

CLASSIFICATION OF HOUSE LANDSCAPE ELEMENTS BY THE BUYERS' NEEDS ACCORDING TO THE KANO MODEL

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ABSTRACT

This research studied an approach in the classification of house landscape elements of detached houses in housing projects in the Bangkok Metropolitan Region in order to better understand buyers' needs. The Kano Model Classification was used to analyze 3 categories of house landscape elements: (1) must-be quality (2) one-dimensional and (3) attractive elements. In this quantitative research, 202 buyers selected through quota sampling were requested to answer a questionnaire. The research results enable property developers or designers to profoundly understand the buyers' needs and to apply this understanding as a guideline in designing the house landscape elements to answer the buyers' needs within limited budgets to ensure the housing projects' success.

Disciplinary: Multidisciplinary (Real Estate Business, Customer Behaviors, Landscape Architecture).

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1. INTRODUCTION

Detached houses are desirable as family homes because they offer complete privacy, utility space, and outside space for activities such as gardening, outdoor activities, family entertainment, parking, etc. [1]. At present, the urban area has been greatly expanded, particularly in the Bangkok Metropolitan Region. Hence, despite the needs for detached houses, new housing projects are rare and most detached houses are expensive. It is, therefore, challenging for housing project entrepreneurs in the detached house market to develop their projects to respond to the needs within reasonable budgets, so that the houses are not too expensive.

For the reasons stated above, designing appropriate house elements, including landscape elements, to meet the buyers' needs at various price ranges is used by various entrepreneurs as a

strategy for creating selling points. Nowadays, house landscape design, especially garden design, is quite popular, requiring considerable budgets, to prevent possible mistakes, to ensure quality house landscape layout, and to enhance the residents' quality of life, etc. Therefore, a study on consumers' needs is required and the specification of details must be done appropriately and efficiently [2].

The Kano Model is an analysis method to determine appropriate qualities for products and qualities to suit different groups of consumers, based on the assumption that different groups of consumers desire different qualities in the same products they need. Certain qualities are essential; some will make the products attractive and remarkable and will persuade consumers' decisions and ensure greater satisfaction. On the other hand, some elements may cause dissatisfaction [3, 4].

Therefore, this study focuses on the classification of house landscape elements of detached houses in housing projects from the buyers' perspectives according to the Kano Model to provide guidelines in designing house landscape elements of detached houses in housing projects and creating greater satisfaction for the buyers.

2. OBJECTIVES AND SCOPE OF RESEARCH

2.1 RESEARCH OBJECTIVES

The objectives of this research were to analyze the classification of house landscape elements of detached houses in housing projects from the buyers' perspectives according to the Kano Model and to present guidelines in designing house landscape elements of detached houses in housing projects and creating greater satisfaction for the buyers.

2.2 SCOPE OF STUDY

This research studies the classification approach and design specification of house landscape elements of detached houses in housing projects in the Bangkok Metropolitan Region in 4 price ranges: (1) under 3 million baht (\$100,000) (2) 3.01-5.00 million baht (\$100,000-166,500) (3) 5.01-10.00 million baht (\$166,500-333,000) and (4) over 10.00 million baht (\$333,000). (the currency exchange rate in March 2018 was about 31Baht/1 US dollar [5]).

3. LITERATURE REVIEW

The researcher has reviewed the literature on relevant theories and research studies, including theories related to factors in the choice of residence, house landscape elements, priority in the systematic product development according to the Kano Model, and concepts on the determination of price ranges of detached houses in housing projects.

3.1 FACTORS IN CHOICE OF RESIDENCE

The literature review reveals that individuals' choices of residents depend on two factors; that are, (1) internal factors such as the buyers' or residents' income, age and family size, etc. and (2) external factors or physical properties of the residence such as the surroundings, accessibility, and security. The two types of factors are related and both are taken into consideration. The internal factors that influence the choice of residence are the prices, types of residence, designs of residence, i.e. architectural design, interior design, and house landscape design. On the other hand, the external

factors that influence the choice of residence or physical properties of the residence are the positive surroundings (attractiveness and cleanliness, etc.), accessibility, good infrastructure, social and cultural conditions [6, 7, 8].

3.2 HOUSE LANDSCAPE ELEMENTS

House landscape elements are a set of physical properties or external factors that influence the buyers' choice of residence. House landscape elements are various and can be divided into two main categories: softscape and hardscape. The researcher has reviewed relevant academic papers, reports, and documents regarding landscape elements and can summarize important landscape elements in different contexts, as demonstrated in Table 1.

Table 1: Landscape Elements in the Garden.

