INFLUENCE OF DESIGNS FOLLOWING GREEN ASSESSMENT CRITERIA ON DECISION TO BUY HOUSES IN HOUSING PROJECTS: THAILAND'S ECOVILLAGE

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Abstract

This study aimed to investigate the influence of Ecovillage design concept on the decisions to buy houses in housing projects. This work used a quantitative method in which data were collected from 813 samples in Bangkok Metropolitan area from March to May 2016 using quota sampling technique. The data were analyzed using descriptive statistics. The study broadly found that certain distinct criteria influenced consumers' decision to buy a house. Most of the respondents considered the infrastructure in the area as the main factor affecting their decision such that electricity, paved roads and water supply system should be readily available. As to the village layout, most of the respondents considered the accessibility of a market, convenience stores and other stores within the area to affect their decisions. However, the study interestingly found that energy and environment conservation factors also influence consumers' buying decisions for each housing type and price level. All site selection factors and some site design factors such as the marketplace and sports or recreation area have high or highest influence on consumers' decision to buy a house in all segments while some factors have high or highest influence on the majority of house segments such as the bike lane, wide footpath, fishbone road network and U-turn roundabout, air-flow type fence, environmentally-friendly material used, universal design, garbage management, and natural disaster prevention. These findings can be used as a guideline in designing housing projects to satisfy consumers' needs.

Keywords: Energy and Environmental Conservation Design, Sustainable Community Criteria, Housing Development, Ecovillage Assessment Criteria, Decision to Buy

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INTRODUCTION

The rapid growth of the world population has caused rapid housing and city expansion. The latter has increased the use of natural resources and areas for housing development without good environmental management. Eventually, this has caused various environmental problems such as pollution, garbage, environmental change and increased energy use, which resulted in rapid environmental degradation that directly impacted humans (Thirakomen, 2004). The World Meteorological Organization concluded that the year 2017 was the warmest year on record even without the influence of El Niño. Several high-impact climatic disasters such as hurricanes, flood, heat waves, and drought attacked several areas worldwide all throughout the year (World Meteorological Organization, 2017). As to Thailand, it was ranked ninth among the countries that are most vulnerable to the effects of climate change in the long run. (Kreft, Eckstein, Dorsch & Fischer, 2016). There was a total of seven high-impact floods affecting Thai people's lives and properties recorded in 2017. (Thaiwater, 2017). Coastal erosion, as a result of various factors including global warming, may cause Bang Pu to disappear from the map of Thailand in the next 20 years (Buakamri, 2017).

Many countries encountering environmental problems have initiated design and development projects under the energy and environment conservation concept including project planning and building design (Puthipairoj, 2015, p. 20).

The principle of the design concept for energy and environment conservation has caught the world's attention and is currently being developed for real-world applications. Organizations associated with green building assessment were accordingly established in various countries in order to initiate the energy and environment conservation design mechanisms in creating housing projects. Currently, there are several standards published by these organizations in their respective countries such as the LEED (Leadership in Energy and Environmental Design) standard from the United States of America, the BREEAM (Building Research Establishment's Environmental Assessment Method) standard from England and TREES standard (Thai's Rating of Energy and Environmental Sustainability) standard from Thailand. It is generally accepted that the projects certified by these organizations are considered as green buildings or called as energy and environment conservation projects. The assessment level of the project or building is in accordance with the standards of each organization. According to the environmental conservation trend, several real estate companies such as Noble Development Public Company Limited (Noble Development, 2013) or Pruksa Real Estate Public Company Limited (Pruksa Real Estate, 2012) have set out policies for the development of subdivision projects using the environmental conservation concept. The assessment criteria were used as the concept for the design and for both vertical and horizontal project development.

According to the preliminary survey done by researchers, the horizontal development of projects that follow energy and environmental conservation was used by several companies as the main selling point of their marketing activities. Among these associations, the LEED is often referred to as the standard for development. LEED for Neighborhood Development is used in assessing a new community design. However, in Thailand, the LEED standard is not related with the country's physical environment (Siriwansilp, 2008) thus, the Ecovillage assessment standard has to be developed by the National Housing Authority (NHA) (Sreshthaputra, 2013). This standard has been used in several housing projects developed by NHA under two main areas: 1) site planning and landscape and 2) site design.

