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## Valuing the Attribute Enhancements of Urban Park: A Case of the King Rama IX International Mangrove Botanical Garden, Thailand

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### ABSTRACT

The King Rama IX International Mangrove Botanical Garden (The King Rama IX-IMBG), Thailand provides a bundle of benefits, including a source for exchanging knowledge on mangrove forests and recreation opportunities. This study was applied a choice experiment to investigate the potential users' preferences and willingness to pay for different educational programs and recreational enhancement projects in The King Rama IX-IMBG, Thailand. The population used in this study were tourists between the ages of 20 and 60 who had experience in traveling to provinces in the Eastern region. The sample size was determined using the ratio of 40 samples per choice set. There are 10 choice sets for this study, thus estimating the optimal sample size of 400 individuals who were determined by purposive sampling. The empirical results from conditional logit model show the potential users are willing to pay 25 Baht, 27 Baht, 89 Baht, and 102 Baht for improved museum design, information signs, recreation activities, and facilities, respectively. The results suggest that the planning and management of this place subject to budget constraints should take into account the attributes of this botanical garden and the preferences of visiting citizens to improve their welfares.

*Keywords:* Botanical Garden, Willingness to Pay, Choice Experiment

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## **Background and Signification of the Research Problem**

The advantages provided by urban forest ecosystems include the following: air and water improvement, biodiversity preservation, and recreational benefits (Gómez-Baggethun and Barton, 2013). These benefits improve the quality of life of the communities surrounding the area and are important to formulate a policy to increase green spaces (Ferroaro et.al., 2011). Therefore, the urban forest should be constructed in a way that reacts to and accommodates the present demands of residents who utilize urban forests. This is of particular concern for potential area in the Eastern of Thailand where is an important coastal tourist attraction and has an abundance of coastal ecosystems that are suitable for urban forest development. The King Rama IX-IMBG was located in the Eastern of Thailand, covering the mangrove forests that provide residents various ecological and social benefits. Community gardens are beneficial to agricultural education and ecosystem sustainability. It is particular important to understand the relative value of different attributes in mangrove botanical garden. Therefore, the research question of this study is: what is the most preferred type of this botanical garden as an educational and recreational site? This study takes into account residents' preferences for different types of botanical gardens in order to support urban forest planning and management decisions.

The King Rama IX-IMBG was located in Bansamedngam Moo.10 Tambon Nongbua, Ampoe Muangchanthaburi, Chanthaburi province and bounded by Chanthaburi River. That has been managed by the Department of Marine and Coastal Resources, whose mission is to preserve, to conserve, to restore, and to manage marine and coastal resources including mangrove forests. In the action plan of the King Rama IX-IMBG, it is divided into 2 phases as follows:

- Phase 1 (October 1, 2018 – September 30, 2021) Preparation and implementation consist of the establishment of the Project Supervisory Committee. It is responsible for analyzing the internal and external environment of the project in order to design the site plan and the accompanying structures.

- Phase 2 (October 1, 2021 – September 30, 2023) Landscape improvement and construction of facilities in the area consist of nature study paths, the exhibition building, plant hall and library, parking lots and community stores, research laboratories, administration buildings, and improvement of the internal water system.

According to the action plan, it shows that the development of the area is in the second phase. This study was conducted a survey in order to use the information to plan and organize activities, facilities and services to benefit visitors in both educational and leisure opportunities.

This botanical garden has contributed to the restoration of mangrove forests that have been encroached to become fertile. It also increases habitats, spawning grounds and nurseries in the mangrove forests, providing important food and income sources for coastal communities.

The highlight of this place is the world's first mangrove botanical garden that collects various mangrove plants in the world. Therefore, it is a place to exchange academic knowledge on botany and the proper use of mangrove plant species to promote sustainable development of the United Nations. It is also a living museum suitable for ecotourism and natural recreation for people.

The more visitors may be attracted by special recreation facilities provided within the park. Thus, the research problem of this study is what types of investment in recreation facilities will generate the greatest welfare gain? to ensure that investments are best targeted to attain the greatest marginal gains.



