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Metadata Record: https://dspace.lboro.ac.uk/2134/13843

Version: Published

Publisher: Design Research Society © the authors

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The Status of Sustainable Design in Thailand

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Abstract
Sustainable design encourages manufacturers to consider social and environmental impacts whilst generating economic benefits (Macdonough & Braungart, 2002). Bhamra & Lofthouse (2007) state that sustainable design can provide business opportunities to organisations though cost reduction and increased marketability. Promoting sustainable design activity has the potential to stimulate the Thai economy by responding to a global trend in sustainability. Despite this, few manufacturers have the capacity to integrate sustainability into their products due to inadequate sustainable design knowledge. Various learning strategies and materials have been developed internationally, however, they cannot be productively incorporated into Thai design education for reasons discussed in this paper. This paper presents the partial findings from PhD research that proposes to develop a more appropriate approach for learning and teaching sustainable design in Thailand. It provides overview of education for sustainability, then outlines the current status of sustainable design in Thailand by dividing into three sectors: government, business, and education. The study commenced with a review of relevant literature and secondary data, which indicated a limited amount of material for the Thai context. Primary data collection was undertaken to address this shortfall through semi-structured interviews with experts participated in sustainable design activities. The findings indicated that Thailand has increased its focus on sustainability over recent years; a range of sustainable design initiatives has been carried out. However, the implementation of sustainable design in Thailand is not widespread because of three main obstacles. Firstly, imbalance between the three pillars of sustainability — most sustainable design activities have given priority to economic issues. Secondly, a lack of solid linkage among the initiatives — most of them have run individually and have not resulted in significant impacts. Thirdly, Thailand is lacking in sustainable design knowledge — most participants involved in these initiatives lack an understanding of this concept.

Keywords: sustainable design, eco-design, industrial design
1. Introduction

Natural resources in the biosphere sustain humankind by enabling survival and the development of communities, but future generations may lack important supplies that were consumed by previous generations (Brundtland, 1987). Growing awareness of the environmental and social impacts of business activities resulted in the concept of ‘sustainable development’, (Sherwin, 2006), which can be defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987).

Sustainable development, or sustainability, is comprised of economic, environmental, and social concerns (Elkington, 1998; Yencken & Porter, 2001), known as the “three pillars” or ‘Triple bottom line’ (TBL) (Elkington, 1998) MacDonough & Braungart (2002) suggest that in order to shift industry towards sustainability, manufacturers must consider environmental and social aspects while generating economic benefit. Sustainable design is a subset of sustainable development. Whereas Sustainable Design considers all three pillars, Eco-design, which “aims to integrate environmental consideration into product design and environment” (Charter & Tischner, 2001: p121), predominately considers environmental concerns. Integrating concepts related sustainability into the Thai manufacturing industry has the potential to stimulate the national economy of Thailand by responding to a global demand for sustainable products. However, to date, the Thai manufacturing industry has yet to successfully implement sustainable design owing to a lack of insight and knowledge of its principles. Education is a necessary component to improve sustainability literacy of designers (UNESCO, 2005; Ramirez, 2007); various teaching solutions have been developed and implemented. However, they cannot be effectively applied in Thailand as they are not context-specific. Indeed, a “one-size-fits-all” approach to education for sustainability has been proved to be ineffective (UNESCO, 2011). This situation has motivated the first author to undertake a PhD that aims to propose an appropriate learning and teaching framework for undergraduate product design students in Thailand. This paper unveils partial findings from the PhD research regarding the current status of sustainable design in Thailand by focusing on product development issues. It starts with the concise overview of Education for Sustainable Development (EDS) and then discusses the findings of primary research by dividing into three sectors: government, business, and education sectors. Being central in the discussion, two terms of small companies in Thailand are defined: SMEs in Thailand has been defined as companies that have fixed assets of less than 200 million THB (= 6,34 million USD) and 200 employees (Punyasavatsut, 2010); SMCEs are groups of local communities that carry out business activities using regional resources (Untachai, 2008).

