

The emergence of sustainable design in interior design projects (small hotels)

การเกิดขึ้นของการออกแบบภายในอย่างยั่งยืนสำหรับโรงแรมขนาดเล็ก

Varaporn Anuntaprayoon (วราพร อนันตประยูร)*

Orn-la-or Homsettee (อรลออ หอมเศรษฐิติ)**

Abstract

Sustainability has become a major concern in recent years. Consequently, there has been an emergence of sustainable designs in several interior design projects, particularly for small hotels. This research used Winchip's sustainable strategies as a framework to determine how these hotels applied to sustainability practices in interior design and analyze users' perceptions, attitudes and awareness of sustainable designs. Semi-structured interviews, open-end questions and observations were conducted. Three hotels were selected according to the criteria that firstly, located at the center of Thailand and nearby. Secondly, provided room services less than 30 rooms. Thirdly, used sustainable design concept in areas of space utilization, energy, water, material and resource. Finally, started business more than one year. Therefore, the interviews were arranged with the four owners of these three hotels. Furthermore, nine users who were stay over at least two nights and attended at least one eco-tourism activity were collected. The results showed 88 percent of sustainable design features in hotel A was complied with Winchip's sustainable strategies while 81 percent and 100 percent were complied in hotel B and hotel C respectively. The major results showed the following:

- Site investigation and exploration begin before a project starts. This includes the study of the effect on the site's surroundings, ecology and the local community.
- The majority of the hotels apply energy efficiently in areas of passive design and energy efficient products. However, only some use a renewable energy system.

* Lecturer of Assumption University, Suwanabhumi Campus, SamutPrakarn, Thailand. Email : or_vara@hotmail.com

อ.ประจํามหาวิทยาลัยอัสสัมชัญ วิทยาเขตสุวรรณภูมิ สมุทรปราการ ประเทศไทย อีเมลล์ : or_vara@hotmail.com

** Lecturer of Assumption University, Suwanabhumi Campus, SamutPrakarn, Thailand.

Email : ppdeuxsoeur@gmail.com

อ.ประจํามหาวิทยาลัยอัสสัมชัญ วิทยาเขตสุวรรณภูมิ สมุทรปราการ ประเทศไทย อีเมลล์ : ppdeuxsoeur@gmail.com

- Water efficiency is practiced in terms of water efficient products, but few hotels apply a passive design, water re-use and recycling.

- The hotels use sustainable design materials and resources for acoustical ceiling products, wall coverings, floors and furnishings.

- Indoor environmental quality (IEQ), space utilization and user involvement in sustainable practice are employed by all the hotels.

- The hotels provide green areas for users and their own purposes, such as local gardens and organic vegetable gardens. In addition, they support activities related to sustainability, such as canal rubbish collecting.

- The users are impressed by the hotels' sustainable designs and have a positive attitude toward the hotels.

- Most of the users have a clear perception of eco-friendly and sustainable designs. Moreover, the users are fully aware of sustainability and apply it in their lives; for example, by using their own containers and not using plastic bottles. However, a few users are not interested in this issue.

The interior design components that the hotels employed complied with Winchip's sustainable strategies framework. Moreover, this research discovered that the hotels serve as local sustainability learning centers that educate customers and local people. This influence and impact on people's behavior may lead to social change.

Keywords: Sustainability design, green design, eco design, green hotel, interior space

1 Introduction

Hotels have developed several strategies to promote themselves and have a positive impact on users. The small hotel industry distinguishes itself from other hotel sectors by offering comfort, luxury and elegance. These features consume extra resources and energy. However, since sustainable designs emerged in Thailand several years ago, the hotel industry has begun to apply this idea to new projects. Instead of consuming more resources and electricity to create a comfortable space, a sustainable design can make more effective use of resources without harming the ecological system and the environment. At the same time, hotels still require attractive designs and to offer a pleasant experience for customers.

This research used Winchip's sustainable strategies as a framework to determine how these hotels applied sustainability practices in interior design and analyze users' perceptions, attitudes and awareness of sustainable designs. Winchip's sustainable strategies aim to help interior designers understand the principle of sustainability so that they can appropriately specify products, materials, lighting systems and building components. Furthermore, these strategies support the creation of environmentally friendly spaces and the good health and well-being of people.

2 Review of the literature and theoretical concept

With respect to professional designs, sustainability was introduced in the late 1920s by R. Buckminster Fuller who created the Dymaxion House. The Dymaxion House is "Fuller's solution to the need for a mass-produced, affordable, easily transportable and environmentally efficient house" (Baldwin: 2016). Fuller's concept of sustainable design involved a focus on renewable energy and minimizing ecological impact (Winchip: 2011, Baldwin: 2016). Victor Papanek is another sustainability design pioneer. His philosophy is that a design should relate to human ecology and social change (Papanek: 1991). Two of Papanek's (1982:188) fundamental tenets are "that the design of any product unrelated to its sociological, psychological, or ecological surrounding is no longer possible or acceptable" and "if a design is ecologically responsive, then it is also revolutionary." In 1982, Walter R. Stahel presented the "Product-Life Factor" concept, for which he was awarded the Mitchell Prize (Product-Life Institute: 2016). Later, he invented the phrase "cradle to cradle". Subsequently, Michael Braungant and William Mc-Donough connected this concept to the practice of designs. Mc Donough (2002) stated that the cradle to cradle concept requires that the materials used in industrial and commercial processes should be biodegradable and should biodegrade easily and securely. The materials must be either technical nutrients or biological nutrients (Mc Donough: 2002). These concepts have influenced many designers currently working in the area of sustainable design. Winchip (2001) also emphasized that to understand sustainable design, the designer requires an awareness of the ecology and environmental science.