Figure 1 Map of the King Rama IX-IMBG

Source: Google map

### Literature Reviews on the Mangrove Urban Forest Valuation

Most of the mangrove forest valuation literatures were conducted to evaluate their ecosystem services while, research on the benefits of mangrove forests as urban forests is limited (Tavárez & Elbakidze, 2019). The benefits from mangrove botanical garden as an urban forest are both ecological benefits and recreation opportunities which are market value and non-market value. The literatures that assess the value of recreational benefits have employed by allowing respondent to reveal or state their preferences. The travel cost method (TCM) has

been used widely to estimate the recreation value but it has the problem for urban sites since there are basically no or very small cost of travelling to the site (Tyrväinen et al., 2005). Thus, the hedonic price method (HPM) and contingent valuation method (CVM) have been frequently applied to assess the value of urban forest but they have some limitations to assess the various of urban forest attributes. However, the choice experiment (CE) can assess the attributes of environmental goods and services, regardless of the relationships and trade-offs between qualities (Seenprachawong, 2016). Thus, CE is more suitable for assess the respondents' preferences of urban forest with multiple attributes than HPM and CVM.

CE technique is widely used to investigate the preferences over various urban forest attributes as they provide the recreation benefits (Christie et al., 2007; Nielsen et al., 2007; Bestard & Font, 2009; Edward et al., 2012). These studies employed the recreational attributes including trails, information, and parking to estimate the willingness to pay of respondents that related to the quality management. Arnberger et al. (2010) picked the user type, the number of visits, the positioning of visitors, pet permission to enter the area, and the movement direction as the attributes of urban park to investigate heterogeneous preferences. Nordh et al. (2010) selected grass, bushes, trees, flower beds, water features, and the number of visitors as the attributes of urban park to examine the relative value of certain components in Scandinavian pocket parks using conjoint approach. However, the selection of attributes in CE depends on the study objectives. In designing the botanical garden to be a source of education, it is important to consider the museum design, activity programs, and facilities. Saptutyingsih & Diswandi (2019) applied choice modelling to assess the value that communities and visitors pay for mangrove conservation as educational site in West Lombok, Indonesia. In this study, the sample was received several scenarios to determine alternative choices in improving mangrove forest by their attributes including entrance fee, parking cost, rubbish bin toilet, gazebo and security guard. Hong, Kim, Jo, & Lee (2018) developed conjoint choice model to determine the preferences of urban dwellers on urban forest attributes including forest tree type, paving material of trail, topography, walking time, travel time, and fund. Koo, Park, & Youn (2013) investigated the preferences of urban residents for various attributes of urban forest with a focus on recreation benefits. Urban forest attributes including trails, slope, biodiversity, environmental education programs and entrance fees were discovered to influence Korean citizen.

Moreover, many CE studies have found that the differences in socio-economic variables (gender, age residential area, marriage, education, income, family composition, and occupation) affect to the preference regarding to urban park attributes (Arnberger et al., 2010; Nordh et al.,

2010; Koo, Park, & Youn, 2013; Xu & He, 2022). Following the significance of problem and previous studies, this study aims to investigate the preferences of potential users regarding various attributes of King Rama IX international mangrove botanical garden. The rest of paper is organized as follows: objective of the study, scope of research, theoretical framework, research methodology. In the following section, the empirical results are presented and interpreted. The discussions are summarized and study are recommended in the last section.

### Research Objective

This article aimed to estimate the economic value of change to the quality of the King Rama IX-IMBG.

### Scope of Research

The King Rama IX-IMBG provides the benefits to local villagers and potential tourists therefore, foreigners were excluded from survey. The population sample was chosen from Thai people living in traveling to the Eastern of Thailand. A sample of 400 individual was randomly selected. The main survey was proceeded from April 2022 to July 2022. Each individual was asked to express a preference for the garden's four features, namely the museum designs, information signs, recreational activities, and facilities.

### Theoretical Framework

To assess the attributes of the study area, the choice experiment (CE) is employed to analyze the data. The random utility model provides the theoretical framework for analyzing the choice experiment. Each alternative choice is represented with the indirect utility function that consist of a deterministic element ( $V_i$ ) and a stochastic element ( $\epsilon_i$ ). Individual utility of alternative  $i$  is shown in equation (1).

$$U_i = V_i + \epsilon_i \quad (1)$$

The probability that individual  $n$  will choose option  $i$  over option  $j$  is given as equation (2).

$$Prob(i|c) = Prob\{V_{in} + \epsilon_{in} > V_{jn} + \epsilon_{jn}, \text{ all } j \in c\} \quad (2)$$