Elements / Sources	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]
1. Surrounding Elements									
1.1 Fences	√	√	√	√	√	√	√	√	
1.2 Entrance Gate, Porch	√	√	√		√	√	√	√	
1.3 Shelter or Arbor	√	√	√	√	√	√	√	√	√
1.4 Partition	√	√	√	√	√	√	√	√	
2. Surface and Paths									
2.1 Terraces	√	√	√	√	√	√	√	√	√
2.2 Paths	√	√	√	√	√	√	√	√	√
2.3 Parking	√	√	√		√	√		√	
2.4 Courtyard	√	√	√	√	√	√	√	√	√
3. Aquatic Elements									
3.1 Ponds/Fish Ponds	√	√	√		√		√	√	√
3.2 Waterfalls/Waterfall Walls	√		√		√	√	√	√	√
3.3 Overflow Pots / Lily Pots		√	√		√			√	√
3.4 Fountains		√	√		√	√	√	√	
3.5 Swimming Pool	√	√	√		√	√	√	√	√
4. Garden Furniture									
4.1 Pavilions	√				√	√	√	√	√
4.2 Garden Set	√	√	√	√	√	√	√	√	√
4.3 Benches	√	√	√	√	√	√	√	√	√
4.4 Swings		√	√			√		√	√
4.5 Poolside Beds	√	√	√					√	
4.6 Children's Toys			√				√	√	
4.7 Shelves			√				√	√	
5. Lamps and Lighting									
Lamps and Lighting	√	√	√	√	√	√	√	√	√
6. Other Garden Decoration									
6.1 Statues, Stuccos, Relief Sculptures	√	√	√		√	√	√	√	√
6.2 Bird Houses								√	
6.3 Flower Pots, Plant Pots		√			√	√	√	√	√
6.4 Earthen Jars						√			√
6.5 Firepits	√	√				√			
7. Plants									
7.1 Trees	√	√	√	√	√	√	√	√	√
7.2 Bushes	√	√	√	√	√	√	√	√	√
7.3 Climbers	√	√	√	√	√	√	√	√	√
7.4 Ground Cover Plants	√	√	√	√	√	√	√	√	√
7.5 Aquatic Plants		√	√		√		√	√	√

Based on the literature review summarized in Table 1, this research focuses on the relationship between the price ranges of detached houses and the physical properties of the residence, particularly in the aspect of designing house landscape elements to suit the residents' needs. These elements are divided into 7 categories: surroundings, surface and paths, aquatic elements, garden furniture, lamps and lighting, plants, and other elements in the garden.

3.3 KANO MODEL

The Kano Model was invented in 1984 by Dr. Noriaki Kano, a university lecturer, and consultant in an international organization. In 1997, he was awarded the Deming Prize for the concept of "Attractive Quality Creation", referred to as the Kano Model. Dr. Kano's concept challenges traditional ideas that consumers' product satisfaction is based on the "more is better" approach, whereby certain qualities or elements of the products do not relate to customers' satisfaction. That is, an increase in certain qualities may result in less satisfaction) [3, 4]. Kano puts product satisfaction into five categories: (1) attractive quality, (2) one-dimensional quality, (3) must-be quality, (4) reverse quality, and (5) indifferent of quality, as illustrated in Figure 1.

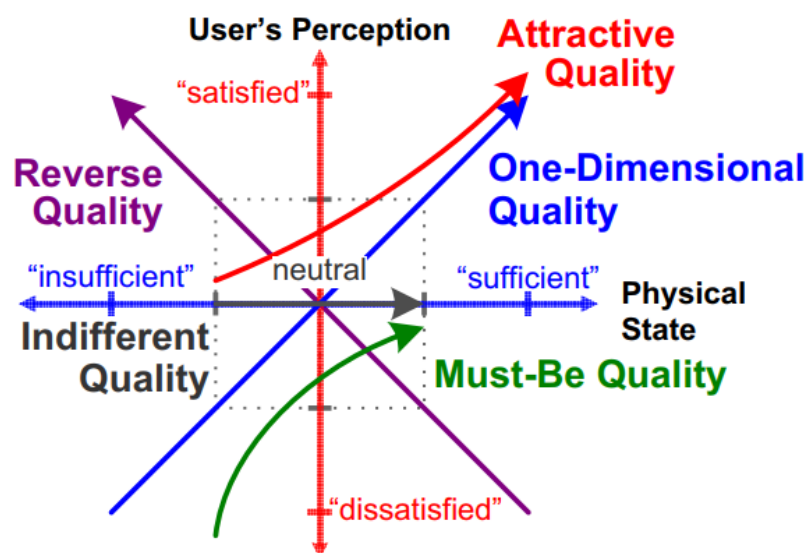


Figure 1: Five Categories of Customers' Satisfaction (after [4]).

