

## Status of Eco-design in Thai Furniture Industry

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**Keywords:** Eco-design, Thai Furniture Industry, Furniture Design, Environmental Impacts

**Abstract.** Furniture manufacturing is known to have considerable impacts on the environment and there is a definite trend towards environmental-friendly product designs in the industry worldwide. This paper reports the results of an exploratory research on the status of eco-design in the Thai furniture industry. Two basic research questions are addressed; 1) are there any eco-design activities and, if so, to what extent and 2) what are the driving forces that drive or hinder eco-design activities. A combination of research methodologies were employed; interviewing, survey, and actually examining selected products in the market. The results show that key personnel know very little about eco-design, but they have implemented a number of eco-design methods in their products and processes in practice. The driving force for such progress seems to be not from the environmental consciousness per se but rather the demands and requirements from the customers and the markets. The legal and supporting infrastructure to promote and move eco-design forward is just emerging and still rather weak. There are, however, considerable implementation problems and obstacles due to lack of technical know-how on the part of the personnel involved. It is concluded that the Thai furniture industry is implementing number of eco-design activities without knowing much about eco-design principles and the underlying philosophy. Public awareness and consequently the market force is key to moving eco-design forward. Effective campaigns and better education on sustainable development and eco-design, together with stronger legal and supporting infrastructure, would certainly help increase eco-design activities.

### Introduction

Furniture manufacturing could lead to environmental impacts of various kinds. These include particulate matters and air pollutions [1], volatile organic compounds [2], carbon dioxides [3], and depletion of natural resources. The degree of such impacts, of course, varies from firm to firm depending upon such factors as manufacturing processes and technologies being employed, raw materials, environmental management measures etc. Improving such downstream activities, could only be done to a limited extent, however, as most activities are previously set by design decisions made earlier. Environmental friendly design, or eco-design, would therefore be more effective in countering the impacts from furniture industry.

Eco-design has in fact been increasingly adopted by leading furniture manufacturers worldwide [4]. Environmental awareness of end-use customers is also increasing and the customers are prepared to pay more for environmental friendly products [5]. Ikea, for example, minimizes the types of materials in its products, employs extensive recycling leading to dramatic waste reduction (up to 75%), and avoid using not-so-environmental-friendly materials such as chlorofluorocarbons and polyvinylchloride [6]. Steelcase employs life cycle assessment methodology in assessing environmental impacts of raw materials and final products [7]. Other eco-design concepts are also employed including the use of recycled and recyclable materials, minimizing packaging materials, and design for disassembly and ease of maintenance. Other leading manufacturers such as Hermanmiller, Knoll, Allsteel and Itoki are increasing their efforts to reduce the impacts on the environment by embracing eco-design concepts together with environmental friendly manufacturing

technologies [8]. It can be said that the trend towards more environmental friendly design and manufacturing in furniture industry is here to stay.

Eco-design is relatively new to Thailand. The concept was implemented originally in electrical and electronic sectors due essentially to the requirements set by importing countries [9]. Other sectors such as plastics, packaging, petrochemical, textile, and automotive are now implementing eco-design concept to some degree [9]. Whether eco-design concept is employed in the Thai furniture industry is not clear, however. The objectives of this research are 1) to find out whether there are any eco-design activities and, if so, to what extent, and 2) to identify the motivation behind such activities.

## Methodology

A combination of research methods were employed in this research; questionnaire survey, interview, study of actual products and the companies' literature. Out of the 300 questionnaires sent, 30 were returned of which 20 were from small firms, 9 from medium-sized and one from large firms. Twenty-two interviews were conducted, half by face-to-face and the other half by telephone. Interviewees were selected from all sizes of firms and from a variety of responsibilities, from CEOs to managers to designers and manufacturing personnel. Several products were investigated, partly to cross-examine the information obtained from the survey and interviews, and partly to directly assess the extent of eco-designs embedded in the products. Relevant information from other sources such as catalogs, leaflets, company reports, and websites were also consulted.

