

面向可持续生活方式的工业设计策略与案例研究

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摘要: 可持续设计必须考虑到在整个产品生命周期中环境、经济和社会等因素的影响。通过系统分析和比较可持续设计、绿色设计和生态设计等概念, 研究了可持续生活方式的表现形式和内涵。在此基础上, 提出了可持续生活方式导向下的产品创新设计策略, 这些策略主要包括关注服务系统、关注地域环境、关注公众参与和关注用户行为。应用这些策略, 分析了由美国哥伦比亚大学地球研究所的科学家和工程师所开发的竹制自行车项目。

关键词: 工业设计; 可持续设计; 生活方式; 案例研究

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Industrial Design for Sustainable Lifestyle: Strategies and Case Study

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Abstract: Sustainable design takes into account of environmental, economic and social impacts enacted throughout the product lifecycle. By providing a systematic analysis and comparing sustainable design, green design and ecodesign, thorough researches about representing forms and meanings of sustainable lifestyle were offered. Based on these, a series of strategies of sustainable lifestyle-oriented creative product design were outlined, such as service system focus, local environment focus, participatory focus, and behavior focus. Applying these strategies, the bamboo bike project developed by scientists and engineers at the Earth Institute at Columbia University was thoroughly analyzed.

Key words: industrial design; sustainable design; lifestyle; case study

1 Introduction

The crisis of sustainability, the fit between humanity and its habitat, is manifest in varying ways and degrees everywhere on earth (David W. Orr, 1992). Many individuals, companies, and organizations now recognize the crisis described by Orr and others, and are searching for solutions to the myriad of problems caused by today's industrial and

economic practices. The field of design (and all of its subsidiary professions: architecture, industrial design, interaction design, engineering, etc.), has become a major focal point for sustainability, yet 20 years ago there was no real concept of it and very little research into the subject of environmentally conscious design. This changing of design concept is not surprising since poorly designed industrial systems, products, and buildings can more and more greatly contribute to envi-

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ronmental and social degradation. Although the concept of environmentally conscious design is relatively young, its importance is gaining recognition throughout industry and academia. Environmental concerns are being addressed in a number of organizations and, with the introduction of legislation. “green”, “environmentally friendly”, “eco-” and “sustainable” have become catchphrases in almost every design discipline.

However, it is becoming clear that current views of “design for the environment” cannot fully solve the crisis of sustainability because they focus only on a product’s physical attributes: material construction, energy use, manufacture, transportation, and disposal. The shortcoming of this perspective is that even if a company could design and manufacture a product that uses only clean energy, gives off no carbon dioxides, and could be recycled at the end of its useful life, it would still not be truly sustainable unless every person who uses it does so in a responsible manner and returns it for recycling at the end of its life. The idea of a “sustainable product” is misguided because the impact that any product has on the social and ecological environment depends as much on its use as on the technology it deploys. Chopsticks, for example, can easily be made from recyclable renewable bamboo, but it will still have a negative environmental impact if used disposable. The crisis of sustainability has emerged as an extremely complex sociological dilemma, where the lifestyle that we have adopted is rapidly eroding our ability to survive. It is obvious, then, that to play a profound role in making sustainability a reality, one must persuade the general public to adopt sustainable lifestyle. The role of the designer in developing a sustainable society is not simply to create “sustainable products”, but rather to envision products, processes, and services that encourage widespread sustainable lifestyle. This goal of industrial design can be accomplished through the strategies to help guide design decisions.

2 Sustainable Design and Sustainable Life-style

2.1 Sustainable design

Sustainable product design is one part of a global movement towards sustainable development, which is driven by the realization that society cannot continue current modes of production and consumption without serious ecological damage. One commonly quoted definition of sustainable

development is “development which meets the needs of a current generation without compromising the ability of a future generation to meet their needs”. According to Simon, sustainable products “must generate capital for future generations to offset its use of non-renewable resources”. A comparison of these can be made with the definition of sustainable product development, given by The Centre for Sustainable Design at Surrey Institute of Art & Design: “Sustainable product design is a design management practice which aims to balance the ‘triple bottom line’: environmental, social and economic needs.”