Winchip (2011:101) and Chick et al. (2011) noted that the economy, environment and society are three interdependent components that designers have to consider when undertaking a sustainable design project. Winchip (2011:226) further stated that "sustainability features should be elements of commercial interiors because these facilities are impacted by a

large number of people”, and sustainable design is “an excellent tool for teaching people about the principles of sustainability.”

Sustainable designs for commercial and residential interiors emphasize the following concepts (Winchip: 2011:225, Bergman: 2012):

- Site issues
- Efficient energy use
- Efficient water use
- Materials and resources
- Indoor environmental quality (IEQ)
- User involvement with sustainable practices
- Space utilization

Site issues

With regard to interior design projects, site selection is normally performed before we begin our work. However, site selection must take the design into consideration since the designer has to explore the existing site and context. Moreover, the site and its context have to integrate with the sustainable design.

In addition, the principles of sustainability also focus on how the construction methods affect the ecological system and the environment that surround the selected site. These methods impact local biodiversity, transportation and the community (McDonough et al.: 2002, Bergman: 2012).

However, in the area of interior design, we are generally working with existing buildings. Designers should employ strategies to address this. Winchip (2011:219-221) indicated that the National Historic Preservation Act offers the following four standard approaches for property treatment:

1 Standard for Preservation: This focuses on retaining all historic materials by using a process of conservation, maintenance and repair.

2 Standard for Rehabilitation: This aims to retain and repair historic materials to maintain the historic character of the property.

3 Standard for Restoration: This emphasizes the retention of materials that were meaningful in a certain period of time in a property’s history. However, the materials from other periods of time can be removed.

4 Standard for Reconstruction: This approach is restricted to recreating buildings, structures, landscapes and objects that are related to an historic location.

Efficient energy use

There are several ways to achieve energy efficiency; however, for interior design, we look at how to apply and implement this concept in commercial projects. Winchip (2011:43) suggests that designers should emphasize the understanding of the commissioning process and advise occupants to use energy-efficient lighting systems, equipment and appliances.

Furthermore, sustainable interior designers should approach low-energy designs by incorporating the following concepts (Maxon: 2012: 64-74):

- Passive design.

Passive design aims to use and benefit from natural energy. The strategies for passive design are natural ventilation, natural daylight, air-tightness, thermal mass, thermal insulation, solar gain, solar shading and living walls.

- Energy efficient products.

Choose energy efficient products, such as lighting and appliances. In addition, employ energy-efficient building services and encourage occupants to reduce unnecessary energy usage.

- Renewable energy systems.

This category includes biomass, wind power, solar thermal heating, photovoltaic cells and heat pumps.

Efficient water use

Conserving water is a basic rule for a sustainable design. There are two methods to conserve water. First, consume less water by using water efficient equipment. Second, employ water reclamation and reuse systems (Winchip: 2011).

Alternative ways to conserve water are ranked according to priority as follows (Maxon: 2012)

1. Passive design. This focuses on utilizes buildings to gain the benefits of rainfall and rainwater.

2. Water efficiency. This consists of using water-saving sanitary fittings and appliances, such as toilets, washing machines, and others. Water meters are also used to track usage and encourage occupants to use water responsibly.

3. Water re-use and recycling. This concept is concerned with rainwater re-use, grey water recycling and blackwater recycling.