However, three important qualities are (1) attractive quality –This is a unique quality which customers may not explicitly desire if not stated in a questionnaire. Without this quality, they may feel neutral, but when fulfilled it will create great satisfaction; (2) one-dimensional quality – This is an extra attribute. Mostly they are qualities requested by customers such as colors and extra durability, without which the customers will be greatly dissatisfied; (3) must-be quality – Customers expect the products to have this quality, such as bedrooms in houses. Without this quality, the customers will be greatly dissatisfied, but feel neutral when it is present [18].

The Kano Model is useful in developing products and services, particularly in developing detached housing projects to have fulfilling properties and qualities that provide customers with deep satisfaction. The model can be applied to this research in order to determine one-dimensional house landscape elements and attractive elements in detached houses in housing projects at different price ranges, to serve as a further guideline for product development to appropriately respond to the customer's needs.

4. METHOD

4.1 DATA COLLECTION

This research collected data from a questionnaire survey among 202 respondents who are interested in buying and residing in detached houses in housing projects in the Bangkok Metropolitan Region (see Figure 2). The survey was done during February-April 2018. Quota sampling was employed and the survey results were analyzed using the Kano Model.

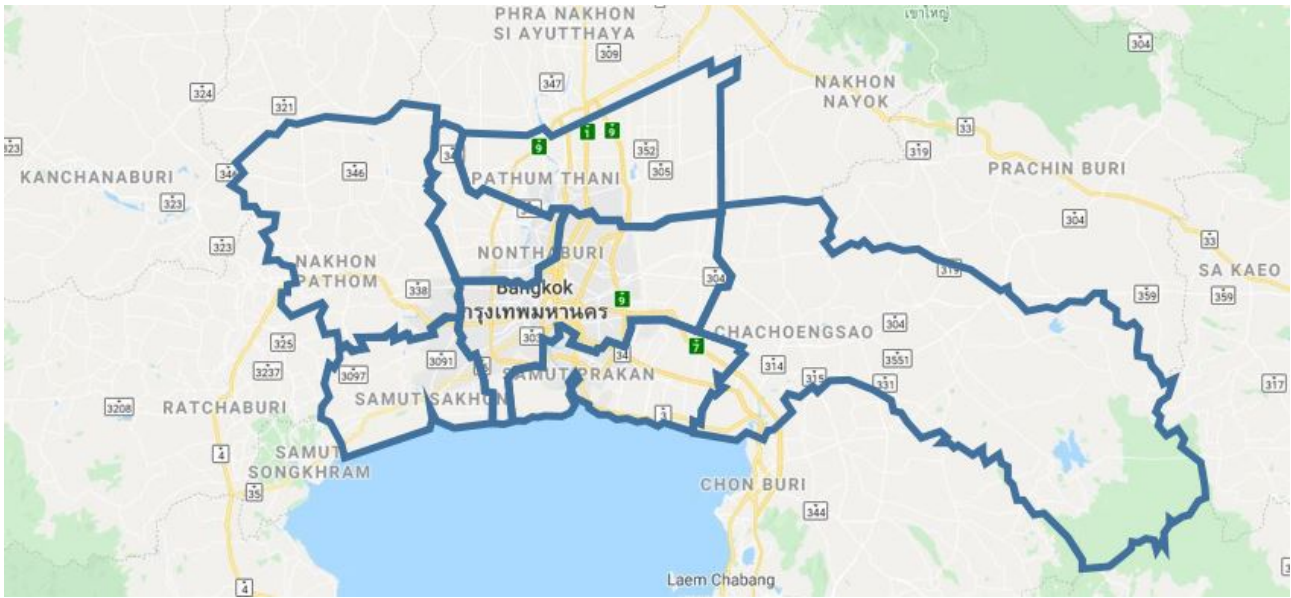


Figure 2: Bangkok Metropolitan Map Housing Projects (Modified Photo, Courtesy of Google Maps).

4.2 KANO MODEL ANALYSIS

Based on Kano's concept (Figure 1), the data obtained from the questionnaire survey on needs for various qualities of products and services, conducted with target customers, can be presented in Table 2. The satisfaction is divided into 5 levels: like, expect, neutral, accept, and dislike.

Table 2: Data from Questionnaire and Analysis. [19]

Customer Requirement		Dysfunctional				
		Like	Expect	Neutral	Accept	Dislike
Functional	Like	Q	A	A	A	O
	Expect	R	I	I	I	M
	Neutral	R	I	I	I	M
	Accept	R	I	I	I	M
	Dislike	R	R	R	R	Q

Whereby,

A (Attractive) is a quality that attracts and impresses customers.