Given  $C$  is complete choice set and the assumption over the distributions of error terms are Gumbel-distributed independently and identical distributed that is assumed to estimate the equation (2) (McFadden, 1973). Thus, the probability to choose is given by equation (3).

$$Prob(i) = \frac{\exp^{\mu v_i}}{\sum_{j \in c} \exp^{\mu v_j}} \quad (3)$$

where  $\mu$  is scale parameter if  $\mu \rightarrow \alpha$ , the model become deterministic. Equation (3) is estimated by means of multinomial logit regression, which assumes the Independence from Irrelevant Alternatives (IIA) property is consistent with any choices. It simply interprets that any individual, the proportion of choice probabilities of any two choices is totally unaffected by the utilities of other choices (Ben-Akiva, Lerman, & Lerman, 1985). Thus, the IIA property is fundamental testing for CE data set if it violates that rule, then the standard random utility cannot be applied. In case that  $V(\cdot)$  is linear form such that  $V = \beta(X_n)$ , which  $X$  is vector of observable attributes, and  $\beta$  is vector of the estimated parameter. The probability of two choices,  $i$  and  $j$ , is converted to equation (4).

$$Prob(i) = \frac{e^{-\mu\beta'(X_{in} - X_{jn})}}{1 + e^{-\mu\beta'(X_{in} - X_{jn})}} \quad (4)$$

The CE technique relies on carefully design choices including attribute levels and ranges that expose the elements influencing choice. Moreover, the CE method relates the statistical design theory to generate scenarios which provide complicated parameter estimates. Thus, the orthogonal designs are essential to reveal random preference in the view of the separation of the effects of each feature in the selection, while attributes in reality are normally high correlated with each other.

An estimated linear-in-parameters utility function for alternative  $i$  often takes the form of (5)

$$V_i = \alpha_i + \sum_{j=1}^n \beta_j X_j + \sum_{k=1}^m \gamma_k \alpha_j Z_k \quad (5)$$

where  $\alpha_i$  is an alternative constant,  $X_j$  is the attributes involved with the alternative,  $Z_k$  is individual socio-economics characteristics and  $\beta_j$ ,  $\gamma_k$ , and  $\alpha_j$  are parameters. All the attributes of the botanical garden design are entered the model using effect codes. Welfare estimates are analysed in choice experiment, using the formula explained by Hanemann (1984):

$$CV = \frac{1}{\theta} [\ln \sum_{i \in C} e^{V_{i1}} - \ln \sum_{i \in C} e^{V_{i0}}] \quad (6)$$

where  $\theta$  is the marginal utility of income,  $V_{i0}$  and  $V_{i1}$  are the indirect observable utility before and after the change of mangrove botanical garden, and  $C$  is the overall choice set. If there is only one before-and-after policy option in the choice set, equation (6) reduces to

$$CV = \frac{1}{\theta} [\ln e^{V_{i1}} - \ln e^{V_{i0}}] = \frac{1}{\theta} [V_{i1} - V_{i0}] \quad (7)$$

From equation (7), if it is a linear utility function, the marginal rate of substitution between two attributes is the ratio of their coefficients. The marginal willingness to pay for a change in attribute is given by equation (8)

$$MWTP_j = \frac{-\beta_j}{\theta} \quad (8)$$

## **Research Methodology**

This study intends to assess the characteristics of a botanical garden that users place on its quality changes. The current situation of this area is assumed as status quo or the average level. Respondents will be offered two simulation options (option A and option B) which provide the exhibition, recreational activities, information signs, and facilities. The options will ensure that the quality mangrove botanical garden will be improved to higher levels (good and excellent). The different entrance fee is included as willingness to pay measure, which associated with the parameter of attributes and money.

### **Data Collection**

The population used in this study were tourists between the ages of 20 and 60 who had experience in traveling to provinces in the eastern region. The sample size was determined using the ratio of 40 samples per choice set. (Seenprachawong, 2016) There are 10 choice sets for this study, thus estimating the optimal sample size of 400 individuals.

This study take place in the mangrove forest area of Chanthaburi which has two functions including 1) educational and learning purposes, where the visitors can engage in activities that could enhance their knowledge and 2) relaxation purposes, where the visitors can enjoy activities such as viewing scenery along the nature trails, jogging, taking pictures, reading, etc.