However, the development of a housing project that follows these criteria is not yet currently defined. This is projected to influence consumers' decisions as buying a house in a housing project that follow the Ecovillage design concept is now on trend. This implies that the energy and environmental conservation designs affect the purchase decision of consumers for each housing type as well as the price level of horizontal projects such as the single-detached or twin houses and townhouses in the Bangkok metropolitan region. This then leads to the question, "Does it benefit the real estate developer to use the design for energy and environmental conservation concept as a project selling point for each housing type and each price level?" The researchers then intended to study the influence of the designs that follow Ecovillage assessment criteria on consumers' decision to buy houses in housing projects. The real estate developer could use this study's findings to further develop housing project designs that follow the Ecovillage assessment criteria to meet the consumer's needs in the future.

RESEARCH OBJECTIVE

This present study aimed to investigate the influence of designs that follow Ecovillage assessment criteria on consumers' decision to buy houses in housing projects for different housing types such as single-detached or twin house and the townhouse and at which price level in the Bangkok Metropolitan region.

LITERATURE REVIEW

1. Type of Housing Concept

Each building type has an individual structure and specific name with different meanings providing a different interpretation of the law. The interpretation of the building types shall be in accordance with the requirement of the Land Development for Residential and Commercial Building Law, Bangkok Metropolitan, 2550 B.E. Law and the Ministerial Regulations no.55, 2543 B.E. (A.D.2000) issued by virtue of the Building Control Act, 2522 B.E. (A.D.1979) (Panyasakulwong and Yamsaso, 2009).

2. Demographic Segmentation

Market segmentation is a process of defining or subdividing consumers with the same characteristics into the same groups to enhance the efficacy of a marketing activity and to divide a budget to target each group of consumers with different demands (Rungruangphon, 2014, P.114).

Demography is important in setting market segmentation in the target group. The variables such as gender, age, family status, education level, occupation and income are commonly used in market segmentation (Sereerat et al., 1995, P.41-42).

3. Housing Price

Pricing is determined by the seller, and it depends on various marketing and psychological factors. The influential factors in pricing are comprised of the product cost plus profit, which the producer or seller requires. However, if we consider the whole pricing process, cheap or expensive pricing depends on the consumers' awareness of the market cost and whether the cost is reasonable, which will be individually different depending on the supporting data (Rungruangphon, 2014, P.148). The Agency for Real Estate Affairs surveyed the price level demands in buying houses from those who visited the 31st House and Condo Festival on 9 to 12 October 2014. The price data from the survey were divided into five price levels: 1) under 2.00 million Baht, 2) 2.01-3.00 million Baht, 3) 3.01-5.00 million Baht, 4) 5.01-10.00 million Baht and 5) over 10.00 million Baht (Government Housing Bank, 2014). Several research works have attested to these price levels as the same criteria were used to identify the price level of houses nowadays (e.g. Thanapatjatuporn, 2014; Jern, 2014; Ariyaviriyanant, 2014; & Kulintonprasert, 2015).

4. Ecovillage Assessment Criteria

The criteria that aimed at assessing the sustainability of the project have already been designed, planned and constructed. These criteria were developed to enhance the quality of life in the community and decrease its negative environmental impact. In short, they were deemed appropriate in assessing housing projects with groups of buildings connected by roads, pavements and open areas to promote community activities and relationships. The criteria for the site planning and landscape are as follows (Sreshthaputra, 2013):

1) Site Selection and External Area Connection

These criteria consist of 1.1) project site that is not in a drainage area, 1.2) project site that does not disturb the natural eco-system, 1.3) available infrastructure in the area, 1.4) available public bus transportation, 1.5) available public rail transportation, 1.6) available public water transportation, 1.7) schools and 1.8) available health facilities.

2) Site Design

These criteria consist of 2.1) area for marketplace, convenience store or other stores, 2.2) sports field, sports center or recreation area, 2.3) bike lane system, 2.4) project pavement at least two meters

wide, 2.5) fishbone road connection and U-turn roundabout, 2.6) fence around housing project, 2.7) subdivision of area for vegetable planting and 2.8) edible perennial plants, 2.9) materials used in public area must be environmental friendly without retaining or producing heat, 2.10) universal design, 2.11) garbage management in the project is environmentally friendly and 2.12) design and plan for natural disaster prevention (flooding, earth quakes, soil collapse)