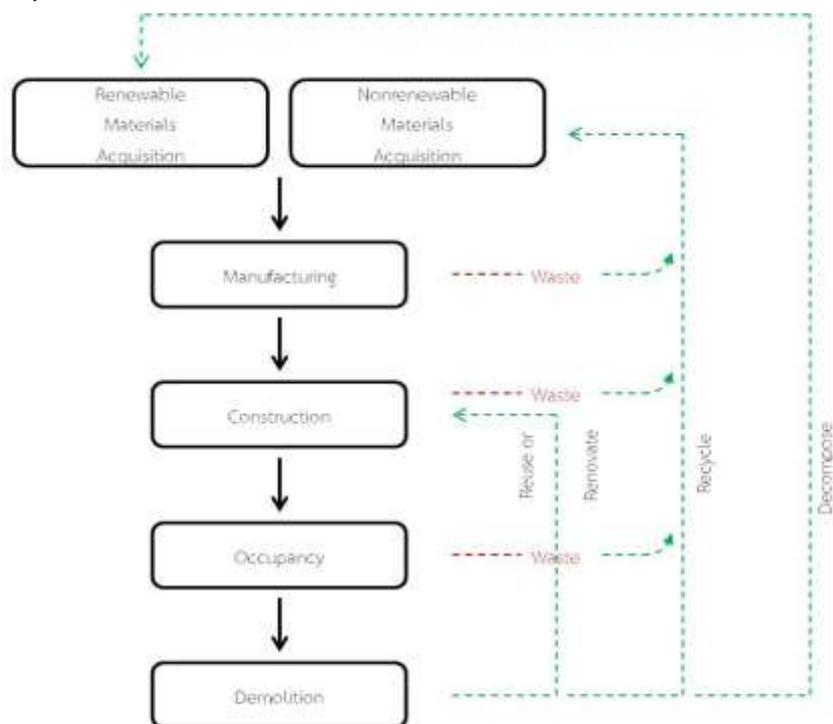
Materials and resources

Fundamentally, resource and material reduction should be considered a top priority. The approaches to material reduction as noted by Winchip (2011) are as follows.

- Reusing existing materials.
- Using recycled and recyclable materials.
- Specifying the precise quantity of products.
- Using standard sizes of products.

In addition, interior designers must understand and consider the life cycle of products to select appropriate materials. This notion is elaborated upon by McDonough and Braungart who are cited in the Sustainable Design Book (Bergman: 2012). See figure 1.

Figure 1: Life Cycle of Products



In the cradle-to-cradle life cycle of a product or building, all waste materials, including those resulting at the end of life, return to either the biological or technical nutrient cycle, or are reincorporated into later steps in the life cycle.

Sources: Bergman, D. (2012) Sustainable Design: A Critical Guide. Princeton Architectural Press, New York. pp: 19

Materials and resources cover several areas, such as ceiling products, wall coverings, floors and furnishings. Sustainable designers should explore the products' characteristics when making a selection (Winchip (2011: 118-139). The characteristics of materials and resources are as follows:

Acoustical ceiling products

- Acoustical ceiling tile content (natural or virgin material, recycled material).
- Noise control considerations.
- Quality lighting considerations / reflective properties.
- Safety considerations.

Wall coverings

- Durability.
- Insulating properties.
- Sound absorbency.
- Material content (natural or virgin material, recycled material).
- Free of volatile organic compounds (VOCs).
- Recyclable.
- Biodegradable.

Floors

- Durability.
- Life cycle assessment.
- Acoustical properties.
- Thermal mass for passive solar applications.
- Flame resistance.
- Ease of maintenance.
- Low or zero volatile organic compounds.

Hard finishes and soft finishes are the main types of floor materials that are recommended for use in sustainable interior design (Moxon: 2012). Hard finishes, such as bamboo, timber, ceramic tile and stone tile, are highly durable and recyclable. Furthermore, if the materials are sourced locally, they have low embodied energy. Soft finish materials should be renewable, non-toxic, biodegradable and durable. Examples of soft finishes are cork, linoleum and carpet.

However, when carpet is chosen, Winchip (2011:128) advises that the designer consider the “type of carpet fibers, construction method, durability factors, cushion characteristics, installation method, maintenance procedures and means of disposal”. The choice of carpet should also comply with recommendations regarding volatile organic compounds (VOCs) and indoor air quality (IAQ).

Furnishings

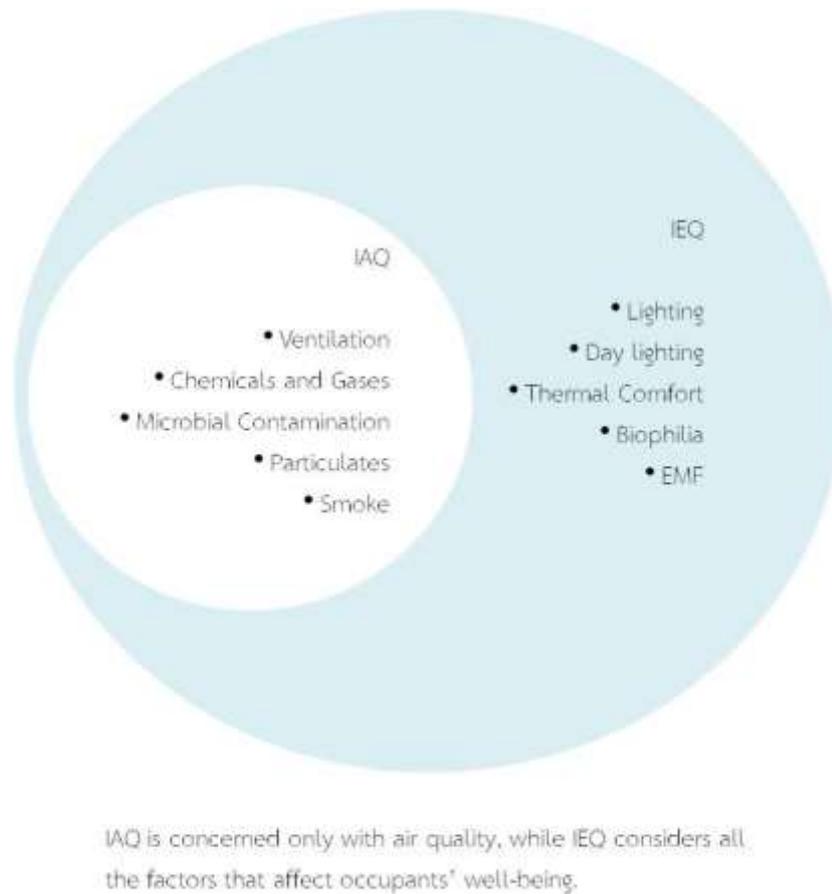
Winchip (2011: 132-141) further states that furnishing involves the following:

- Fabric. Considerations for fabric involve the manufacturing processes and volatile organic compound (VOC) emissions. Therefore, fabric impacts the environment when the materials are disposed of in landfills. Accordingly, sustainable interior designers have to examine fibers, yarns, weaves, dyeing methods, fabric finishes, performance characteristics and economic considerations.
- Window treatments. When selecting materials for window treatments, designers should review the product’s life cycle assessment (LCA) and its capacity to insulate, control noise, provide privacy, reduce glare from sunlight or exterior lighting and maximize daylighting.
- Furniture and seating. Sustainable designers should examine durable, refurbished, recycled and biodegradable materials. Then, the focus should be on the user of the space; for example, whether users would benefit from a universal design and an ergonomically functional space. Moreover, products should be free of formaldehyde, PVC, chrome, benzene, lead, mercury, solvents, and brominated flame retardants and have zero or low VOCs.

Indoor environmental quality (IEQ)

Previously, construction methods were concerned with indoor air quality (IAQ); however, there are other influences that generate healthy indoor spaces, and these should be considered in the overall picture of indoor environmental quality (IEQ) (Bergman: 2013:) – See Figure 2.

Figure 2: Indoor environmental quality (IEQ) and indoor air quality (IAQ)



Sources: Bergman, D. (2012) Sustainable Design: A Critical Guide. Princeton Architectural Press, New York. pp: 94

However, interior designers must understand the difference between IEQ and IAQ. The following are features of IEQ and IAQ (Winchip: 2011:146):

- Indoor environmental quality (IEQ). IEQ focuses on the elements that affect users' perception of a space and the users' performance. The elements are daylight, ventilation, temperature, humidity, noise, electrical light source and personal control of setting.
- Indoor air quality (IAQ). IAQ emphasizes the use of materials and products that affect people's breathing and health. Examples of these materials and products are paint and furniture.

Once designers distinguish between IEQ and IAQ, it is important that they concentrate on creating healthy interiors that consider the users' needs to achieve the principles of sustainable design (Smith: 2010), (Winchip: 2011), (Bergman: 2013), (Moxon: 2012).

User involvement in sustainable practices

One of the sustainable strategies is that commercial interior designers should endeavor to inspire and encourage users to become involved with sustainable practices (Winchip: 2011). Furthermore, the design can have a significant influence on people's behavior and improve their lives (Brown et al.: 2010, Bua-Kli: 2013, Chick: 2012).

Examples related sustainable practices in hotel projects include providing recycling containers, reusing towels to preserve water and energy, using energy efficient lamps and planning accessible lighting controls (Winchip: 2011). Moreover, sustainable services can be offered, such as organic food, green products in guest rooms and sustainable tourism.

Space utilization

In every project, specific information is essential for interior designers to develop space plans. For hotel projects, designers must ensure that the room and suite layouts are accessible to the physically challenged (Chiara et al.: 2001, Neufert: 1980, Panero et al.: 1979). Moreover, designers must understand the following issues (Winchip: 2011:226):

- the purpose of the space.
- how users function in the environment.
- site context.
- characteristics of the built environment.

Sustainable designs' approach to space planning is to "reduce square footages while maintaining accessibility, safety and security"; furthermore, this reduction shall result in less energy consumption, reduce the amount of material, and reduce waste and maintenance (Winchip: 2011:226). In addition, designers should create a space that maximizes comfort while using less energy (Pilatowicz: 1995: 123).

3 Research methods

The purposive sampling method was selected for this research to choose suitable respondents who have knowledge regarding this issue. The criteria to select sample group of the hotel are :

- Located at the center of Thailand and nearby.
- Provided room services less than 30 rooms.

- Used sustainable design concept in areas of space utilization, energy, water, material and resource.
- Start business more than one year.