Sustainable design takes into account environmental, economic and social impacts enacted throughout the product lifecycle (Bhamra and Lofthouse, 2007), requires the balancing of economic, environmental, ethical and social issues in product design and development. Sustainable product design requires creativity, innovation and the participation of many different actors such as policy makers, business strategists, managers, designers, engineers, marketing managers and consumers.

2.2 Green, eco- and sustainable design

A suitable definition for environmentally conscious design is one that has been applied to eco-design: design which addresses all environmental impacts of a product, without unduly compromising other criteria like function, quality, cost and appearance (ECO₂ group, 1994). And “sustainable design” always are used to refer to a broader, long-term vision of ecodesign, it means “analyzing and changing the ‘systems’ in which we make, use, and dispose of product”, as opposed to more limited, short-term DfE (Design for the Environment). The ECO₂ group makes a similar distinction between “green design, project-based, single issue and relatively short-term; and sustainable design, which is system-based, long-term” ethical design. Emma Dewberry and Phillip Goggin have also explored the distinctions between ecodesign and sustainable design, arguing that, whereas ecodesign can be applied to all products and used as a suitable guide for designing at product level. The concept of sustainable design, however, is much more complex and moves the interface of design outwards toward social conditions, development, and ethics...

2.3 Sustainable lifestyle

Economic and environmental concerns are generally well defined and understood, the social sphere of sustainable design is less so and as such warrants further explanation. In

its broadest terms it can encompass personal responsibility, quality of life, health, well-being and happiness, democratic participation and cooperative behavior. It is widely agreed that consumer's lifestyles can influence product design and that they are now beginning to request "sustainable" products, yet it is apparent that there is little understanding of sustainability. Designers shape the development of products and services which directly impact upon people's lifestyles. The application of sustainable design strategies can greatly reduce environmental impacts which occur during use, however, are often determined by consumer's behavior and lifestyles. For example, In support of a change in attitude and lifestyles, the UK government launched its "Going for Green" project to stimulate ideas to change people's lifestyles and identify obstacles to progress in achieving sustainable development.

3 Strategies

When applied to design, sustainability not only introduces the ideas of ethical and social responsibility, but also the strategies and processes of creative product innovation. Sustainable lifestyle-oriented product innovation aims to provide customer, society and business values whilst significantly decreasing environmental impacts. And the strategies in practice always involve service system focus, local environment focus, participatory focus, and behavior focus.

3.1 Service system focus

In its broadest definition, design is the art of shaping society through new products, organizational structures, processes, services, and methods of communication and interaction. Correspondingly, the overall goals of design are the overall goals of society. The goal of sustainable design is to create service system for people living meaningful, peaceful, and fulfilling lives in beautiful harmony with the natural world, so that the designed products should be compatible with a set of values, attitudes, and characteristics that designers wish to promote, and the goals are to promote sustainable lifestyles, format a sustainable society. This suggests changes in design and the role of design, including an inevitable move from a product to a service system, from hardware to software, from ownership to service, and will involve concepts such as dematerialization and a general shift from physiological to psychological needs.

3.2 Local environment focus

Sustainable lifestyle involves different practices and values for different people depending on their local environment, culture and resource, so that attempting to determine a universal product service system for all people is inconceivable. A successful sustainable design requires a set of values, traits, or characteristics that encourage sustainable living in local situation. And the people's sustainable lifestyle will be achieved when every individual possesses a fundamental set of local skills and use local resource to develop sustainable solutions to local problems. These are the characteristics that enable people to live in harmony with their local surroundings.

3.3 Participatory focus

Participatory design means "strong democratic" solutions when the peoples make decision about their needs and development in design. This suggests that the job of the designer is to provide choices for people. These choices should be real and meaningful, allowing people to participate more fully in their own life decisions, and enabling them to communicate with designers in finding solutions to their own problems, even — whether they want to or not — to become their own designers. People act as their own designers when they are able to recognize needs in their lives or their communities, and develop solutions to meet those needs.

