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Improving Sustainability Concept in Developing Countries

Sustainable Thinking and Environmental Awareness through Design Education

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Abstract

Environmentally aware design aims to convert global socio-environmental concerns to investigate ecological principles and interactions with design decisions, which determine levels of sustainable usage of environmental resources. The aim of this study is to analyze the changing role and responsibility of designers and the importance of environmentally aware design education as crucial factors to acquire knowledge through the viewpoint of sustainability. The outputs and findings of the workshop conducted with design professionals and educators will be analyzed to consider the obstacles and fundamentals of sustainable design education for developing countries to create environments, buildings and products in a sustainable way.

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Keywords: Sustainable Thinking; Environmental Awareness; Sustainable Design Education; Socially Responsible Design.

1. Introduction

Design is an environmental focal point since design decisions have huge impacts on the environment. Considering environmental issues, designer's responsibilities become more difficult and more important than before. Designers have crucial responsibilities to create sustainable products and solutions for the earth. To do that, they must be extremely concerned about environmental issues and they are supposed to be far more knowledgeable as professionals than anybody. Since they have crucial positions to create better solutions by considering environmental issues and creating environmental processes and products, they have to consider a wide range of criteria as part of the design process with respect to the environmental considerations.

It is not always easy to be aware of all the environmental issues that surround design decisions because of lack of knowledge and information on the environmental performance of design processes and possible solutions. In this

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case, when considering environmental issues in design education, the responsibilities of designers and design educators are more extensive than ever before to create a better design in a better way for the environment.

Sustainable design is a complex and important issue that basically represents irreversible changes in production and consumption and thus, the way people interact with nature through the environments, buildings, as well as products. Considering the ecological footprint of the developing world, it is crucial to develop significant differences emerge on the environment regarding consumption of renewable and non-renewable resources. Sustainable design has mainly been described as the intersection point among the social, environmental and economic goals that challenges for social and technical innovation globally. In this case, it has consequences for all design professions from urban planning to architectural design and also to product design with its complexity that can be addressed and managed through design for sustainability.

Sustainable thinking is basically defined as making decisions that do not cause negative consequences for current or future generations. In this respect, sustainable design and environmental awareness aim to preserve natural resources and to reach human and societal wellbeing. Not only governments but also design professionals need to create design decisions for communities that can provide for an improved quality of life, protected ecosystems, social wellbeing and economic equity. No matter what the scale is, the ultimate goal of sustainable design aims to find better solutions that provide quantitative, qualitative, physical, and psychological benefits to the users. There are many possibilities for achieving this difficult goal and mainly three principles of sustainable design including economy of resources, life cycle design, and socially responsible design that provide a broad awareness of the environmental issues associated with every scales of design education.

Unlike developed countries, although sustainable design is intended to develop more environmentally conscious products and processes, environmental effects have been ignored through design and planning stages in developing countries. In this case, considering the better environmental solutions derived from awareness and related regulations by developed countries, it is crucial that the applications of sustainable design require new way of thinking and particular frameworks for considering environmental issues. In this case, developing countries need to consider these solutions for challenging traditional procedures through new way of design thinking and applications. Designers have responsibilities to create a better world by considering environmental issues and creating environmental awareness throughout the country. Unlike developing countries, designers and design educators have already started to translate rising public concern into action by changing their behavior to accommodate recycling or energy efficiency and by using environmental awareness as the main criteria of their design decisions as professionals.

2. The Importance of Sustainable Thinking through Design

Today, environmental regulations force designers as well as manufacturers to become more responsible for the environment that requires a new approach to design. Although traditional issues considered in design have related mostly to function, appearance and financial concerns, it is important that designers need the right information and tools to minimize the negative effect on the environment results from their design decisions (Köhn, Hinterberger & Straaten, 1999). Environmentally aware design perspective requires new regulations to achieve a new sustainable approach that includes all stages of its life cycle.

