommended to compare the results with a few robustness analyses such as ANN, Composite-based SEM, or ANP. The results from such robustness analyses will generate a possible range of weights. Researchers can then determine optimal weights based on different methods.

5.2 Theoretical Contribution

The application of the Modified Analytic Hierarchy Process provides weight values of the factors that are standardized or normalized to 100% for all factors and all sub-factors throughout a model. The results provide information which enables decision-makers to compare the importance of each factor or subfactor to the others, emphasizing a clear set of factors and subfactors that should be focused on.

For this research, the acquired Modified AHP model shows the factors and subfactors which effectively stimulate the decision to purchase a residence in a particular type and a price level. From the weights of all factors and sub-factors acquired from the Modified Analytic Hierarchy Process. The research results showed that:

(1) The key and primary factor that affects the decision to buy a residence in Bangkok and its perimeter for all types of residences and price ranges is the product factor since the product is the essence that represents the value and benefit that the consumers will receive. This finding is consistent with Ingkhanisarn's (2016) statement that physical factors are most important to townhouse buyers. Tseng (2014) identified several product factors that are important to real estate decisions to buy of all types and price ranges, namely location, construction quality, after-sales service, residential unit design, residential unit area, and function.

(2) One secondarily important factor is the price factor, affecting the decision to buy a residence in the categories of semi-detached house, townhouse, and condominium in Bangkok and its perimeter in almost all price ranges. This finding is consistent with several prior studies, such as Ingkhanisarn (2016) and Kumar & Khandelwal (2018). In contrast, Thaker & Sakaran (2016) found that price was the first factor of importance, with a weight of 23.30%. In addition, Tseng (2014) found that price had a high level of influence on the decision to buy a residence.

The price factor is significant because it is what the consumer must pay to obtain the value and benefit they will receive. In housing categories with a limited land size, such as condominiums, townhouses, and semi-detached houses, buyers are much more sensitive to price increases. They are more concerned with price factors than single-detached house buyers.

Other than value for money, the price sub-factors that affect the decision to buy for all types of residences in all price ranges, are the size of the down payment, the size of monthly installments, and the presence of low-interest rate loan services with quick loan approval and a high credit limit.

(3) Another secondarily important factor is the marketing promotion factor, following the product factor in its affect on the decision to buy a residence in the categories of townhouse and condominium with prices not over $91,968 in Bangkok and its perimeter. The reason is that in this market segment, some buyers purchase for investment and speculation purposes, which are different from those in single and semi-detached house segments that often reflect the real demand. Therefore, receiving marketing promotions, especially sales promotions, will result in greater investment yields. This finding is consistent with Tseng

(2014), who proposed that marketing promotion significantly influences the decision to buy a residence.

(4) The building design, construction quality, after-sales service, and price are all minor sub-factors that affect the decision to buy a residence in all types and price ranges, except for condominiums priced at $91,969 - $152,280 in Bangkok and its perimeter under the after-sales service sub-factor. This is because building design is a sub-factor that can respond to consumers' living behavior. The construction quality and after-sales service are the sub-factors that involve the quality of construction in terms of both beauty and stability. Consumers must pay the selling price to obtain the value and benefit. Several prior studies support these findings. Tseng (2014) stated that construction quality is one of the highest priority factors for single-detached and semi-detached houses, while design, after-sales service, and price are high priority factors. Kumar & Khandelwal (2018) found that construction quality is the second most important factor after price, while Tseng (2014) proposed that it is the second factor after location. Rungruangphon (2020) stated that different design concepts are an effective selling point for a residential project. Moreover, Thaker & Sakaran (2016) concluded that structure and home amenities are important, with 12.60 and 10.60 percent of the weight, respectively.

(5) The project and the residence location are sub-factors affecting the decision to buy in lower-price categories, which are lower than $153,280, in Bangkok and its perimeter. A good project location usually provides easy access to transportation, such as being close to public transportation or main roads, saving consumers many travel expenses. Moreover, the buyers of low-price residences tend to use more public transportation and have lower levels of private car use. Several works of literature stated that location is one of the top-three factors influencing the decision to buy a residence (Kumar & Khandelwal, 2018; Rungruangphon, 2020; Larpcharoen, 2020; Thaker & Sakaran, 2016; Tseng, 2014). Furthermore, Thaker & Sakaran (2016) also stated that location has a weighting of 14.30 percent in the decision to buy, in line with Tseng (2014), who found that location has the highest level of influence.

It was found that the higher the price of a residence, the less important the location. On the contrary, the project design, construction, after-sales service, and common fee will become greater concerns. This is because most consumers who desire to buy a residence in the upper-end segments are more willing to pay for a unit with a higher price in order to possess a residence with a distinctive design of high construction quality and provision of good after-sales service without concern of the location since this customer group can easily purchase vehicles for convenient commuting. However, properties with higher prices usually occupy more usable space. This results in higher common fees that owners must pay in the long run. Therefore, it is more beneficial if the developers can lower the common fee.