SCOPE OF STUDY

Firstly, the scope of the study is to identify the influence of the designs that follow the Ecovillage assessment criteria on consumers' decision to buy houses in a housing project (single-detached house, twin house and townhouse). The price levels were placed at 1) under 2 million Baht, 2) 2.01-3.00 million Baht, 3) 3.01-5.00 million Baht, 4) 5.01-10.00 million Baht and 5) over 10.00 million Baht in Bangkok Metropolitan area. Secondly, it also identifies the influence of certain criteria on consumers' decision to buy a housing project design that follow the Ecovillage criteria of the National Housing Authority (NHA), those which were specifically mentioned in the previous part such as site planning and landscape. These criteria include appropriate project site, public transportation and site design, bike lane system and edible perennial plants, etc. However, this present study focused mainly on project site planning and landscape. Lastly, this present study employed a total of 813 consumers who were given survey questionnaires to determine the factors affecting their decision to buy a house. The respondents were selected as they already had decided to either buy a single-detached house, twin house or townhouse at each price level in Bangkok metropolitan region.

RESEARCH METHODOLOGY

1. Literature Review

Secondary data were collected from the technical documents, research reports and manuals for the Ecovillage assessment criteria of NHA including data from the government and private sectors, which were considered when developing the questionnaire.

2. Population and Sampling

The samples were 813 consumers who had decided to buy single-detached houses, twin houses or townhouses in the Bangkok metropolitan region. They were selected using the quota sampling technique from among those who were interested in buying houses with at least 30 people for each type and price level so as to create the normal distribution of the means as required by the Central Limit Theorem (Wanichbuncha, 2007). The data were accepted at the 95 percent confidence level.

3. Assessment of Research Tool

1) Validity Test

The questionnaire was tested by three experts to check its content validity. After testing, the Index of Congruence (IOC) values were calculated using Equation 1:

$$IOC = R / N$$

When, IOC means Index of Congruence. R means expert opinion, where

Value +1 means the question can certainly be used for measurement.

Value 0 means uncertain use for measurement.

Value -1 means the question can certainly not be used for measurement.

N means the number of experts.

The data collected from the experts were used in calculating the IOC value and accordingly selected the IOC values that are 0.5 and above (Tirakanant, 2008).

2) Reliability test

Forty questionnaires were trialed with respondents with the same qualifications as the samples to determine whether they understood the questions correctly. In addition, the questionnaires were tested for their reliability using the Cronbach's Alpha Coefficient Formulas Equation 2 (Tirakanant, 2008):

$$\alpha = \frac{n}{n-1}\left\{1 - \frac{\sum s_i^2}{s_t^2}\right\}$$

When, α is Cronbach's Alpha Coefficient.

N is the number of items in the test.
S_i^2 is the variance of each item in the test.
S_t^2 is the variance of the whole test.

The test provided a 0.95 Cronbach's Alpha Coefficient, which was higher than the acceptable value of 0.70 as suggested by Tirakanant (2008).

After designing the questionnaire using data from technical documents and the literature review, the sampling and collection of the data were done within the assigned time limit, and the questionnaires were collected to check their completion and processed by computer program. The data were analyzed through descriptive statistics.

RESEARCH RESULTS

1. Demographic data of respondents

From the general data analysis of the 813 samples, there were more male than female respondents and their average age ranged from 31-40 years old. Most of them are single, had obtained an undergraduate degree, are private officers with a total family income of more than 200,000 Baht and with 2 to 4 members in the household. Most of respondents have had no young children in their family. This showed that the samples were of working age where most of them are single. They are at the age of buying their first house for family expansion as their old house may now be too small for the family. Table 1 shows the descriptive data of the respondents:

Table 1 Descriptive Data of the Respondents

Data	Number of Respondents	Percentage
1. Gender		
1.1 Male	415	51.0
1.2 Female	389	49.0
2. Age		
2.1 Less Than 20	24	3.0
2.2 21-30	180	22.1
2.3 31-40	282	34.7
2.4 41-50	195	24.0
2.5 51-60	100	12.3
2.6 More Than 60	32	3.9
3. Marriage Status		
3.1 Single	410	50.4
3.2 Married	313	38.5
3.3 Married But Unregistered	35	4.3
3.4 Divorced / Widowed	55	6.8
4. Education		
4.1 High School	22	2.7
4.2 Diploma	34	4.2
4.3 Bachelor's	432	53.1
4.4 Master's	273	33.6
4.5 Doctorate	52	6.4
5. Career		
5.1 Trading / Private Business / Business Owner	224	27.6
5.2 Employee	336	41.3
5.3 Government / State Enterprise	172	21.2
5.4 Butler / Maid	19	2.3
5.5 Hire / Farmer	10	1.2
5.6 Retire	14	1.7
5.7 Other	38	4.7
6. Household Income		
6.1 Less Than 40,000 Baht	143	17.6
6.2 40,001-60,000 Baht	143	17.6
6.3 60,001-100,000 Baht	179	22.0
6.4 100,000-200,000 Baht	131	16.1
6.5 More than 200,000 Baht	217	26.7
7. Number of Family Members		
7.1 1 Person	53	6.5
7.2 2-4 Persons	424	52.2
7.3 5-7 Persons	310	38.1