The challenge of environmental awareness and sustainable design is to alter traditional design and planning procedures to incorporate environmental considerations and applications effectively (Allen, Bonazzi & Gee, 2001). Sustainable design needs to translate global environmental concerns into products and applications. Designers have an opportunity to exert considerable influence, however, it will have to be supported by knowledge and flexibility, and an ability to go on learning since they have an essential tool in planning and design a sustainable future (Mackenzie, 1991).

Sustainable design involves a framework for considering environmental issues and improving traditional methods for design in the light of sustainability. As stated by Lewis and Gertstakis (2001), sustainable design considers need, equity, and ethics and seeks to translate global socio-environmental concerns into design decisions and creation techniques. Therefore, it is crucial to create sustainable economic and socially responsible solutions and designer must ensure that by providing solutions to one set of environmental problems they are not creating or increasing others. This concept is vital to designers for every scale from product to the environment. Burall emphasizes that

(1991) designers need to show their imagination and leadership, pioneering the way for solving environmental problems. Environmentally aware designers should aim to increase efficiency in use of energy and other resources as well as minimizing pollution derives from design decisions.

Although designers have an ability to help create environmental process and design decisions, a great deal of design professionals educated without reference to the environmental impact of their design decisions and activities since design has not been taught in the context of its social and ecological impact. In this case, many designers assume that their area of responsibility is limited to function and appearance and do not spread through the lifecycle of their designs no matter what their scale is (Rassam, 1995). For many years, designers have been demonstrating the power of design as the new demands of designing for minimum ecological impact provide an ideal platform from which designers acknowledge their responsibilities (Mackenzie, 1991).

Design must be considered as the pivotal part of the environmentally aware thinking and process that involves a wide range of other skills. Many environmental problems are caused by the pollution that results from the products and services from the environmental scale to the building and products (Hiesinger & Marcus, 1993). Because, most products and services use natural resources, many of which are irreplaceable. Traditional definitions of good design already include criteria such as performance, safety, simplicity, efficiency and attractive appearance (Papanek, 1971). Designing for sustainability does not ignore the traditional criteria for good design, but it demands new considerations are also taken into account (Burall, 1996).

Environmental development requires some fundamental changes in approach by designers. Traditionally, designers have restricted their work to considerations affecting just a part of the lifecycle of a product: meeting the needs of the user and they mostly ignored the fundamentals for ecologically aware design. Environmental design and development extends these considerations to the whole process. Designers have a responsibility for direct health and safety consequences of their work. Today, those responsibilities are extended to the benefit of the global ecology (Papanek, 1995). According to Papanek (1995), design is the key intervention point for making radical improvements in the environmental performance of products and the relationship between design and ecology is a very close one, and makes for some unexpected complexities, as well.

Environmentally responsible design requires a clear policy, a structured approach and reliable information no matter what their scale is (McCamy, 1972). Life cycle assessment is about minimizing environmental troubles throughout the life cycle of a product. The life cycle concept is a ‘cradle to grave’ approach to thinking about products, as well as processes and services. It recognizes that all product life-cycle stages have environmental and economic impacts. Fiksel explains that (1996), product life cycle begins with the first phases of design and proceeds through the end of production. Research, marketing and service to support products are also included in the life cycle. However, retirement and disposal of products are generally not considered. The life cycle framework is a system for assessing the full environmental, economic and social consequences of design (McClellan, 1970). So, in its most complete form, life cycle design evaluates total inputs, outputs, and effects for all stages of the life cycle (Keoleian & Menerey, 1994).

It is ultimately the designer who gives form and meaning to objects that not only offer utility, function and convenience but also entertainment and visual pleasure. However, although a growing number of designers acknowledge that they wish to be a part of the solution that is sustainable development, many designers and others involved in product development seem to feel restrained from having a positive environmental effect on the design process (Zube & Moore, 1987). In this case, design for the environment mainly divided into main parameters including process design that focuses on reduction of energy consumption and pollution processes. Material design is concerned with the use of raw materials to minimize hazardous wastes. Finally, energy consumption design is the selection of processes that results in a reduction of the energy requirement (Byars, 1999).