2. Method

The investigation attempted to shed light on three research questions: (01) What has influenced Thailand to promote and implement sustainable design? (02) What sustainable design activities have been carried out in Thailand? (03) What barriers could hinder the implementation of sustainable design in Thailand?

The research commenced with a review of relevant literature and secondary data, which indicated a limited amount of literature exploring Sustainable Design in the Thai context. Consequently, primary data collection was undertaken to address this shortfall. Interviews were employed to gather additional data from four groups of experts involved in teaching, practicing or promoting sustainable design in Thailand. The subjects were four lecturers in sustainable design from leading design institutes; four SME owners who have implemented sustainable design into their product development process; two
representatives from governmental agencies who contribute to the development of sustainable products; and a manager of a non-governmental organisation that has organised sustainable design competition. Semi-structured interviews were chosen as they enable researchers to investigate a participant’s experience and knowledge (Bryman, 2008), to focus on specific questions and to modify questions while conducting the survey. The interviews were recorded and transcribed in full and the transcripts were analysed using coding and clustering. This analysis method was employed because it enabled the author to organise overwhelming data and elicit all transcription in a meaningful way (Miles & Huberman, 1994).

3. Education for sustainable development

Adverse consequences of unsustainable consumption patterns have led mankind to confront with ecological and social crises. Papanek (1972) points to design practitioners as being most implicated in these problems because they are actively involved in promoting wasteful products and unsustainable lifestyles. Nevertheless, product designers have enormous potential to influence sustainability as they play a crucial role in selection of production processes and materials (Mackenzie, 1991; Bhamra & Lofthouse, 2007). Industrial Design Society of America (IDSA) (as cited in Ramirez, 2007) presents that all designers have a duty to comprehend and reduce the negative impacts of their profession. Design Education is an imperative element that enables designers of tomorrow to understand and effectively contribute to sustainable development (Ramirez, 2007). According to the findings from the literature review, NGOs and higher institutes have carried out a great number of initiatives which aim to help design students and practitioners to develop sustainability literacy. For example, Information/Inspiration is a web-based information that provides principles of sustainable design and various case studies. It was developed based on the learning culture of designers such as creative presentation, brief description and maximum use of graphics (Lofthouse, 2006). Moreover, the IDSA, one of the largest profession associations of product design, introduced an eco-design curriculum entitled “OKALA” that was structured to be compatible with existing industrial design classes (White, Belletire & St Pierre, 2004). The United Nations also contributes to knowledge development through the Decade of Education for Sustainable Development (DESD) which runs from 2005 to 2014. It’s objectives are to facilitate networking for Education for Sustainable Development (ESD), enhancing the quality of learning and teaching in sustainability, enabling the member states to make progress toward sustainable development, and providing opportunities to incorporate ESD into the education system (UNESCO, 2005). Although numerous learning materials and frameworks have been developed, they are not appropriate for Thai students. This is because most of them have been created by western developers and rely on European experiences, thus the information they contain does not relate to the context of economically developing nations such as Thailand (Crul & Diehl, 2006). In addition, each country has different sustainability priorities and particular needs (UNESCO, 2007). In order to fulfill the requirements to develop a learning approach for Thailand, the author investigated the current status of sustainable design in Thailand. This is discussed in the sections below.

4. Government

According to the 8th National Economic and Social Development Plan (1997-2001), the Thai economy experienced significant growth in the last three decades; the capita income was increased from 2100 THB (=66.55 USD) in 1961 to 68000 THB (=2154.96 USD) in 1994. Although Thailand has achieved economic growth, it has faced social and environmental problems caused by unsustainable development (OPM, 1997). Urban and
rural income inequity has contributed to increased migration to urban areas resulting in negative societal impacts such as overcrowding, unemployment, and crime (Prayukvong, 2005). Natural wealth has been over consumed; more than 790000 acres of forest was lost between 1992 and 1993. This deforestation has contributed to soil erosion and deterioration of water quality (OPM, 1997). In addition, the collapse of Thai currency in 1997 led to a financial crisis. The official unemployment rate increased from 1.4% in 1997 to 5.1% in 1999 (Lane, et al. 1999). Reviving SMEs and SMCEs is one of the most appropriate ways to stimulate the national economy (Punyasavatsut, 2010). These circumstances drove the government to focus on sustainable development, particularly within SMEs and SMCEs. A number of governmental agencies have been established to provide support including funding, marketing, product development for SMEs and SMCEs. Government support in sustainable design can be categorised into two approaches: local product development (see 4.1) and eco-product development (see 4.2).