The heterogeneity in preferences for attributes of this place was evaluated through two sample of respondents composed of residents and non-residents of this place. Residents sample was made up the people who live around The King Rama IX-IMBG, while non-residents sample was the potential people who use to travel in the eastern region.

Non-probability sampling, that is, purposive sampling, was used to determine the distribution of the 400 samples in both residents and non-residents. In purposive sampling, a screening question in the structural questionnaire was used to ask the respondent to check their criteria. If the respondents passed the screening criteria, the interviewers asked the respondents further questions.

### **Questionnaire Development and Sampling**

The study questionnaire consisted of four sections. The first section contained the consent form; the second section comprised warm-up questions that ensured familiarity with the botanical garden and the services it provides; the third section included the choice experiment; and the fourth section contained the socio-demographic attributes of the participants.

Prior to actual data collection, the questionnaire was pre-tested using a payment ladder on 30 participants to reveal the implicit prices (entrance fees) for each quality change. A payment ladder is a kind of payment card that sorts the entrance fee from low to high. The attributes used in choice experiment were developed in cooperation with related authorities, local villagers and potential tourists. In the introduction of choice experiment, respondents will be explained the importance of the garden and clarified that the layout and building design are currently on the process which needs information in order to plan for the maximum benefit of the users. The respondents were provided the attribute information (see Table 1). The museum designs, information signs, recreation activities, and facilities were clearly offered by pictures. The results of the pre-test survey allow for correction of ambiguous questions and scenarios to facilitate the effective final survey.

**Table 1** Attributes and Attribute Levels

Attributes	Level
Museum designs	Average (normal exhibition), Good (3-storey tower), Excellent (5-storey tower)
Information signs	Average (normal sign), Good (vocal sign), Excellent (audio guide)
Recreational activities	Average (walk and run), Good (cycling), Excellent (Kayak)
Facilities	Average (toilet and car park), Good (food court), Excellent (local product center)
Entrance fee (Baht per time)	0, 40, 60, 90, 120, 200

Source: Author's Study

The four quality attributes of mangrove botanical design were presented at three different levels (average, good, and excellent) while the entrance fees reflecting the willingness to pay were varied between 0 to 200 Baht per time. In the choice experiment, each respondent replied four choice sets which were created using factorial design which is a grouping experiment of all levels of attribute variables (Cochran & Cox, 1957). This design was computed by  $L^{mn}$  when  $m$  is the number of non-status quo alternatives  $n$  is the number of attributes and  $L$  is the number of attribute levels. Therefore, in this study, the number of groupings of choice was equal to  $3^{2*4} = 6,561$  choices. The advantage of factorial design is that main effect and interaction effect are



orthogonal of each other and can be estimated. Using SPSS to create 40 alternatives in the orthogonal design (see table 2) then each of orthogonal design was cyclically allocated to different choice sets. The attribute level in the next alternative is the next higher than the one used in the prior alternative, and if the highest level is reached, the attribute level is reset to its lower level. These 40 choice sets were then blocked into 10 versions each containing 4 choice sets.

**Table 2** Example of Orthogonal Design

Set	Museum design	Information sign	Recreation activity	Facility	Entrance fee
1	Excellent	Excellent	Excellent	Good	90
2	Excellent	Good	Good	Excellent	120
3	Good	Average	Average	Excellent	200
4	Average	Good	Excellent	Excellent	200
5	Average	Excellent	Excellent	Average	60

Source: Author's Study

In each choice set, respondents were asked to choose among three alternatives (see Table 3). The first alternative was the status quo, in which no improvement and no charge. The other alternatives assumed a number of quality improvements to the garden.

The botanical garden attributes were arranged into three hypothetical options for the respondents to reveal their most preferred choice. This information together with their most preferred choice shows the relative importance among these ecosystem attributes and money. Socioeconomic variables were entered in the estimating equation interactively. These choice experiment data and the unknown parameters were estimated by maximizing the likelihood function. The results of calculation provided the coefficient of each attribute which is computed as the marginal rate of substitution between botanical garden quality attribute and money.