Table 1 (continued)

7.4 8-10 Persons	22	2.7
7.5 More Than 10 persons	4	0.5
8. Age of The Youngest Child Living in the Family		
8.1 Less Than 3 Years	50	6.1
8.2 3-6 Years	81	10.0
8.3 7-12 Years	64	7.9
8.4 13-15 Years	54	6.6
8.5 16-18 Years	44	5.4
8.6 More Than 18 Years	60	7.4
8.7 No Youngest Child Living in The Family	460	56.6

The consumer behavior data for the house selection from the 813 samples were analyzed. Most of the consumers selected a single-detached house or twin house in the price level of 2.01to 3 million Baht and the age of the projects is more than three years. Most of them decided to buy houses in medium density housing projects with 100 to 299 households in an urban area.

The importance of each design aspect that follows the Ecovillage assessment criteria on the decision to buy houses in the housing project for each type and price level was analyzed. For the single-detached house, twin house and townhouse with five price levels, the influencing factors are shown in Table 2.

DISCUSSION

From the results shown below, the level of influence of the designs that follow the Ecovillage assessment criteria on the decision to buy houses in housing projects was determined. Overall, the respondents who lived in single-detached houses, twin houses and townhouses agreed that the Ecovillage criteria have a high influence on their purchasing decision. Several high influential factors were in the "Site selection" category. The most influential items were the infrastructure in the area and public bus transportation. The respondents who lived in a house that was 2 to 5 million Baht were concerned about these factors as they do not want to pay much more for their daily transportation expenses. These factors also highly influenced the respondents who live in houses with a price of 5 to 10 million Baht.

In addition, the high influential factors in the "Site design" category for the respondents who lived in single-detached houses, twin houses and townhouses were an area for a marketplace, convenience store or other stores, and sports field, sports center or recreation area. These indicated that the buyers desired the facilities for daily living and exercise in the community. If the housing project has these areas, they can be used as a selling point.

Table 2: Influence of Design Following Ecovillage on Decision to Buy House.

Influence of design following Ecovillage on decision to buy house	Influence level									
	Single-detached / Twin house					Townhouse				
	Less than 2.00 MB	2.01-3.00 MB	3.01-5.00 MB	5.01-10.00 MB	Over 10.00 MB	Less than 2.00MB	2.01-3.00 MB	3.01-5.00 MB	5.01-10.00 MB	Over 10.00MB
1.Site selection										
1.1In drainage area	*	*	**	*	*	*	*	*	*	*
1.2Does not disturb natural eco-system	*	*	**	*	*	*	*	*	*	*
1.3 Nearby facilities	**	**	**	*	**	**	**	*	*	*
1.4 Has public bus transportation	**	**	**	*	*	**	**	*	*	*
1.5 Has public rail transportation	*	**	**	*	**	*	**	*	*	*
1.6 Has public water transportation		*	*	*	*	*	*	*	*	*
1.7 Has schools	*	**	*	*	*	*	*	*	*	*
1.8 Has health facilities	*	**	**	*	*	**	**	*	*	*
2. Site design										
2.1Has marketplace, convenience store or other stores	*	**	*	*	*	*	**	*	*	*
2.2 Has sport field, sport center or recreation area	*	*	*	*	*	*	*	*	*	*
2.3 Has bike lane system	**	*	*	*	*	*	*			*
2.4 Has at least two meter wide footpath	*	*	*		*	*	*			
2.5 Has fishbone road network and U-turn roundabout	*	*	*	*	*	*	*			
2.6 Has air-flow type fence	*	*	*	*	*	*				
2.7 Has area for community garden										
2.8 Has area for edible landscape										
2.9 Uses environmental friendly materials in public area	*	*	*	*		*			*	
2.10 Designed with universal design concept	*	*	*	*	*	*	*	**	*	
2.11 Has environmental friendly garbage management	*	*	*	*	*	*	*	*		
2.12 Designed for natural disaster prevention (flooding, earth quakes, soil collapse)	*	*	*	*	*	*	*	*		
row overall	*	*	*	*	*	*	*	*		*