4.1 Local Product Development

The findings of the interviews showed that Thailand has implemented some initiatives to create well-being and contribute to rural development in order to reduce inequity of income and facilitate local entrepreneurship. In 2001, the Thai government adapted a Japanese policy entitled, ‘One-Village-One-Product’ (OVOP), a successful model of a regional programme to promote rural development. The OVOP allowed rural communities in Japan to gain opportunities for economic growth by developing and enhancing local businesses. Each village was encouraged to create a regionally distinctive product using local resources that complies with the requirements of the international market (Natsuda, Igusa, Cheamuangphan, Shingkharat & Thoburn, 2011). This programme has successfully stimulated economic development in rural areas and resolved social problems such as overcrowding in cities, low standards of living in rural areas, and environmental issues (Igusa, 2006).

Local government structure in Thailand can be divided into 4 levels, which are 76 provinces, 876 districts, 7255 sub-district (Tambon in Thai), and 79830 villages. The OVOP programme, renamed ‘One-Tambon-One-Product’ (OTOP), was first applied at the sub-district levels of Thailand in 2001. It was initially introduced to SMCEs but later included SMEs. The OTOP policy was adapted from the original scheme which operated on a local level (Bottom up) in the Thai context, as the central government plays a major role in running the programme (Top down) and provides various support. As shown in Table 1, the focus of the OTOP programme has been modified every year since its inception (Natsuda, et al. 2011).

<table>
<thead>
<tr>
<th>Year</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>Ministerial Integration</td>
</tr>
<tr>
<td>2002</td>
<td>Search for OTOP Products</td>
</tr>
<tr>
<td>2003</td>
<td>OTOP Product Champion</td>
</tr>
<tr>
<td>2004</td>
<td>Standard Champion</td>
</tr>
<tr>
<td>2005</td>
<td>Marketing OTOP</td>
</tr>
<tr>
<td>2006</td>
<td>Search for Excellent OTOP and OTOP Village Champion (OPC)</td>
</tr>
<tr>
<td>2007</td>
<td>Knowledge-Based OTOP</td>
</tr>
<tr>
<td>2008</td>
<td>Entrepreneur Promotion</td>
</tr>
<tr>
<td>2009</td>
<td>OTOP Tourism Village</td>
</tr>
<tr>
<td>2010</td>
<td>Sustainability of OTOP</td>
</tr>
</tbody>
</table>

As seen in Table 1, although OTOP aims to contribute to rural development in term of both economic support and human resources, most of the OTOP directions have predominately focused on economic issues. For example, the OTOP Product Champion (OPC) scheme has been introduced in order to enhance the export capability of the OTOP participants (Natsuda, et al. 2011). The scheme aims to help the rural producers to
create brand awareness of the local products by advertising them through use of the OTOP logo. OTOP producers are invited to submit their distinctive products which are then graded and awarded stars-certificates based on four criteria: the product is exportable and has a brand quality, production can be sustainable and with consistent quality, the product can provide customer satisfaction, and the product has an impressive background story (Kurokawa, Tembo & Velde, 2010). Four and five star certificates are granted to OTOP products which are of high quality and have export potential (Kurokawa, et al. 2010). Producers achieving three stars and above are eligible to access government funding and trade their products in the OTOP Expo, an annual trade fair in Bangkok. In addition, the local government provides some financial support to rural entrepreneurs.