O (One-dimensional) is the quality that customers desire.

M (Must-be) is the quality that customers expect the project to have.

Q (Questionable) is a quality that needs to be questioned.

R (Reverse) is a quality that customers do not desire.

I (Indifferent) is the quality of which customers feel neutral.

The values (A, O, M, Q, R, and I) are obtained from each of the questionnaire items and analyzed for satisfaction (Satisfaction: CS+) and dissatisfaction (Dissatisfaction: CS-) coefficients using the Equations (1) and (2) [19]. The values obtained ranged from 0-1, where the dissatisfaction levels are in negative numbers.

$$\text{Satisfaction (CS +)} = \frac{(A+O)}{(A+O+M+I)} \quad (1),$$

$$\text{Dissatisfaction (CS -)} = \frac{(O+M)}{(A+O+M+I) \cdot (-1)} \quad (2).$$

The calculated values are plotted in a graph and can be divided into five groups, see Figure 3.

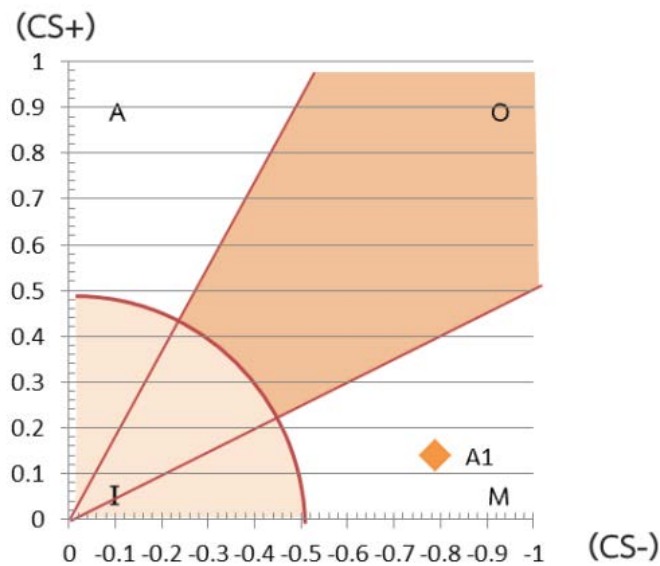


Figure 3: A Kano Classification (after [20, 21]).

The results demonstrate which qualities or elements are desirable for buyers. Remarkable are 3 types of qualities: A (Attractive – a quality which attracts and impresses customers), O (One-dimensional – a quality which interests customers) and M (Must-be – a quality that customers expect) because they can be used to specify guidelines for house landscape element design for customers.

5. RESULT AND DISCUSSION

The questionnaire data from the target group survey were divided into 4 groups according to the price ranges, and the satisfactory coefficients were calculated. Based on the Kano Model, the classification of house landscape elements can be presented as in Table 3.

From the survey of satisfaction with landscape elements in houses under three million baht (\$100,000), the must-be element (M) that the buyers expect is a parking space. The reason may be that nowadays people own more cars and parking spaces in the residence are deemed essential. Without this feature, the buyers will be dissatisfied while they will be neutral when it is present. The attractive elements (A) in houses in this price range are fish ponds, waterfalls, and fountains. These are superfluous to basic functions and can be placed in small spaces. Other elements are considered indifferent quality (I).

Table 3: House Landscape Elements according to the Kano Model.

House Landscape Elements	< 3.00 MB (<\$100,000) (n=36)	3.01-5.00 MB (\$100,000-166,500) (n=74)	5.01-10.00 MB (\$166,500-333,000) (n=50)	>10 MB (>\$333,000) (n=42)
1. Surrounding Elements				
1.1 Shelter or Arbor (A1)	I	I	I	I
1.2 Walls or Garden Partitions (A2)	I	I	I	I
2. Surface and Paths				
2.1 Terraces (B1)	I	I	I	M
2.2 Paths (B2)	I	O	O	O
2.3 Parking (B3)	M	M	M	M
2.4 Courtyard (B4)	I	I	I	A
3. Aquatic Elements				
3.1 Ponds/ Fish Ponds (C1)	A	I	I	I
3.2 Waterfalls/ Waterfall Walls (C2)	A	I	A	I
3.3 Overflow Pots / Lily Ponds (C3)	I	I	A	I
3.4 Fountains (C4)	A	I	A	I
3.5 Swimming Pool (C5)	I	I	A	I
4. Garden Furniture				
4.1 Pavilions (D1)	I	I	A	A
4.2 Garden Set (D2)	I	I	I	A
4.3 Benches (D3)	I	I	I	A
4.4 Swings (D4)	I	I	I	I
4.5 Poolside Beds (D5)	I	I	I	I
4.6 Children's Toys (D6)	I	I	I	I
4.7 Shelves (D7)	I	I	I	I
5. Lamps and Lighting				
5.1 Lamps and Lighting (E1)	I	M	M	M
6. Other Garden Decoration				
6.1 Statues, Stuccos, Relief Sculptures (F1)	I	I	I	I
6.2 Flower Pots, Plant Pots (F2)	I	I	I	I
7. Plants				
7.1 Trees (G1)	I	I	I	O
7.2 Bushes (G2)	I	I	I	M
7.3 Climbers (G3)	I	I	I	I
7.4 Ground Cover Plants (G4)	I	I	I	M
7.5 Aquatic Plants (G5)	I	I	I	I