Note ** Highest influent factor   * High influent factor

The factors that influenced consumers' decision when classified by the house type and price level are as follows:

1. Single-detached or twin houses

1.1 Single-detached or twin houses with price under 2.00 million Baht

From the project site and external area connection category, the consumers gave priority to the infrastructure in the area and public bus transportation. Most of the people who lived in this price level house used public transportation and wanted to live in an area with infrastructure for daily convenience.

When developing this project type, the project site needs to be in an area that is not far from the community and public transportation systems. From the site design category, the consumers in this price level desired a bike lane system as cycling is a popular form of exercise, thus a project that has a bike lane system would influence consumers' decision.

1.2 Single-detached or twin house type with price between 2.01-3.00 million Baht

From the project site and external area connection category, the consumers gave priority to public transportation, both bus and rail, as well as nearby schools and health facilities. Consumers who work or whose workplaces are in the city commonly used rail transportation, which significantly influenced their purchase decision. Thus, project site selection should be near public transportation. From the site design category, this segment gave priority to the

marketplace, convenience store or other stores for their daily shopping needs.

1.3 Single-detached or twin house type with price between 3.01-5.00 million Baht

From the project site and external area connection category, the consumers gave priority to public transportation and health facilities. The consumers from this segment started to be concerned about the environment both inside and surrounding the project site. Thus, a design for the environment and drainage area avoidance can be a project selling point. None of the site design category topics showed a significant influence.

1.4 Single-detached or twin house type with price between 5.01-10.00 million Baht

From the project site and external area connection category, the consumers were influenced by all factors. Most of the consumers in this category lived in urban areas and have their own cars so the need for site selection was less than with the other segments. Overall, the influence on the purchasing decision was still high.

1.5 Single-detached or twin house type with price over 10.00 million Baht

From the project site and external area connection category, the consumers gave priority to the available infrastructure in the area and public rail transportation. From the site design category, most of the factors were shown to be influential. The consumers in this segment were influenced by the Ecovillage assessment criteria, which can

be used for design and as a project selling point.

2. Townhouses

2.1 Townhouses with price under 2.00 million Baht

From the project site and external area connection category, the consumers gave priority to the available infrastructure in the area and public bus transportation. Most of the residents live in an urban area and commonly use public bus transportation. They also wanted a project site with nearby health facilities. For the site design category, most of the items were influential.

2.2 Townhouses with price between 2.01-3.00 million Baht

From the project site and external area connection category, the consumers were highly influenced by the available infrastructure in the area and public transportation both bus and rail. Since the residents who lived in this housing segment often worked or have workplaces in the city, projects near both public bus and rail transportation were desired. For the site design category, this segment of consumers were concerned about the accessibility of the marketplace, convenience store or other stores.

2.3 Townhouses with price between 3.01-5.00 million Baht

From the project site and external area connection category, all of the factors have overall high influence on their buying decision. For the site design category, the residents at this price level were concerned about the design as the residents include those who belong to old age group and have disability. The demand for other designs is less influential because the project sites with this price level are in the city, which has lesser public areas.

2.4 Townhouses with price between 3.01-5.00 million Baht and over 10.00 million Baht

From the project site and external area connection category, overall, all of the factors were influential. For the site design group, the residents in this segment desired lesser public areas because the project site is in the city where the public area is limited. Nevertheless, the demand for a marketplace, convenience stores or other stores and exercise area still exists.

From the complete data analysis, it can be concluded that designs that follow the Ecovillage assessment criteria can be used as a project selling point. However, the design should adhere to the factors that significantly influence consumers at each housing segment. Primarily, the price level and housing types are the most influential factors in consumers' purchase decisions. Take for instance, houses priced under 2 million Baht and up to 5 million Baht are preferred as long as there are available infrastructures in the area and are readily accessible to public transportation. For single or twin houses, the consumers' requirements for a common area were more than that of the townhouse since townhouses are often

located in a downtown area, which apparently have limited common area. Thus, townhouse residents prioritized site selection criteria more than site design criteria. In addition, it was also found that the more expensive the price level, the less relevant the project design criteria unlike with that of the single or twin house types for which the demand for a common area increases as the price also increases. It can be concluded that designs that follow the Ecovillage assessment criteria can be adjusted to make a sustainable housing project and create a green community. For the marketing aspect, it can be used as a project selling point due to its strong influence on the consumers' purchasing decisions.