In addition to designers, consumers of the future should extremely concern about environmental issues and should be more knowledgeable than many of their elders (Morris, 1997). The changes required for designing and marketing environmentally sensitive products and processes. Designers should be aware of that being the first with an environmental innovation also brings competitive advantage (Ottman, 1998). Meeting the challenges of environmental consumerism presents its own rules for corporate processes, product quality and promotion that are need to take into account from the viewpoint of sustainability (Richards, 1997).

Many marketers now grow their businesses by addressing the specific environmental issues most relevant to their consumers. Not only marketers, but also designers use these strategies to create profitable new or improved sustainable products and packages that balance consumers' needs with environmental consideration. So, for the designer, the ability to understand the environment impact of design decisions will no longer be an optional extra, but rather an essential part of design skills (Rassam, 1995). Designing products in order to minimize their impact on the environment is becoming increasingly important. Many designers are beginning to recognize this fact and are therefore demanding tools and techniques that enable them to design more responsibly (Moore & Miller, 1994). In business use, a product life cycle begins with the first phases of design and proceeds through the end of production.

Research, marketing and service to support products are also included in the life cycle. However, retirement and disposal of products are generally not considered. The life cycle framework is a system for assessing the full environmental, economic and social consequences of design (Wann, 1996). So, in its most complete form, life cycle design evaluates total inputs, outputs, and effects for all stages of the life cycle (ReVelle & ReVelle, 1974). Reducing environmental impacts and risks depends on developing and using accurate information. The need for information extends throughout design (Graedel & Allenby,1996). If the product/environment have been properly designed with a concern to minimize environmental damage, extending the life of a product can also directly reduce environmental impacts (Vesilind, Peirce & Weiner, 1990).

Consequently, ecological and social issues have become more important than ever before and developing countries have finally realized that design and design professionals have vital new roles as the pioneers of creative sustainable thinking. Looking at products closely highlights the environmental problems they cause which environmentally aware designer should take into consideration. Sustainable design simply defined as the best for people, profits and the green planet (Park & Lebys, 1998). Environmental issues are complex and environmental problems mostly caused by the design decisions taken by designers who have lack of ability and knowledge on the environmental issues and sustainable point of view.

3. Improving Environmental Awareness via Design Education: Interdisciplinary Workshop

In traditional terms, the concern of designers usually ended with design of products, services and environments. However, considering the recent studies from developed countries, it is obvious that environmentally aware designer should think about the complete life of their creations and solutions for every scale of design. In this respect, a design workshop, named 'Think Sustainable', has been conducted to realize the fundamentals of sustainable thinking and the obstacles for environmental awareness through design education for developing countries. Because of demanding changes in attitude for today, the responsibilities of environmentally conscious designers have become more difficult and important than ever before. Designers have already needed to consider criteria as part of their design process including production, financial and technical considerations, etc. However, environmental considerations and respect could be even more complex compared with these traditional processes.

Sustainability and socially responsible design studies have shown that designers should be aware of their environmental performance that they create via design decisions from the beginning to the end of product life for their creations for various scales of design including environments, buildings to the products. In order to do that, designers must take considerable responsibility for asking right questions recognizing that the improvement of the environmental performance for any product does not come in a simple way. In this case, it is difficult to be aware of all the environmental issues that surround design decisions and also to find detailed information on the environmental performance of products for developing countries that creates negative effects on sustainable thinking. In order to find out growing responsibilities of designers through the rising environmental concerns, two-days design workshop has been conducted with the designers and design educators.

Through the workshop, professional design educators, as well as academicians, from varied scales of design disciplines have come together to analyze the obstacles for developing countries and to find out the fundamentals of sustainable thinking and environmental awareness for designing and creation processes. Besides, participants of the workshop have also discussed the difficulties for reaching the environmental regulations and solutions for adjusting these processes for developing countries.

Unfortunately, many designers and design courses continue to ignore environmental issues through their design and design education process in developing countries. However, this particular study has proved that it is essential to include detailed information about environmental issues and their relationships to design processes. In order to anticipate problems and devise inspired solutions, designers and design educators must be equipped with an understanding of subjects that goes beyond the boundaries of traditional design teaching.