4.2 Eco-product Development

Since 1990, environmental impacts have increasingly been considered in Thailand’s manufacturing industry and Thailand has started to build the infrastructure needed to support Thai SMEs in complying with the requirements of the international market that relate to environmental issues (Lindahl, 2007). Mungcharoen, Yuvaniyama, Chomkumsri & Varabuntoonvit (2006) present an overview of the eco-design movement in Thailand, Table 2.

Table 2: Eco-design concepts in Thailand (adapted from Mungcharoen, et al. 2006)

<table>
<thead>
<tr>
<th>Year</th>
<th>Organisations</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>FTI/DWI/TEI</td>
<td>Cleaner Technology in Thai industry</td>
</tr>
<tr>
<td>1996</td>
<td></td>
<td>Cleaner Technology Concept to Education</td>
</tr>
<tr>
<td>1997</td>
<td></td>
<td>Promote LCA concept</td>
</tr>
<tr>
<td>1999</td>
<td></td>
<td>Introduce Eco-design concept</td>
</tr>
<tr>
<td>2001</td>
<td>RU/AIT</td>
<td>Establish Thai LCA network / Teaching LCA at AIT, LCA and Eco-design at RU</td>
</tr>
<tr>
<td>2002-2007</td>
<td>MTEC</td>
<td>Knowledge Transfer from Japan and Promote Eco-design Concept</td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td>LCA/Eco-design in EE Sectors</td>
</tr>
<tr>
<td>2006</td>
<td>MTEC</td>
<td>Thai Green Design Network (TGDN)</td>
</tr>
</tbody>
</table>

As seen in Table 2, Eco-design was initially introduced in the Thai manufacturing industry in 1999 by government and non-government organisations (Mungcharoen, Phanichavaliit, Yuvaniyama & Chomkhamsri, 2007). The findings of interviews argued that Eco-design has been given greater consideration because it enables the export industry to comply with requirements of the international market. Hence, government agencies were specifically established to support Thai manufacturer’s development of eco-products. The National Metal and Materials Technology Centre’ (MTEC) is acknowledged as one of the main organisations that are playing an important role in implementing Eco-design in Thailand (ASEAN+, 2010). MTEC aims to support research related to material development and provide a significant contribution to industry by providing knowledge. The agency has set up an environmental research unit comprised of the following five departments: Life Cycle Assessment Lab, Excellent Centre for Eco-Products (XCEP), Environmental Management Lab, Material for Hazardous Substance Free Product lab, and Material for Environmental Lab. These departments have cooperated with others organisations including universities and non-government agencies to launch eco-design initiatives. These initiatives will now be discussed.

Human resource development activities, including workshops and seminars have been carried out to introduce Eco-design principles to industry (Mungcharoen, et al. 2007). Since 2008, XCEP has organised an annual competition that allows all Thai residents, including students, SMEs and designers, to participate. Selected candidates are invited to attend an eco-design camp which provides instruction on the basic principles of eco-design and enables the participant to develop their own products. Moreover, it has
contributed to the launch of a set of e-learning courses that offer eco-design knowledge through the www.learn.in.th website. MTEC also conducts research to facilitate eco-product development. For example, it has developed software called ‘Thai GHGs+ Software’ that enables manufacturers to estimate amounts of greenhouse gases resulting from production processes (MTEC, 2011). A consultancy service is also provided to help manufacturers to implement Eco-design. Thirdly, MTEC have established a series of eco-design networks. Lindahl (2007) believes that online networks are appropriate resources for Eco-design because they allow Thai SMEs to access information on product development. Thai Green Design Network (TGDN) was officially introduced in 2006; it proposes to transfer knowledge and technology on eco-products and create online network to promote the concept. MTEC also provided funding to establish the ThaiRoHS website which assists electrical and electronic manufacturers in complying with international standards by providing information (ThaiRoHS, 2012). The findings from the interviews indicated that end-users in Thailand lack understanding of Eco-design and MTEC is attempting to overcome this barrier by helping green manufacturers to increase sales through educating Thai consumers. For example, the Eco-product directory was initially published as a printed catalogue that displays product images and descriptions. In 2011, the directory had over 1000 eco-products and was made available as an online catalogue.