Accordingly, only three small sustainable hotels are fall into these criteria and selected as a sample group. Three hotels are located in Samutprakarn (Hotel A), Samut-Songkram (Hotel B) and Nakorn-Ratchasime (Hotel C) in Thailand. (See Table 1)

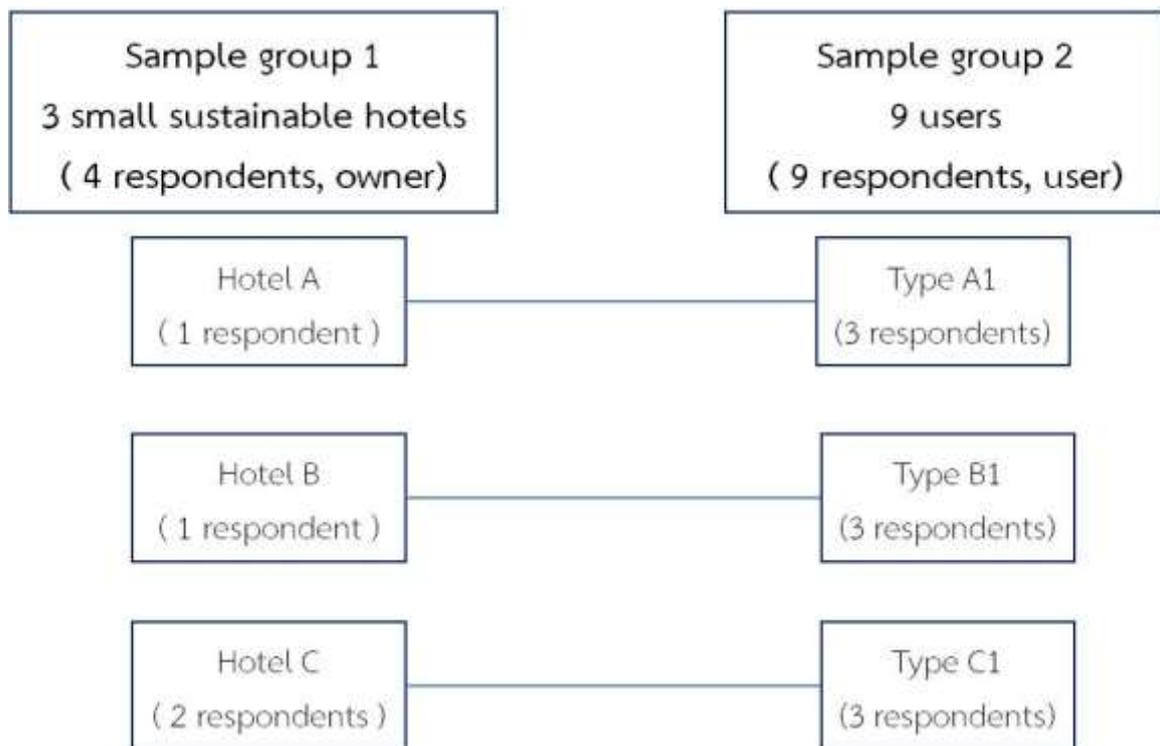
Table 1: Hotel Description

Hotel	Room Services	Location	Facilities
A	5	Samutprakarn	<ul style="list-style-type: none"> ▪ Restaurant ▪ Bike parking area ▪ Eco-tour package
B	26	Samut - Songkram	<ul style="list-style-type: none"> ▪ Restaurant ▪ Outdoor swimming pool ▪ Recreation space ▪ Spa ▪ Bar ▪ Multi-purpose room ▪ Thai cooking class ▪ Eco-tour package
C	9	Nakorn - Ratchasima	<ul style="list-style-type: none"> ▪ Cafeteria ▪ Playground & pond ▪ Multi-purpose space ▪ Studio for ceramic & painting ▪ Eco-tour package

Three hotels sample was divided into two groups. There were four respondents in group 1 and nine respondents in group 2.

This research is used purposive sampling methodology. The sample of group 1 is the owner of the 3 small sustainable hotels, who can provide deep and meaningful information for this research topic. Group 1 consists of four respondents (one owner from hotel A, one owner from hotel B and two owners from hotel C). Then, the sample of group 2 is the people who use the hotels' services, attend at least one eco-tourism activity and stay over at least two nights. Consequently, only three respondents of each hotel are selected and there were nine respondents of group 2. Group 2 was divided into 3 types. Type A1 are the users of hotel A, type B1 are the users of hotel B and type C1 are the users of hotel C (See Figure 3).

Figure 3: Sample Group



This research focuses on qualitative analyses (in-depth interviews) and used semi-structured interviews, open-end questions and observations to collect data. The reason for using the interview method is that this method can collect participants' personal experiences, opinions, attitudes and their perceptions (Denscombe: 2010, Martin: 2012). In addition, the Bohm Dialogue method was also employed in this research to facilitate effective conversations (Bohm: 1996). The observation method is the process of attentively observing the phenomena of people's behavior, artifacts, environments, events and interactions (Denscombe: 2010, Martin: 2012).

The research was designed according to the two groups. For group 1, the semi-structured interviews, open-end questions and observations aimed to elaborate how sustainability was effectively integrated in existing interior design contexts; for example, with respect to water, energy, materials and green areas. For group 2, the researchers sought to analyze users' perceptions, attitudes and awareness of sustainable designs by employing open-end questions, semi-structured interviews and observations.