**Table 3** Example of a Choice Set from Questionnaire

Your choice ➡

Attributes	Status Quo	Option 1	Option 2
Museum designs	Normal exhibition	Normal exhibition and 3-storey tower	Normal exhibition and 5-storey tower
Information signs	Normal sign	Sign with sound and audio guidance	Normal sign
Recreational activities	Walk and run	Walk, run, and cycling	Walk, run, cycling, and kayak
Facilities	Toilet and car park	Toilet, car park, food court, and local product center	Toilet and car park
Entrance fee	0	60	90

Source: Author's Study

To analyze the CE data, effect codes were applied following Louviere & Hout (1988). It is category-rating scales in econometric analysis corresponding to excellent museum design (ME), good museum design (MG), excellent information sign (IE), good information sign (IG), excellent recreational activity (RE), good recreational activity (RG), excellent facility (FE), and good facility (FG) (see table 4). The coefficients on these variables provide the marginal utility of its level of the particular attribute, while -1 times the sum of coefficients of particular attribute provide the marginal utility of average level of that attribute.

**Table 4** Effect Codes for Botanical Garden Attributes

Quality level	ME	MG	IE	IG	RE	RG	FE	FG
Excellent	1	0	1	0	1	0	1	0
Good	0	1	0	1	0	1	0	1
Average	-1	-1	-1	-1	-1	-1	-1	-1

Source: Author's Study

## Results

### Behaviors and Attitudes on King Rama IX Botanical Garden

The first part of questionnaire consists of visitors' behavior to confirm that they are potential users and visitors' attitude on the factors affecting the visit to the botanic garden. Respondents were asked about their visit to the eastern provinces as shown in Table 5 They were also asked about their activities that they had done during their visit to the Eastern as shown in Table 6 This section of the questionnaire screens potential persons traveling to the Eastern region to assess their willingness to pay based on the choice experiment.

**Table 5** Ranking of the Frequency that Respondents Go to Province in The Eastern of Thailand

Provinces	Frequency (Rank)
Chonburi	394 (1)
Rayong	271 (2)
Chantaburi	202 (3)
Chachengsao	182 (4)
Prachinburi	111 (5)
Trat	104 (6)
Sa-Kaew	64 (7)

Source: Author's Calculation

**Table 6** Ranking of the Frequency that Respondents Engage in Activities in Eastern of Thailand

Activities	Frequency (Rank)
Travelling	376 (1)
Visiting relatives or acquaintances	186 (2)
Studying the natural resources	58 (3)
Buying the local products	40 (4)
Sporting events	12 (5)

Source: Author's Calculation

The respondents had traveled to Chonburi the most, followed by Rayong and Chanthaburi respectively, which were considered as the transit provinces of this botanical gardens. The purpose of the trip is to travel for both recreational and educational tourism. For the choice

experiment analysis, the attitude of respondents toward the attraction of this botanical garden was further explored. Respondents were presented with a list of factors affecting coming to the botanical garden and asked how important it was. These are summarized in Table 7.

**Table 7** Attitudinal Opinions on Factors Affecting Coming to the Botanical Garden

Factors	Highest Importance	Very Importance	Moderate	Less Importance	Least Importance	Mean	S.D.
Facilities	174 (40.0)	159 (36.6)	88 (20.2)	11 (2.5)	3 (0.7)	4.13	0.87
Recreational activities	133 (30.6)	185 (42.5)	106 (24.4)	10 (2.3)	1 (0.2)	4.01	0.81
Museum model	121 (27.8)	181 (41.6)	116 (26.7)	14 (3.2)	3 (0.7)	3.93	0.86
Landscaping	183 (42.1)	165 (37.9)	79 (18.2)	6 (1.4)	2 (0.5)	4.20	0.81
Travel time to the park	128 (29.4)	151 (34.7)	137 (31.5)	15 (3.4)	4 (0.9)	3.88	0.90
Entrance Fee	114 (26.2)	170 (39.1)	133 (30.6)	15 (3.4)	3 (0.7)	3.87	0.87

\* Number of people and percentage (in parentheses)

Source: Author's Calculation

There are several factors that influenced the respondents' visits to the botanical gardens. From the questionnaire collection, it was found that

(1) The landscape design of the botanical garden was the most important factor that the respondents valued. It refers to the modern design that reflects the identity of the space as well as suitable for people of all ages. Over 42% of all respondents replied that it was the most important factor. Therefore, it was shown that respondents' satisfaction was most determined by landscape factors.

(2) Facilities factors such as the adequacy of car parks, restaurants and clean and adequate restrooms were the priority among any factors. One hundred and seventy-four of the respondents replied that it was the most important factor, with 40% of the total respondents. It shows that the amenity features of this botanical garden directly affect the utility of its visitors.