5. Business

The findings of the interviews indicated that business benefits influence product producers in Thailand to integrate sustainable design into their production processes. This section provides an overview of sustainable design in the Thai manufacturing industry through two distinct approaches: Local product development (see 5.1) and Eco-product development (see 5.2).

5.1 Local product development

According to Ministry of Interior statistics (as cited in Natsuda, et al. 2011) SMCEs represent the highest proportion (66.8%) of the participants in the OTOP programme. The number of registered products increased sharply from 20970 to 85183 items between 2003 and 2010 (Chandoewit, 2003; Natsuda, et al. 2011). These products are categorised into 5 groups: decorative items, herbal products, foods, textiles, and beverages. The majority of the registered products are decorative items as shown in Figure 1.

![Figure 1: Types of OTOP products (Natsuda, et al. 2011)](image)
The findings of the literature indicated that OTOP had successfully satisfied the rural development by enabling rural residents to obtain higher income (Kurokawa, et al. 2010). Sales of OTOP products gradually rose from 245 million THB (= 7.77 million USD) to 77705 million THB (= 2466.825 million USD) between 2002 and 2008 (Natsuda, et al. 2011). Although the scheme has prosperously stimulated economic growth in rural areas, most OTOP products do not meet the standard expected within the international markets. Export sales accounted for only 14% of total sales in 2008 (Natsuda, et al. 2011). In term of the star rate system, only 5.7% and 26.3% of the products in OPC 2006 have been awarded 5-stars and 4-stars respectively, and it is only these products which can be considered as having outstanding quality and export potential (OSMEP, 2008). Based on the empirical data collection, most OTOP producers do not meet the requirements of the international market because the producers have little interest in product development and lack design capability. Boonia-or & Chuenrudeemol (2010) investigated a community enterprise in Chaintat province and found that the producer typically developed new products by changing the appearance e.g. size, colour, and pattern. Natsuda, et al. (2011) investigated 32 OTOP producers in Cheang-mai and discovered that most respondents require marketing support rather than training to enhance their products. The findings from the interviews underlined that fact that most Thai producers prefer to copy existing products rather than develop new products. Many small companies avoid business risks by production of counterfeit products (Masera, 1999). A study by UNEP and Delft University found that “in most developing economies, copying (or imitating) is the prevalent method to develop new products” (Crul & Diehl, 2006: p73). Moreover, the findings of interviews found that some communities have increased production capacity to generate higher revenue by using modern technology and chemical substances that cause environmental problems.

5.2 Eco-product development

The composite findings of the literature review and preliminary data collection strongly indicated that Thai SMEs have started to integrate Eco-design principles into their product development processes due to business opportunities arising from export, advertising, and reduction of production costs (Klinpikul & Srichandr, 2010). However, the findings of interviews showed that most Thai SMEs lack knowledge and skills in Eco-design and, as a result, their practices contribute negative environmental impacts. For example, some manufacturers produce Eco-products using recyclable materials, but they are not aware that some recycling processes require significant amounts of energy and toxic chemicals.

The findings of the primary data collection indicated that most manufacturers have little or no understanding of the product life cycle and always try to push responsibility for environment on to other parties. The SMEs interviewed as part of this study successfully create Eco-products because they do not only focus on economic aspects but also wish to reduce environmental impacts and have a clear understanding of the product life cycle. Most of them have gained eco-design information from international sources such as business partners, international journal papers, and training courses. This is supported by the findings of Lindahl (2007) whose investigation of the electrical and electronic industry in Thailand found that most SMEs obtain knowledge of Eco-design from overseas training. In addition, customer demands potentially influence companies to implement Eco-design principles in the production processes (Lindahl, 2007). However, most Thai consumers are lacking in eco-design knowledge and encourage manufacturers to produce products that are not environmentally friendly by purchasing these products.
6. Education

As mentioned before, education is an indispensable element that contributes to sustainable development by educating the designers of tomorrow (Ramirez, 2007). The findings of interviews found that Thai design education has increased its focus on sustainability over recent years (2009-2011). A range of sustainable design initiatives have been carried out in order to contribute to learning and teaching in sustainable design. Thai design institutes offer more sustainable design knowledge because they agree that designers are responsible for the reduction of ecological and social problems. The following section presents an overview of current sustainable design modules available on undergraduate product design courses in Thailand.