Although, designers from developed countries mostly have an opportunity to exert considerable influence, considering developing countries they usually ignore that because of lack of environmental awareness and knowledge. It is crucial that, this influence need to be supported by environmental knowledge and an ability to go on learning and creating sustainable solutions in the first place.

Fig. 1. 'Think Sustainable!' Workshop through Design Disciplines

According to the outputs derived from the workshop, although many of the traditional designers have resisted spending too much time away from the creative process, minorities of them have wished to spend their time devoted to information collection for the environmental effects of their solutions. On the contrary, considering developed countries with improved environmental awareness, new generations of design professions realize that gaining knowledge about environmental effects of their design decisions should be a part of their creation process in order to create environmental solutions. In addition, these knowledge and sustainable thinking also needed to be embedded into design solutions for long-term successful and sustainable results. Environmentally aware designers also emphasize that they have to be working closely with the environmental researchers who can advise them through the design process to identify any potential environmental problems.

As one of the main obstacles for developing countries to reach sustainable thinking through design process, it has defined that designers have asserted their influence for many years and underestimated the power of design for environmental awareness. According to the discussions considered through the workshop, the new demands of designing for minimum ecological impact need to provide ideal platforms from which designers acknowledge their growing responsibilities. In this case, the crucial question is that why should so much responsibility fall to designers and design educators to achieve environmentally aware design solutions for sustainable future?

Design is a pivotal part of the sustainable thinking and creating environmentally conscious design process is a part of a whole complicated way of creation that involves a wide range of other skills. Considering the results derived from the workshop, environmentally conscious designers must demonstrate an ability to widely consider these complex environmental issues that surround designing for minimum environmental impacts. To do that, new generations of designers and design educators in developing countries need to undertake comprehensive and overall research before starting the design process and an understanding of environmental issues that is essential for environmentally aware designers.

Fig. 2. (a,b) Outputs of the 'Think Sustainable!' Design Workshop

Besides, based on the findings derived from the workshop, in order to improve environmental awareness, designers need to evaluate which design solutions are better from an environmental point of view to develop products in a sustainable way. In this case, environmentally aware designers for developing countries have a crucial environmental role to play for reaching the goal and collaboration with other disciplines by considering the importance of sharing knowledge via successful communication and partnerships through varied disciplines. To do that, designers will ensure that environmental issues can be successfully built into products and processes (Figure 3).

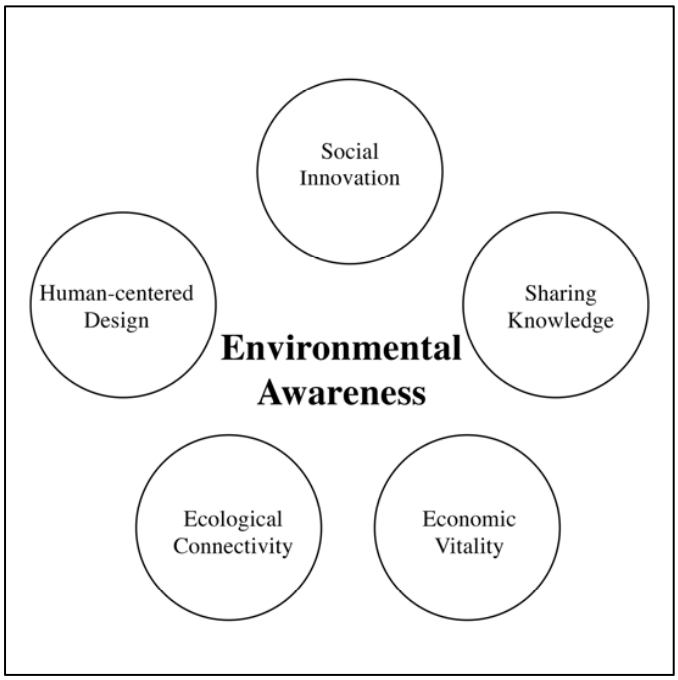

Fig.3. Fundamentals for Improving Environmental Awareness through Developing Countries

Environmental awareness and sustainability are not only environmental, but also ethical and social issues that new generations of designers should consider to minimize negative impacts of their works. Besides, designers must have abilities to create connection and interface among consumers and sustainable design tools. In this respect, designers which consider and respect environmental issues, need to evaluate which design solutions creates better results from an environmental point of view to develop products in a sustainable way better for consumers and the environment. Considering the complicated structure of sustainable thinking, designer's limited role for the environmental improvement in developing countries need to be developed in combination with other disciplines that requires for designers to be aware of their important role to play for sustainable development as well as for creating essential tools in planning a sustainable future.