In this research we classify the level of eco-design knowledge into four groups; Good, Fair, Little, and Nil. 'Good' means being able to explain eco-design concepts clearly with specific examples. 'Fair' implies good general knowledge but lacking details and specificity. 'Little' means knowing rather limited knowledge about eco-design, and 'Nil' refers to not having any of such knowledge at all.

## Results

General eco-design knowledge of key personnel of sample manufacturers were first assessed. It was found that only 10% possessed clear understanding about eco-design while 24% had fair knowledge about the subject. About two thirds of the samples (66%) know very little to noting at all (Fig. 1). More detailed examination revealed that smaller firms were more knowledgeable than larger ones which was rather surprising.

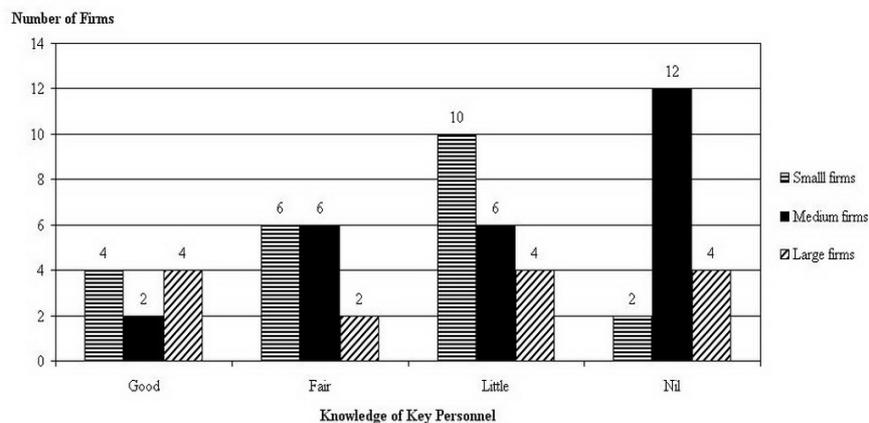


Fig. 1 Eco-design knowledge of key personnel of Thai furniture industry.

When asked about the importance of environmental friendly design and manufacturing, the majority of the respondents (88%) stated that it was important. Almost half (46%) felt that eco-design was important to future success of their products and their companies, and were interested in

implementing eco-design concepts. It is interesting to note that while their eco-design knowledge is limited, most are enthusiastic about eco-design and environmentally benign production.

In order to assess the extent of eco-design which the sample firms might have had implemented, selected products and processes were examined in some detail. It was found that Thai furniture manufacturers had in fact employed a number of eco-design and related concepts in practice. These include design for recyclability, use of recycled and natural materials, design for ease of maintenance, minimizing chemical and other toxic materials, design for minimum wastes and pollutions, and minimizing energy consumption (Fig. 2). Deeper probing for the reasons behind such practices revealed that customer requirements and cost reduction were major drivers rather than environmental consciousness per se.