This study explored the status of current modules through interviews with four lecturers from leading institutes in Bangkok and Khon-kaen. The findings indicated that learning and teaching activities of sustainable design can be divided into two types. Firstly, lecture-based learning is mainly utilised to teach sustainable design principles and motivate students to implement sustainable design principles into their product ideas. In order to achieve the learning outcomes, various teaching strategies have been employed because the topic is relatively complicated and contains extensive jargon. For example, visual aids that include Power point presentations, motion graphics, and video clips are frequently used to clarify complex theories and maintain students’ interest. Moreover, the findings also indicated that students prefer to acquire knowledge through design case studies. Secondly, the findings indicated that sustainable design projects aim to provide empirical experience and enable students to gain a complete understanding of sustainability. In addition, NGOs and government agencies provide students opportunities to practice sustainable design by launching design competitions. The findings from the literature review and the interviews indicated that current modules allow students to gain an understanding of the basic principles of sustainable design. However, the modules are available in a limited number of design institutes due to a lack of lecturers with qualifications and experience in sustainable design. Moreover, as sustainable design teaching initially began in the field of engineering; the most relevant resources in Thailand were developed from an engineering perspective that limits designers’ ability to access information contained in these resources. Although some designers’ resources are available online, they have been created based on a western perspective, which may not be suitable to developing countries that have different conditions (Crul & Diehl, 2006).

7. Conclusion

The finding from this study indicated that Thailand has put in place policies and programmes to promote sustainable development in order to reduce social and environmental impacts but it has not been able to successfully implement these in practice. This section identifies obstacles that may have prevented the implementation of sustainable design in Thailand.

Firstly, most relevant initiatives focus predominately on addressing economic issues and given little consideration to social and environmental aspects. The OTOP programme, for example, aims to contribute to rural development by enabling rural residents to have higher incomes; develop their skills and build self-reliance. However, although the OTOP programme has achieved an increase in rural income, it cannot satisfy other expected outcomes because most initiatives have been focused on generating incomes. Moreover, the government has endeavored to reduce environmental problems by promoting Eco-design and although some manufactures have participated in Eco-design training, most manufacturers have implemented Eco-design to acquire business benefits and only...
carried out activities that enable them to comply with the requirements of the international market and reduce costs. They do not consider the whole product life cycle and, as such, continue to create negative environmental impacts.

Secondly, several sustainable design activities have been implemented but they have not had a great impact due to a lack of solid linkage between all three pillars – Economic, Social and Environmental. Thai Eco-products producers focus solely on environmental aspects and pay little concern to social dimension. This situation also appears in the OTOP initiatives that give small consideration to environmental sustainability whilst promoting social improvements. The findings strongly suggest that the national agenda needs to be more coherent and cooperation amongst all stakeholders including: government, business, and education sectors are required to successfully implement sustainable design.

Lastly, the findings indicated that a lack of sustainable design knowledge has resulted in ineffective implementation of sustainable design. The findings of this research indicated that there is an opportunity to improve the education provision in Thailand and that this could act as a key driver for achieving increased capability and capacity in sustainable design. Although current modules can achieve the outcomes of learning and teaching sustainable design, they are only available in a limited number of design institutes due to a lack of design lecturers with qualifications in sustainability. Moreover, self-learning is restricted by a lack of appropriate learning materials. Future research aims to address these shortfalls by developing an educational tool and a framework that facilitate learning and teaching sustainable design in Thailand.

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