4 Research results

The results for group 1 are as follows.

1. Hotel A in Samutprakarn. The site is located in the “green lung” area of Bangkok (Bang-Nam-Pueng market). Before the project started, the owner conducted a site survey 2 years in advance and spoke to the local community. This included soliciting comments and suggestions from community members. The owner aims to use a sustainable design and wants the project to be a part of the local community. Solar cell and windmill technologies are used in core areas, such as the offices and restaurant. However, the rest of the hotel still uses electricity. All of the sanitary fixtures are water-saving, but the hotel does not use water reclamation. Most of structures are bamboo, and bamboo is also used for the walls, floors and ceilings. However, the columns and beams are steel structures due to the site’s condition. The rooms are in a vertical line and are designed to have natural sunlight and wind; even the bathrooms are designed to be semi-open spaces. Only the sleeping areas use air-conditioning. Each space is simply designed but accommodates users’ needs. For example, most of the users of this hotel enjoy cycling; therefore, the hotel provides space for bicycle parking and a large map board of cycling routes. The hotel also has a green area to plant vegetable for the kitchen, and the restaurant provides organic food. The hotel encourages users to be a part of the sustainable/eco practices by providing eco-friendly products in the rooms, such as local soap, recycled tissue and glass bottles. In addition, sunlight is used to line-dry laundry, such as towels. Workshops, such as local Thai cooking, can be arranged by request. Eco tourism is arranged for users, such as a Bang-Nam-Pueng floating market tour.

2. Hotel B in Samut-Songkram. The site’s location is in Amphur Mae-Klong because it is the owner’s hometown. The owner intends to apply an eco-design to make the hotel environmentally friendly. The hotel structures are primarily traditional Thai house structures; secondarily, they are local structures that use elements, such as brick and thatched roofs. The hotel also has a pine forest area for its internal use. In addition, the canals around the hotel area were built using folk wisdom and are used for water catchment in the summer. However, the hotel mainly uses electricity and air-conditioning for the multi-purpose room and accommodations. Water reclamation is not used by this hotel, but all of the sanitary fixtures are water saving. The materials and resources used in the interior design were selected because they are environmentally friendly, virgin materials and lack volatile organic compounds. The hotel rooms are arranged in a horizontal line and are designed to take advantage of natural wind, sunlight and tree shadow. The space in each room is arranged to

make users feel comfortable and offer a sophisticated design. Eco-friendly amenities are provided for users, such as recycled tissue, local soap products, organic food, and others. Importantly, the hotel has a system for sorting waste material and has its own organic vegetable garden for the restaurant. Finally, users can select many programs and activities related to eco-tourism such as the Amphawa floating market, a Thai cooking class and garbage collecting.

3. Hotel C in Nakorn-Ratchasime. This hotel is located in a small village near the Kao-Yai Natural World Heritage Site. All of the Thai house and local building structures were developed using sustainable design considerations, such as bamboo, clays and recycled materials. The layout of the buildings takes advantage of the sunrise, the sunset, natural wind and the shadows from existing trees. In addition, the architecture appears to be in harmony with the existing nature. An earthen house was also constructed to house the multipurpose area and accommodations. The green areas consist of local plants, local vegetables and rice fields. All the functional areas do not use air-conditioning or fans. Solar cells are used to heat water; however, electricity is still used in the main area. With respect to water management, a rahat baler is used for the pond and the organic paddy field. Water recycling is used to wash dishes, and rainwater is reused. Furthermore, all of the sanitary fixtures are water saving. The materials used in the interior design are natural, recycled and reused. The toilet doors and hand rails are reused. Old wood was recycled to build the new furniture. Virgin materials, including clay, straw, and rice husks, were used to build the walls. As mentioned earlier, the accommodations are designed to benefit from natural sunlight, wind and tree shadows. The rooms are laid out in a horizontal line, and all the amenities are eco-friendly. In addition, the circulation flow of people among the spaces—for example, from the reception space to the multipurpose space or from the cafeteria to the accommodations—are also arranged in a horizontal line. This layout helps people feel relaxed, calm and airy. The cafeteria here provides only soft/hot drinks. Meals are outsourced from the local community as are some of the appetizers. There are several sustainable activities that users can select, such as a workshop for organic detergent and soap or trekking and making a ceramic mug. However, users are encouraged to wash their own dishes and use water-saving methods. The hotel's waste material is well organized, and users are encouraged to sort garbage. Importantly, every user attends a session to raise awareness of the sustainability issues relating to our lifestyle.

The results of group 2 are divided into 3 types.

Type A1

With regard to the sustainable issue, three respondents understand this matter clearly and came to the hotel to experience an eco-hotel. All of them are foreigners. One of them is a biologist who helps non-profit organizations with activities, such as trash clean up in his/her hometown. However, two respondents are working with companies in Bangkok.