3.4 Behavior focus

In sustainable design, one of the challenging roles of the designer is to change the behavior of consumers for the benefit of us all. This change can be very minor — selection of one material, or major — a reduction in energy usage and waste generated etc., which can make the product more sustainable. Sustainable design, therefore, has a major requirement to understand consumer actions in their many modes of operation. To understand how designers can encourage sustainable behavior, one must first closely examine the extent to which designed products and new technologies affect society and individuals.

4 Case Study

This case is a Bamboo Bike Project by scientists and engineers at the Earth Institute at Columbia University, and aims to examine the feasibility of implementing cargo bikes made of bamboo as a sustainable form of transportation in

Africa. The ultimate goals of the project are:

- 1) To build a better bike for poor Africans in rural areas.
- 2) To stimulate a bicycle building industry in Africa to satisfy local needs.

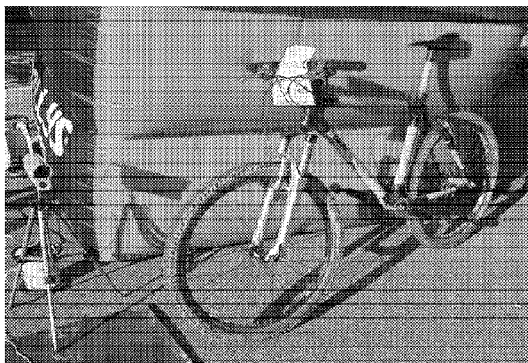
They have determined that it is possible to source the material and supplies necessary to build a bamboo cargo bicycle in Africa, and train the local people to build the bikes.

The next steps are:

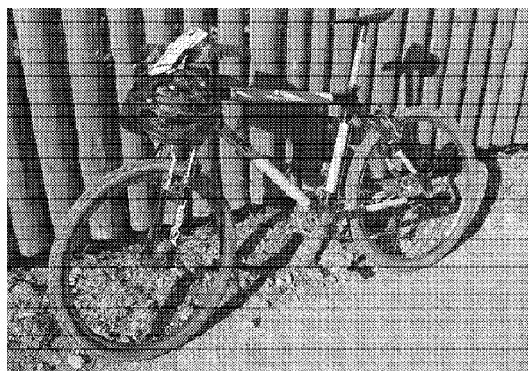
- 3) To setup systematic bamboo cargo bike building training.
- 4) To setup a supply chain of necessary parts and supplies.
- 5) To scale the effort so that it makes an impact.



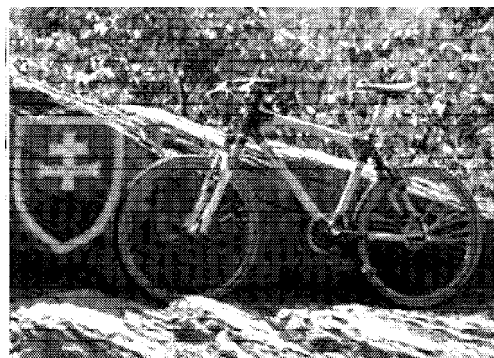
a) Structure of Bamboo Bike



b) Service Scenario of Carrying Cargo



c) Service Scenario on Muddy Road



d) Service Scenario on Rugged Road

Fig. 1 Bamboo bike and its service scenarios in different environment

5 Conclusion

The transition from “green” to “eco-” to “sustainable” in the design field represents a steady broadening of scope in theory and practice, and to a certain extent, an increasingly critical perspective on sustainability and design. To some extent, sustainable creative design strategies rely upon the sustainable lifestyle and consumption patterns. From the macro perspective, the reality of inequality between developed and developing nations, the fact that 20 percent of the world’s population consumes 80 percent of the world’s resources, result in the limitations of sustainable design developing and global moving toward sustainability in today’s international development context.

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