Findings of the workshop also state that environmental issues need to be considered throughout the development of design concepts and applications. There is an important need to consider environmental issues from the early stage in the design process to the long-term harm to the environmental sources. In this respect, environmentally conscious designers have to be understood the relations among design decisions and the long, as well as short-term effects to the environment. As stated, that difficult job requires close partnerships with other disciplines that lead designers to look beyond appearance of their design and development decisions to minimize the risks coming from the failure of a process.

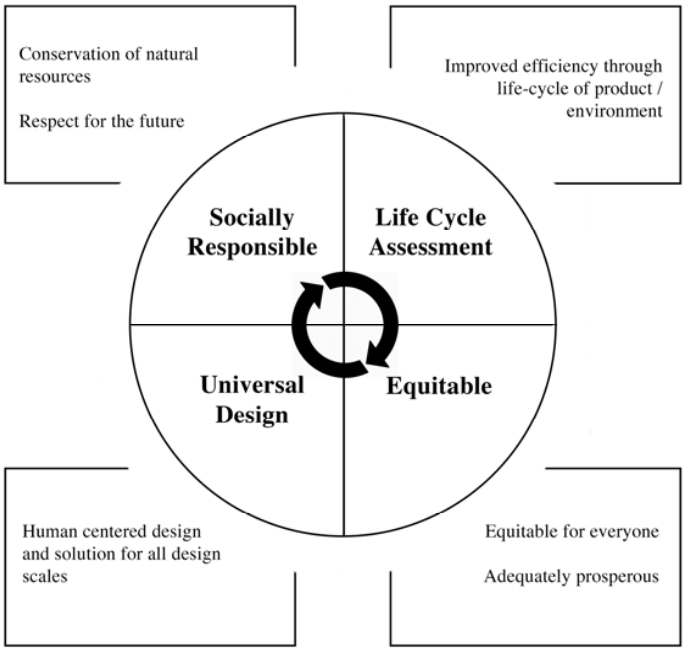

Fig.4. Components for Improved Sustainable Thinking through Design Education in Developing Countries

On the other hand, developing sustainable products and processes require sensible resource use, environmental protection and sustainable economic development. To support this, there is an urgent need to have an environmental awareness and reflect its fundamentals through design and education processes. In this respect, environmentally aware designers also have crucial responsibilities for creating sustainable economic and social solutions to ensure that by providing solutions to one set of environmental problems they are not creating or increasing others.

Although the emergence of education for sustainable thinking is relatively new concept for developing countries, the discussions and results from workshop have proved that, it has to be included environmental, social, economic thinking and also ecological aspects. In this respect, education for sustainable design processes and solutions aim to be transformative on human thinking, collaboration, ethics and values (Figure 4). Consequently, considering the workshop and its outcomes it is proven that, unlike the traditional design thinking, the responsibility of environmentally aware designers do not end with the launch of the products regarding that environmentally conscious designer should consider the complete processes for preventing any long-term harm to the environment. In other words, new and developed definitions of good design should include environmental considerations and sustainable way of thinking.

3. Conclusion

Since the concept of sustainability and environmental awareness have become more important today, the challenge of sustainable design and manufacturing processes to incorporate environmental considerations have become more crucial that require changes in these existing procedures. Considering developed countries, products are no longer designed with no regard for the long-term impact on natural resources. However, this concept and the way of thinking are quite new aspects for developing countries and the regulations for sustainable future have become recently developing issues for these countries. In this case, increasing environmental awareness is crucial through designers as well as the whole community.