The respondents have a positive attitude toward the whole design of the hotel. This place makes the respondents feel amazing; according to one respondent, “Here, it was amazing to look at everything. It’s been really fun to be here. It just doesn’t feel like you’re in the big city.” The other two respondents’ remarks included, “very stylish, good design, fantastic layout and landscape here; they complement each other.” Bamboo is the most attractive design element that impressed the users, and they learned details about the bamboo’s characteristics from members of the staff at the hotel.

One respondent has a great awareness of sustainable design and applies this knowledge in his/her life; for example, the respondent mentioned using a LifeStraw during his/her travels. This respondent suggested that people should use their own bottle to drink water instead of buying a plastic bottle of drinking water every time. However, the other two respondents who came here only wanted to get away from the city and experience a change of atmosphere.

Type B1

The respondents’ perceptions of the sustainability issue indicated a fundamental understanding of the concept. Two respondents mentioned that it is the way to save water and energy and mentioned having organic food. While the other respondent noted that the phrase “worthiness value” applies to his/her own life.

All the respondents have a good attitude toward this accommodation. The environment here made the respondents feel peaceful, calm and relaxed. The first respondent likes the main canal and the internal canal that connects to the accommodations. The second respondent said that “the lobby here is fascinating, as well as the landscape”. The last respondent suggested that brighter lights at night would be wonderful.

The respondents are not aware of the sustainable design. Their main purpose in coming here is simply to find a place to relax that is not far from Bangkok. Nevertheless, after two respondents stayed here and learned about sustainable design from members of the hotel staff, they reported feeling great about being a part of the hotel’s environmentally

friendly practices and want to come back here again. Furthermore, these respondents plan to apply sustainable practices, such as garbage sorting, in their lives. The last respondent feels indifferent about sustainable designs.

Type C1

When talking about sustainability issues, the three respondents provided their own interesting perceptions. The first respondent described sustainability in terms of a “sustainable feeling from generation to generation and the feeling of extending the sustainability of good things”. The second respondent stated that a “sustainable design means to design only necessary things for human beings”. The last respondent said that “it is the way we live harmoniously with nature”.

The three respondents have a grateful attitude toward this place and its design. Two of the respondents like all the spaces here. One of these two respondents explained that “the space makes me feel fun and happy; the space tells me what to do and how to behave. I feel like I receive good life energy here”. However, the third respondent appreciated the sala (multi-purpose area) the most because the sala made him/her feel very relaxed while engaging in group activities. The rest of the areas provide a sophisticated design and a peaceful environment for this respondent.

The three respondents have an awareness of sustainable design and want their children to understand the concept of sustainability. Accordingly, one respondent said, “I want my kid to learn from nature and live a self-sufficient life”. One of the three respondents applied the knowledge that he/she learned here to his/her work, including information about an organic Thai herb drink, waste sorting, and others.

5 Conclusions and suggestions

This research found that the sustainable designs has been integrated effectively in three existing small hotel projects according to Winchip’s sustainable strategies framework. All of the hotels have considered or incorporated site conditions, energy and water efficiency, materials and resources, indoor environmental quality (IEQ), space utilization and sustainable practices. 88 percent, 81 percent and 100 percent of Winchip’s sustainable strategies framework have been implemented in hotel A, hotel B and hotel C respectively (see Table 2).

Table 2: Summary research results for sample group 1

Sample	Winchip's sustainable strategies																16 Winchip's sustainable strategies	Percentage (%)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
	Investigate, Explore the existing site	Passive Design	Energy Efficient Products	Renewable Energy System	Passive Design	Water Efficient Products	Water re-use & recycling	Acoustical Ceiling Product	Wall covering	Floor	Furnishing	Indoor Environmental Quality (IEQ)	Space Utilization (internal)	Use Involvement with Sustainable practices	Green Area	Activities/ workshop			
	Energy Efficiency			Water Efficiency			Materials and Resources												
Hotel A	●	●	●	●	-	●	-	●	●	●	●	●	●	●	- Vertical vegetable	- Boating to see fireflies - Cycling	14	88%	
Hotel B	●	●	●	-	-	●	-	●	●	●	●	●	●	●	- Pine forest - Horizontal vegetable - Canal - Local garden	- Floating market cruise - Canal rubbish collecting - Thai cuisine workshop - Give alms to the monks	13	81%	
Hotel C	●	●	●	●	●	●	●	●	●	●	●	●	●	●	- Local plant - Horizontal vegetable - Rice field - Local garden	- Trekking - Organic dishwashing workshop - Clay workshop - Organic herb drink - Organic foot spa - Nature explorer	16	100%	

Furthermore, the interior designs of these sustainable hotels are sophisticated, charming and attractive to all users. Eight user respondents out of nine have a strong awareness, a clear perception of and a very positive attitude toward sustainable design, while one respondent was not interested and note the phrase “worthiness value” for perception of sustainability context. This indicated in Table 3 : Summary of key words that respondents in group 2 used regarding the three issues. Moreover, some sustainable design elements and practices, such as eco-friendly products, garbage sorting, and others, influence users’ behavior.