From this present study, it was noticed that consumers at the housing price level under 2 to5 million Baht valued the common area design more than the consumers at the housing price level of 5 to over 10 million Baht. For the townhouses with a price over 3 million Baht, the influence of project design on the buying decision was less than with of the single or twin houses. This showed that the consumers who lived in a high-priced projects with limited common areas will be less concerned about the area, in itself. Unlike the low to medium segments, they were more concerned about the common area of the housing project as well as the availability of a marketplace, convenience stores or other stores. However, most of the housing projects did not design this area for such structures except for the large housing projects. Project site selection for housing projects with a price of 2 to 5 million Baht

demanded public transportation or infrastructure, which is often against the developed housing project. But developers would like to develop the projects for this segment in urban areas because the land is cheaper and that makes the project more feasible. However, such project will be too far away from public transportation and infrastructures that the consumers desired that significantly influence their purchasing decision. Therefore, this makes the project hard to sell. In conclusion, project site is an important factor that influences purchasing decision of consumers when buying a house in a housing project.

Although the designs that follow the Ecovillage assessment criteria were consistent with most of the consumers' decisions and no factor was low or had limited influence in the study, there were still some factors that contain moderate influence on the customer's purchasing decision. Note that all factors with medium effect belong to the site design category. For example, the criteria with medium influence on purchasing decision for both single or twin houses and townhouse projects were the (the number in parentheses shows the mean influence on the purchasing decision for single-detached or twin houses and townhouses, respectively) edible perennial plants (3.18, 2.98), subdivision of land for vegetable planting in the project area (3.21, 3.05), sculpture or art work for good atmosphere for community and area for local activities in the community (3.31, 3.14), use of unused or recycled materials as construction materials for

common area construction (3.33, 3.25), nursery for project with more than 1,000 housing units (3.29, 3.34), energy saving common building (3.36,3.30) and improvement of existing buildings (3.38, 3.31). The real estate developers, marketers and designers should be aware of these issues during the project determination.

RECOMMENDATIONS

The recommendations of this present study for further exploration of a more complete housing project design that follow the Ecovillage assessment criteria are as follows:

1. Developers and marketers are divided into two types: government and private developers.

1.1) Private developers can use the results to determine the direction when using the Ecovillage assessment criteria in project site selection and for the external area connection category as well as the site design category in each housing segment. This is particularly important as these factors influence the purchasing decision of consumers in meeting their demands for a sustainable green community development.

1.2) Government organizations, especially the National Housing Authority, can use the study when developing housing projects. The design of housing projects that follow the Ecovillage assessment criteria data can be used to develop marketing strategies to fulfill the demands of consumers from each segment, which influence their purchasing decision in different housing projects. This can also help define the direction for the design so that it will be suitable for the residents and leads to sustainable living and a pleasant community.

2. Sellers and marketers can use the data to develop a strategy for sales and marketing. These data refer to the marketing characteristics, target consumers, age, occupation and social status of the consumers. Since the design requirements that follow the Ecovillage assessment criteria are different among consumers from each segment, the data from this present study will be helpful in planning a strategy for the target market who would like to buy a house developed for each segment.

3. Housing project architects/ designers can use this present study's results to find the advantages and disadvantages of the designs that follow the Ecovillage assessment criteria. The designer can use selective data to adjust the housing project design according to the level of influence on the purchasing decision of the consumers in each segment. This will create a selling point for the project and meet the demands of each consumer group. The designer can also use the data to design a housing project for a green community, energy and environmentally-friendly surround-ings and to create a sustainable community.

4. Suggestions for further study:

4.1) "Section 2: Building Design," "Section 3: System," "Section 4: Project Management" and "Section 5:

Innovation" should be studied more to get detailed data and a complete study of the Ecovillage assessment criteria that will be used to benefit the housing project development.

4.2) Studies on the influence of the Ecovillage design concept on the decision to buy houses in housing projects in the Bangkok metropolitan region should be done continuously since the behavior of the customers may change according to the environment, economy, laws and social status.

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