(6) The common fee is one of the sub-factors that affects the decision to buy a residence in the high-price category, which is more than $153,280, in Bangkok and its perimeter. Common fees are continuing expenses, which consumers must pay for the juristic person to manage common areas, generating a long-term burden the consumers' must bear. The common fee is usually calculated from the fee rate multiplied by the area of the unit. Since high-priced residences tend to occupy more space than those of lower prices, the owners of higher-priced residences must pay a greater common fee. In addition, in projects with high price levels, common areas are more diverse and have more comprehensive ranges of common area costs than in low-price projects.

The results of this study are in line with the research of Singharattanakorn & Chaiyasoonthorn (2018), which found that townhouse project developers should focus

on choosing durable construction materials, setting the selling price to suit the size and the location of the project and having a juristic person to act on the common administration. The results also match the research of Sirithap (2018), which found that project owners should focus on attracting consumers by exempting the common fee for some time. Meanwhile, research by Tseng (2014), found that the two most important factors affecting the decision to buy a residence at the highest level, are location and construction quality, while there are two other factors with a high-level affect on customers' decisions to buy a residence, namely price and usable area. The analysis of the factors in the decision to buy different types of real estate in each price range reflects the key factors of real estate business operations, namely the location and construction quality. This research is also consistent with that of Kumar and Khandelwal (2018), which found that the price factor, specifically the price level, is of the most significant importance to homebuyers, while the quality of the residence, location, and proximity of facilities also influence purchasing decisions. The research of Singh, Gupta & Dash (2018) also suggested that strength and design affect apartment tenants, while research by Thaker & Sakaran (2016) found that price was the most important factor for buyers, followed by facilities, location, stability, and the excellent reputation of entrepreneurs.

5.3 Practical Implications

Residential project developers can apply the obtained knowledge to formulate marketing strategies to present and deliver value to consumers to make them feel that the proposed residence is worthwhile. House developers should especially focus on the product attributes, i.e., the location, house design, and related services, such as construction quality management and after-sales service processes. However, other research has shown that there should be focus not only on the said product and service attributes but also the price and common fee of their projects. Examples of such competitive marketing strategies are choosing land located near main roads and job sites to develop projects (Sirithananonsakun, 2017; Tochaiwat, Likitanupak, & Kongsuk, 2017), different home design (Rungruangphon, 2020; Larpcharoen, 2020), designing the living space of the house to perfectly suit the living behavior (Rungruangphon, 2020; Larpcharoen, 2020; Srisook, 2016; Thirasophon, 2015), providing a usable house area greater than competitors' projects of similar prices and providing extra usable space such as a working room or a family activity area (Rungruangphon, 2020; Larpcharoen, 2020; Tochaiwat, 2020). Research also includes information on construction with durable materials of strong and high quality, after-sales service that focuses on speed and quality of repair work (Tanaviboonchai, 2016; Rungruangphon, 2020; Tochaiwat, 2020), village administration with a low common fee, the provision of low-interest loans, setting the selling price by emphasizing the value for money concerning the products and services received by customers (Tochaiwat, 2020).

In addition, the research also found concerns in down-payment for condominium buyers and sales promotions for townhouses, condominiums, and low-priced semi-detached house buyers. These findings also informed the residential project developers of the importance of a small down payment in satisfying condominium investors and speculators and the suitable selection of good sales promotion campaigns to stimulate buyers' decisions to buy residences.

5.4 Limitations

Finally, this research has some limitations that should be noted. Firstly, the research needed to study the forms of residences that satisfy the buyers' demands for each residential type and price range. Real estate developers or designers can find the required forms of residences for each factor or

subfactor from other literature, such as those shown in Table 1. Secondly, the research did not study the scoring criteria for the factors or subfactors, as illustrated in Larpcharoen et al. (2022), that can prompt the model users to evaluate the project more objectively. Furthermore, the research studied only the income of buyers and the marketing mix of real estate developers as the factors affecting the buyer's decision to buy a residence.

For further studies, the interested researchers may study the forms of residences for each type and price range as well as the scoring criteria for the model. These studies will give developers or designers a geater understanding of the buyers' demands. Moreover, interested researchers may try other techniques that can determine the weights for multi-criteria decision-making, such as Fuzzy Set Qualitative Comparative Analysis, Composite-based Structural Equation Modelling (Composite-based SEM), Artificial Neural Network (ANN), or Analytic Network Process (ANP), especially Composite-based SEM which can standardize or normalize the weights to 100% for all factors and sub-factors throughout a model, comparing the results with this research. Finally, other factors, e.g., buyer's lifestyle, perception, attitude, personality, values and beliefs, that affect the buyer's decision to buy a residence, may be added to further studies in order to enhance the level of understanding of buyers' behavior.

6. ACKNOWLEDGEMENTS

This work was supported by Thammasat University Research Unit in Project Development and Innovation in Real Estate Business, Thammasat University.

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