(3) Recreational activities develop the body, mind and emotions of human beings. Therefore, the establishment of a botanical garden is necessary to focus on recreational

activities. A high percentage of respondents, 31 % and 43% replied that recreational activities was the most important and very important respectively. A variety of recreational activities help to enhance the well-being of visitors.

(4) The exhibition in the museum is the main objective of this botanical garden to present the knowledge of mangrove forests and the way of life of the community. Therefore, the respondents took into account the museum design because a good museum must be a learning resource that allows visitors to participate. 28% replied that it was the most important factor, and 41% thought that very important.

(5) The travel time and entrance fees were minor factors that the respondents focused on because they are the potential users who used to travel to the Eastern normally, therefore the travel time is not an obstacle to visit. In addition, respondents are aware that there are operating costs involved in exhibitions and events, so they are willing to pay the entrance fee for the knowledge and pleasure that they receive from their vacation. A total of 140 respondents agreed that these two factors were moderately important.

**Table 8** Descriptive Statistics Included in Estimation

Variable	Description	Mean	Std.Dev	Min	Max
Male	= 1 if respondent is male	0.40	0.49	0	1
Age	Respondent age	31.49	8.96	23	68
Edu	Number of years of education	16.32	2.11	6	22
Inc	Personal monthly income (Baht)	32,718.39	24,860.98	7,500	100,000

Source: Author's Calculation

**Table 9** Estimation Results

Variable	Coefficient	Std. error	T-statistics	P value
Constant	-2.096 **	0.564	-3.714	0.000
Cost	-0.006 **	0.001	-10.306	0.000
Excellent museum design	0.021	0.047	0.45	0.653
Good museum design	0.08 *	0.047	1.705	0.088
Excellent information signs	0.086 *	0.047	1.818	0.069
Good information signs	0.022	0.048	0.458	0.647
Excellent recreation activities	0.216 **	0.047	4.583	0.000

**Table 9** (Continued)

Variable	Coefficient	Std. error	T-statistics	P value
Good recreation activities	0.142 **	0.047	3.006	0.003
Excellent facilities	0.325 **	0.046	7.042	0.000
Good facilities	-0.044	0.051	-0.86	0.39
Age	0.005	0.008	0.624	0.532
Income	-0.00001 **	0.000003	-3.302	0.001
Gender	-0.428 **	0.124	-3.449	0.001
Education	0.177 **	0.03	5.919	0.000
<b>No. of respondents</b>	<b>435</b>			
<b>No. of observations</b>	<b>1740</b>			

\*\* Significant at 5% and \* Significant at 10%

Source: Author's Calculation

Table 8 provided descriptive statistics and table 9 showed the econometrics result for the conditional logit specification presents the common alternative specific constant (ASC) for the non-status quo alternatives which imply the quality improvement of this botanical garden. All the quality of botanical garden attributes except for “excellent museum design” “good information signs” and “good facilities” are significant. For the socio-characteristics, the higher income person is more likely to choose the improved alternative while the older and higher educated person is more likely to choose the status quo alternative. The coefficients are applied to compute the marginal rate of substitution between the attributes using the cost coefficient as numeraire. This implies the marginal WTP for change from status quo to each attribute. The results are showed in table 10

**Table 10** Marginal WTP for a Change in Each Attribute

(Unit: Baht/Person/Time)

Attributes	Quality level		
	Average	Good	Excellent
Museum design	-12.50	12.50	-
Information sign	-13.50	-	13.50
Recreation activity	-55.00	22.00	34.00
Facility	-51.00	-	51.00

Source: Author's Calculation

Using equation (7) to estimate the willingness to pay of moving from status quo (average) to non-status quo (good and excellent) provides mean welfare estimates (compensating variation-CV) as shown in table 10 The number are computed as follows

$$\text{CV for improving museum design from average to good} = 12.50 - (-12.50) = 25.00$$

$$\text{CV for improving information signs from average to excellent} = 13.50 - (-13.50) = 27.00$$

$$\text{CV for improving recreation activities from average to excellent} = 34.00 - (-55.00) = 89.00$$

$$\text{CV for improving facilities from average to excellent} = 51.00 - (-51.00) = 102.00$$

The welfare estimates of improving the botanical garden in table 11 shows that the various of facilities including toilets, parking area, food court and local product center is the most important attribute of the botanical garden. An individual is willing to pay 102 Baht per time to improve the various of facilities. The recreation activities including walking, running, biking and kayak are secondary important attribute of this botanical garden. Each person is willing to pay 89 Baht for this attribute. Museum design and information signs are similarly important of this botanical garden. The total willingness to pay of each person per time is approximately 243 Baht.