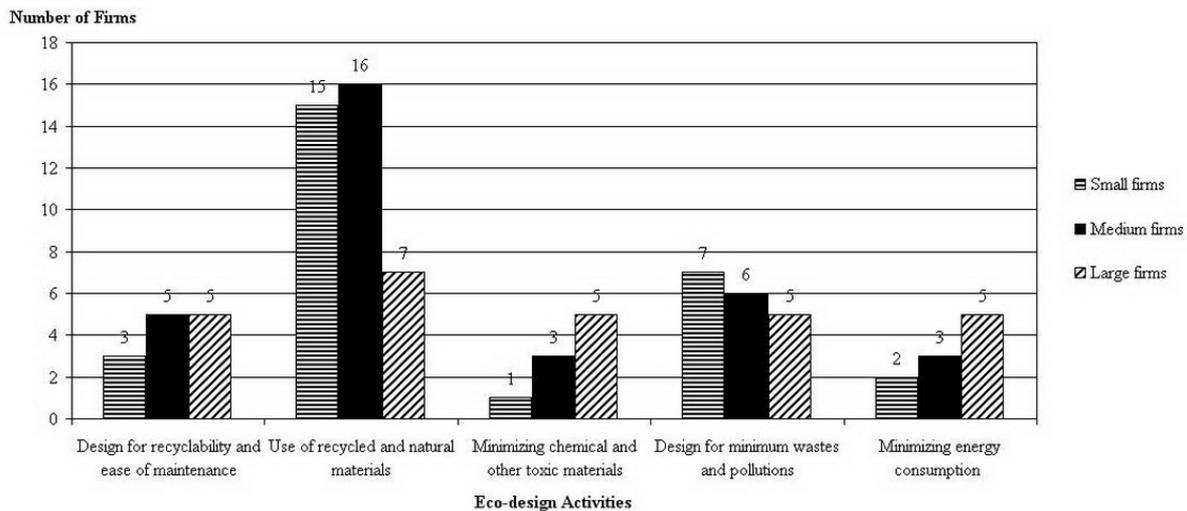


Fig. 2 Eco-design activities implemented by Thai furniture industry.

There were several problems associated with implementing eco-design concepts. Inadequate technical capabilities including lack of relevant knowledge and information was, according to the sample firms, the most important problem, followed by increasing manufacturing cost and lack of cooperation of employees. Most of the firms felt that outside assistance in improving eco-design knowledge and skills was important and necessary to increase eco-design activities in the industry. Increasing public awareness about environmental problems and enacting relevant regulatory requirements were also seen as important measures to move eco-design forward.

## Discussion

Compared with advanced countries such as the USA, Japan and the EU, eco-design activity in Thai furniture industry is rather limited. Those firms that have implemented eco-design in practice are mainly the ones who have customers in advanced countries. This is not surprising when considering the fact that advanced countries possess sufficient knowledge and resources for implementation in addition to high degree public awareness and more developed infrastructure.

It was found in our research that key personnel in smaller firms were more knowledgeable about eco-design than those in larger ones. Our explanation is that those in smaller firms are young people with modern education who have rather more freedom in making design and manufacturing decisions than those in larger firms, thus are more motivated to search for new ideas and knowledge [10]. Larger firms, on the other hand, have their own time-honoured practices and a good deal of information is provided by key customers. This explains why large manufacturers perform a great number of eco-design activities without knowing much about eco-design principles.

Most of Thai furniture manufacturers are aware of increasing environmental problems and intend to employ greener manufacturing practice if possible. When it comes to actual implementation,

however, they are reluctant to do so. This is due partly to limited technical capability and partly to economic motivation. A large number of eco-design activities were implemented because they were specified by key customers. It seems that the true driving force that can really move environmental friendly design and manufacturing forward is customers' requirements. Regulatory measures would also help. Technical capabilities could be readily acquired once the former conditions exist. This observation is in agreement with what happened in other industries, electronic and electrical appliance in particular, who have now widely implemented eco-design concepts and methodologies.

### Conclusions

1. The majority of Thai furniture manufacturers have little knowledge and understanding about eco-design. Only 10% of sample firms possess clear understanding about the subject. Smaller firms are more knowledgeable than larger ones.
2. Almost 90% of the sample firms are enthusiastic about environmental friendly design and manufacturing, and are willing to embrace such concept if possible. Major obstacles seem to be limited technical capabilities and economic motivation of such endeavors.
3. Thai furniture manufacturers have in fact employed a number of eco-design concepts and principles. Most of such activities result from the requirements set by key customers.
4. The true driving force to increase eco-design activities seem to be the demand from customers. Regulatory measures would add the impetus to the process. Technical capabilities could be developed once the motivation is right.

### Acknowledgments

The authors would like to thank the Commission on Higher Education, Thailand, for financial support for this research.

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**Advanced Design and Manufacture II**

doi:10.4028/www.scientific.net/KEM.419-420

**Status of Eco-Design in Thai Furniture Industry**

doi:10.4028/www.scientific.net/KEM.419-420.769

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