Designers' taking the environmental impacts of their works into consideration is quite a new approach for developing countries and the findings of the workshop have shown that designers from developing countries urgently need to be equipped to respond to the new and environmental demands, which will arise from these changes. Unfortunately, in traditional design education process, design has not been taught in the context of its social and ecological impact so far and thus, many designers assume that their area of responsibility is limited to function and appearance. Although designers as mentors of design need to be immersed in design processes to meet expectations without ignoring environmental aspects, these regulations on protecting the environmental issues, collaborations with related disciplines are crucial factors for sustaining these applications for long-term and sustainable solutions. In this case, there is an urgent need to raise awareness starting from the environmentally aware design education for designers and decision-makers.

In developing countries, many of design professionals educated without reference to environmental impacts of their design decisions and applications so far that limits their area of responsibility. However, environmentally aware designers need to lead the way for solving environmental problems through their designs. To do that, they must be aware of their crucial role for dealing with these challenging issues for minimum environmental impacts result from their decisions. However, it is not easy to achieve this goal and requires an awareness to undertake thorough the research before starting the design process and an understanding of environmental issues.

Working alone, designers have limited power to achieve all these improvements. In this context, designers emerge that conflicting range of issues and considerations to build into products and processes in combination with other disciplines. As stated, many designers and design educators continue to ignore environmental issues in developing countries. However, it is essential to include information about environment issues and their relationships to the design processes in order to reach long-term and sustainable solutions. Besides, to anticipate problems and devise inspired solutions, designers must be equipped with an understanding of environmental subjects that goes far beyond the boundaries of traditional design education in developing countries. Reducing any harm to the environment caused by design decisions also need to be considered by designers as decision-makers. In this case, environmental product development requires some fundamental changes by designers without ignoring the traditional criteria for good design.

Designers have to be educated to develop an ability to take on environmental issues to surround designing for minimum environmental impacts. In addition, designing all new products in a sustainable way is simply not enough to prevent pollution and also requires some revisions for existing designs and design solutions. In this case, there are some important areas of concern for environmentally conscious designers that they should establish how they could limit environmental damages from day to day. Since it is difficult to find detailed information on the environmental

performances of design concepts considering developing countries, designers must take huge responsibility for asking right questions to be aware of all environmental issues that surround design decisions. Although designers cannot be expected to have specialists' and deep knowledge to gather all the environmental information, they have to be educated as knowing the importance of collaboration through design and other disciplines related to the environmental issues. In order to achieve this goal, environmentally aware designers have to work closely with environmental researchers and allow them to review their works at concept stage to identify any potential problems throughout the whole life cycle of products.

Unfortunately, many designers and design courses continue to ignore environmental issues in developing countries that are essential to include information about environment issues and their relationships to design process in the curriculum. In order to create inspired solutions, designers of all scales must be equipped with an understanding of subjects that reach beyond the boundaries of traditional design teaching. Designers have opportunities to apply considerable influences that have to be supported by knowledge on sustainable thinking and environmental awareness. They must also realize the basic relations among design decisions and their negative and positive effects on the environment. In this case, new generations of designers must be able to evaluate which design solutions are better from an environmental point of view to develop products in a sustainable way.

Many environmental problems are caused by the pollution that results from production and use of products and services. Designers, which are educated with environmental respect and awareness, can have a positive influence on reducing environmental damages, which occurs at each stage of design process because, most products and services use natural resources that are irreplaceable. Improving environmental awareness among consumers is also crucial duty for these designers as mentors of design disciplines. In addition to consider sustainability issues through design process, creating environmentally conscious consumers by raising awareness via design solutions also help to reach this goal. Regarding these crucial aspects, environmentally aware designers develop life cycle assessments to help to minimize environmental problems caused by design decisions through the whole process for life cycle concept about products, processes and services. In this respect, new generations of designers, which are equipped with environmental awareness and knowledge through their design education, can create an interface among consumers and design that develop awareness on the environmental issues via their design decisions. It must be considered that, designing for sustainable future never invalidates traditional criteria for good design, however it demands that new aspects need to be considered for sustainability since the environmental awareness through design is the main intervention point for making radical improvements in the environmental performance of products, systems and processes that leads to better ways for embracing environmental issues.

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