**Table 11** Welfare Estimates of Moving from Status Quo to Non-Status Quo

Attributes	WTP to improve the botanical garden (Baht/person/time)	Percentage (%)
Museum design	25	10
Information signs	27	11
Recreation activities	89	37
Facilities	102	42
<b>Total</b>	<b>243</b>	<b>100</b>

Source: Author's Calculation

### Conclusion and Discussion

The purposes of the establishment of this area are 1) the first mangrove botanical garden to collect mangrove plant species from around the world 2) a research center for joint learning of academic departments and a source of work for related scientists and 3) an eco-tourism attraction. In a long term, the development of the botanical garden should be taken into account the resident and tourist preferences to achieve the sustainable tourism development. The results of the study demonstrated that potential users' preferences regarding

five botanical forest attributes: museum designs, information signs, recreational activities, facilities, and entrance fees which are similar to the case of urban park in Korea and Indonesia (Koo, Park, and Youn, 2013; Saptutyingsih and Diswandi, 2019). Although the variables used in the study were not exactly the same, statistically significant common fundamental attributes could be used to describe user behaviors.

In addition to the willingness to pay for recreational benefits of this site, the choice experiment results explored found that different preferences of visitors lead to different the attribute enhancements. Respondents were more willing to pay for recreational attributes than learning attributes consistent with the results of Xu & He (2022) found that the recreational activities in coastal wetland was healthy for new urban design. For the case study in Thailand, it was found that the results of this study were consistent with the C Kongphunphin, & M Srivanit (2021) in terms of the willingness to pay for recreation activities in the park located in urban area while S Sriarkarin & CH Leethe (2018) found the willingness to pay for other activities such as educational, and ecosystem services had a higher value than recreation activities in case of national park because tourists value national parks as natural heritage and indicators of sustainable development.

The socio-economic variables including gender, age, income, and education describe the variations in people's preferences for urban forests. However, this study did not find evidence suggesting that age has a statistically significant impact on potential users' choices for botanical garden features, as in the study of (Arnberger et al., 2010; Nordh et al., 2010; Koo, Park, and Youn, 2013; Xu and He, 2022). It was also found that income had a negative impact on willingness to pay, which contradicted the study above because this place targets individuals who wish to seek further knowledge on mangrove forests and high-income people who do not have research goals have the option to travel to other places thus, they put more satisfied with the status quo.

## **Suggestions**

### **Application**

The findings satisfied the research objective and can be applied to design this botanical garden to be attractive to tourists as follows

The respondents preferred an exhibition room and a nature observatory with a height of three floors. For the information signs, they preferred the sign has audio and audio guide for learning through listening. They attach great importance to activities and facilities as they preferred the biking, kayaking, food court, and local product center. These elements are in



addition to the basic status of the existing garden design that the authorities can further improve the quality to meet the needs of tourists.

For the socio-economic factors that affect the attraction of visitors, the study shown that individuals with higher incomes are more satisfied with the existing design than the higher quality ones while individual with higher education are more willing to pay for higher quality. This may be due to the fact that high-income earners have the choice of traveling to a wide variety of places both domestically and internationally, they may not place much importance on this place. While the place is designed to be a learning resource, it is consistent with studies that have found highly educated individuals willing to pay for the quality of the facilities. Therefore, the staff can use it to create a strategy for garden design that focuses on reaching the middle-income group without having to charge a high entrance fee and designing the place by emphasizing it as a comprehensive mangrove learning center in order to create useful research.

#### **Further Research**

According to the results, the total willingness to pay to improve this botanical garden is 243 Baht per person per time. In further research, this value can be primarily applied with the supply-side to configure the entrance fee targeting the consumer group and improving the operations.

This study did not consider attributes regarding the ecosystem services, and the bequest and existence value of this mangrove botanical garden. Therefore, the further research should estimate these values together to be the total economic value in order to propose the government in planning to become an important learning center of mangrove forests in the country.

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