Table 3: Summary of key words that respondents in group 2 used regarding the three issues

		Issues		
		Perception of sustainability context	Attitude to sustainability in interior design	Awareness of sustainable design
Type	Respondents (9 respondents)			
A1	1	Environmentally friendly	Amazing, Excited, comfortable space	<ul style="list-style-type: none"> • Already practice in his/her normal life by reusing containers and not using plastic drinking bottles. • Encourage other people to do trash removable
	2	Natural energy and materials.	Very stylish, Fantastic layout and landscape.	<ul style="list-style-type: none"> • Use electrical equipment that has green label.
	3	Green material, Organic food, Solar cell, Wind mill.	Attractive design, nice small space	<ul style="list-style-type: none"> • Electrical saving at home. • Having organic food.
B1	1	Energy saving, Water saving.	Calm space, charming room, pleasant atmosphere.	<ul style="list-style-type: none"> • Shall apply garbage sorting in his/her normal life.
	2	Energy saving, Water saving, organic vegetable garden.	Fascinating design, impressive decoration.	<ul style="list-style-type: none"> • Shall apply garbage sorting in his/her normal life.
	3	Worthiness value.	Comfortable facilities, nice space.	<ul style="list-style-type: none"> • Saving electricity at home.
C1	1	Sustainability feeling from generation to generation.	Fun and happy interior space.	<ul style="list-style-type: none"> • Already practice in his/her work such as waste sorting, reused materials.
	2	Design only necessary things for human beings.	Cozy interior space, Lovely design.	<ul style="list-style-type: none"> • Educate and apply sufficiency life in his/her family especially kid.
	3	Live harmoniously with nature.	Very relaxing space, Sophisticated decoration.	<ul style="list-style-type: none"> • Educate and apply sufficiency life in his/her family especially kid.

Interestingly, the research found that these sustainable hotels not only provide accommodations and facilities for guests but also act as a learning center or learning experience space in the context of sustainability for guests and the local community. Furthermore, each hotel has coordinated with the local community to circulate folk wisdom in many areas, such as organic farming, local foods and products, and others.

The researchers would like to point out that sustainable design can influence user behavior and may lead to social change when the strategies are used in appropriate ways. Professional interior designer should aware of this context and try to integrated this into their work in order to cope with the environmental issue and enhancing a great interior design in near future.

The first author’s recommendations are to increase the sample population of group 2 and include a quantitative analysis to enable a better interpretation of the impact of sustainable design on user behavior.

The second author recommends expanding the timeline for the data collection to improve the tools and techniques used, such as including online questionnaires.

6 Reference

- Baldwin, J (2016) **Dymaxion House**. Accessed June 13,2016. Available from <http://www.bfi.org/about-fuller/big-ideas/dymaxion-world/dymaxion-house>.
- Bergman, David (2012). **Sustainable Design : A Critical Guide**. Princeto Architectural Press, NY.
- Bohm, David and Nichol Lee (1996). **On Dialogue**. Routledge Classics, NY.
- Brown, Tim and Jocelyn Wyatt (2010). **Design Thinking for Social Innovation**. Stanford Social Innovation Review, Winter 2010.
- Bua-kli, Chatree (2013). Creative & Design Revolution. **Veridian E-Journal**, SU. vol 6, no 4, January – June 2013:99 – 111.
- Chiara, Joseph De, Julius Panero, and Martin Zelnik (2001). **Time – saver standard for interior design and space planning, Second edition**. McGraw – Hill, USA.
- Chick, Anne (2012) Design for social innovation, **Iridescent : Icograda Journal of Design Research**. vol.2, no.1.
- Chick, Anne and Paul Micklethwaite (2011) **Design for Sustainable Change**. AVA Publishing SA., Switzerland.
- Denscombe, Martyn (2010) **The Good Research Guide for Small – Scale Social Research Projects (Forth Edition)**. McGraw – Hill, England.
- Martin, Bella and Bruce Hanington (2012) **Universal Methods of Design**.Rockport Publisher,MA.
- Mc Donough, William and Michael Braungart (2002) **Cradle to Cradle : Remaking the Way We Make Things**. Douglas & McIntyre Ltd. Canada.
- Moxon, Sian (2012) **Sustainability in Interior Design**.Laurence King Publish Ltd.,London.
- Neufert,Ernst and Peter Neufert (2012) **Architects’Data(4ed)**.Backwell Publishing Ltd.
- Papanek, Victor (1991) **Design for the Real World : Human Ecology and Social Change. Second Edition**. Butler & Tanner Ltd., London.
- Panero, Julius and Martin Zelnik (1979) **Human Dimension & Interior Space : A Source Book of Design reference Standards**. The Architecture Press Ltd., London
- Pilatowicz, Grazyna (1995) **Eco – Interiors : A guide to environmentally conscious interior design**. John Wiley & Sons, Inc,NY.
- Product-Life Institue (2016) **Cradle to Cradle**. Accessed June 1, 2016. Available from <http://www.product-life.org/cradle-to-cradle>.
- Winchip, Susan M. (2007) **Sustainable Design for Interior Environments (2ed)**. Fairchild Books, NY.