Note: The fences and doors are considered necessary elements as they are required for the sake of security.

For detached houses in the 3.01-5.00 million baht (\$100,000-166,500) price range, the study shows that the must-be elements are parking, and lamps and lighting, generally required to fulfill the needs for security. Elements that can be omitted because they do not significantly influence the buyers' decisions are garden furniture and plants, for instance.

In the 5.01-10.00 million baht (\$166,500-333,000) price range, most houses have more space. The must-be elements are parking, and lamps, and lighting. The attractive elements are aquatic elements such as waterfalls or waterfall walls, overflow pots or lily ponds, fountains, swimming

pools, and garden furniture in the form of pavilions. Because of the extra space, more features to enhance comfort and aesthetics are required.

For houses over 10 million baht (\$333,000), customers have higher expectations than other price ranges. Because of the higher price, attractive elements are unique and not present in the lower price ranges, and they tend to occupy a lot of space, such as a courtyard, pavilions, garden set, benches, etc.

Overall, in houses of all price ranges, most must-be elements (that deemed must-be in at least 3 price ranges) are parking space, lamp, and lightings. Attractive elements in detached houses in each price range differ significantly. For example, in houses in the over 5 million baht (\$166,500) range garden furniture, particularly pavilions, garden sets, and benches can attract customers while garden furniture in other price ranges are considered indifferent quality or even reverse when functional.

Property developers or designers can apply this research to determine house landscape design for houses in each price range, choosing house landscape elements in each category (Table 3) based on the following guidelines.

- 1) First, choose all the must-be elements because customers expect them in the houses and will be dissatisfied if they are not functional. At this stage, elements necessary for security need to be considered although they do not affect the customers' needs.
- 2) Choose some attractive elements to create selling points for the houses, but it is not necessary to choose all elements from this category because the customers do not expect them. But when present, they create a good impression and encourage customers' buying decisions.
- 3) Choose one-dimensional elements based on the remaining budgets because these elements are related to the customers' satisfaction.

As an example, in designing the landscape of detached houses in the 5.01-10.00 million baht (\$166,500-330,000) price range, the designers should choose parking, lamps, and lighting system, which are must-be elements, including fences and doors which are required for security. After that, they should choose 1 or 2 attractive elements which may be pavilions or aquatic elements such as waterfalls, overflow pots, fountains, or swimming pools. Then, choose to construct paths to the elements in the garden, considering materials and lengths appropriate to functions and remaining budgets, along with aesthetics.

6. CONCLUSION

The study shows that applying the Kano Model in the analysis and classification of landscape elements in detached houses reveals how detached houses in the same price range but with different house landscape elements affect the buyers' decision. Moreover, for detached houses in different price ranges, customers have different expectations and attraction towards different house landscape elements. In designing detached house projects, these data can be used in determining product patterns to suit the buyers' needs, apart from the consideration of projects' concepts, price ranges, and budgets.

The researcher suggests expanding the study in other regions to obtain diverse data and analyses to determine whether and how the elements in different price ranges in each region differ. These data can support planning or designing detached housing projects in other regions of the country. Finally, some research limitations shall be discussed. Firstly, demographic factors theoretically affect the needs of the customers. However, because there may be more than one target group of customers for

a housing project. This research focused on the relationship between the housing projects' main characteristics, e.g. the prices of houses in projects, and the landscape elements that satisfied the house buyers' needs (in overall) to give developers the guidelines on how to effectively allocate their budgets in developing house landscape elements. Secondly, this study was done based on the projects with the general surrounding of Bangkok Metropolitan. For the projects affected with special surroundings, such as the projects located near a highway, or in the hilly terrain, or near river terrain, the results of the study shall be used with special concern.

7. AVAILABILITY OF DATA AND MATERIAL

Data can be made available by contacting the corresponding author.

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