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A Study on the Application of Green Design Theory in Environmental Art Design

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Abstract. At present, human beings face three major problems: environment, resources and population. Modern design must take into account the basis of human survival - natural environment. The design community has put forward the slogan of green design: namely take conservation resources and environment protection as the subject, protect the ecology, and be friendly with the environment. The concept of green design has attracted more and more attention in the environmental art design. Combined with the background of green design in this paper, the connotation and characteristics of green design is analyzed to summarize the basic principles of green design and implementation countermeasure in environmental design. Finally, some examples of feasible green design are put forward for analysis.

1. Background of Green Design

With the rapid development of science and technology, on the one hand, it brings beautification and comfort to human life. On the other hand, it causes great waste and destruction of human resources and environment, and the contradiction between man and nature is increasingly prominent. In the face of many new problems, the establishment of "sustainable development" production model has been adopted by more and more countries as the development strategy, and the "green design theory" that uses advanced technology and takes into full consideration of product greenness and economy has emerged.

In China, the average living standard was low, and the people have relatively fewer material goods. With the development of human society, new technologies and new methods have been widely used in production practice. The ability of people to transform nature has been greatly enhanced, the economic situation has improved, the material resources have been enriched, and the purchasing power of the people has also increased. The government is adopting the proactive fiscal policy to expand domestic demand, and we are entering a period of consumption promotion. At the same time, China is a country with a lower average resource occupancy percentage, and the ecological and environmental problems are more serious.

In order to maximize profits, the company has made every endeavor to promote sales, thereby leading to a lot of waste. On the one hand, enterprises simply pursue economic benefits regardless of consumable materials such as "over-packaging" abundant in the field of packaging design; on the other hand, enterprises unrealistically expand production and accelerate the upgrading of products in order to stimulate consumption, and there are many phenomena of repeated production and repeated construction, such as VCD heat and "touch net heat", which have resulted in a great waste of resources. As a result of these phenomena, the degree of human damage to natural resources has increased, the ecological environment has become increasingly polluted, and the exhaust gas, waste water, waste residue and waste heat emitted from various industrial processes have polluted the atmosphere, water and soil. At the same time, noise and vibration may also be generated to endanger surrounding



environment. In addition, the environmental damage caused by waste and domestic waste after industrial products have been used is also quite serious. Therefore, the protection of green environment of the earth has not only become the key topic of the world, but also the worldwide social problem. The field of design is also responding positively. More and more products are designed with the theme of environmental protection. While increasing productivity, the attention to environmental protection is changing the designer's thought and concept, thus a new trend of green design has emerged.

In the world, green design has become one of the hot spots in the field of design in recent years, especially in the United States, Japan, Europe and other countries, research is very active. The recycling laws and regulations formulated by the United States, Japan, and some European countries have attracted great attention from academia and industry. Many scholars have put forward their own theories on the recyclability of products. In addition, the University of California of the United States not only established a research institute on environmental awareness design, but also established a special web page for green design that can be systematically queried on the Internet. In Europe, there have been many papers on green design and green manufacturing in CIPR in recent years. In recent years, the International Organization for Standardization has proposed the ISO14000 industrial environmental management system standards, and thus as a basis for judging whether products can enter the international market. The emergence of a series of standards has created a strong impetus for manufacturers to promote the development of green products. At the same time, all developed countries and organizations have specialized institutions for green science and technology research, such as CenCITT in the United States, BMFT in Germany, ENEA in Italy, ETH in Switzerland, three national committees in the United Kingdom, and the Science and Technology Department in Japan.

2. Connotation and Characteristics of Green Design

"Green Design" (GD) was originally derived from a copy of environmental pollution regulation in the United States in the 1970s, which has the same meaning as current DFE (Design for the Environment)¹. However, as a kind of new design concept, it comes from the rethinking of modern design art values by the Western design art community in the early 1980s. The so-called green design is the design to protect the green environment of the earth. It is the first step in building a green industry. When developing new products, designers must use the overall thinking (designers shall not only consider the environmental impact on production and use of new product, but also think of the way out after the failure of products in the whole process of product life cycle). The research scope of "Green Design" extends from product design and manufacture to product packaging, product promotion and product marketing that are closely related to products, to green service consciousness and green culture consciousness of the whole society. The 3RE principle - Reduce, Reuse, and Recycling is an important part of it.

Green design has two characteristics: One is that the entire life cycle of design object shall be considered in the design. The other is that the designer should give priority to the environmental properties of design object, prevent the environmental pollution fundamentally, and save the resources and energy while ensuring the normal function of the product.²

3. Basic Principles of Green Design

Compared with the past, the most important difference between modern design and the past is the transformation of design concept, namely adhering to the concept of "sustainable development". This transformation is mainly derived from the cognitive return of human beings to their relationship with nature. From the perspective of environmental protection, the green design includes three basic principles: Safety principle, economy principle and social principle.

3.1. Safety Principle - Protection of the Safety of Nature and Humans.

Natural ecological safety and human survival security are unified. In the environmental design, raw

1 Steven Ashley, Design for the Environment, Mechanical Engineering, 1993.3, P.52-55

2 Liu Beiguang: Green Concepts in Environmental Art Design, Decoration, 11/2005, Phase 151

materials that can be recycled or easy to regenerate are used as much as possible, which shall be easy to disassemble, recycle and reuse after use, hereby saving energy and not polluting the environment. In the 27th Olympic Games held in Sydney in 2000, the concept of "Green Olympics" was used. In the construction of the Olympic venues in Sydney, the piece of wood and straw were crushed into recycled boards for partition board, and the solar battery was used for night illumination of Olympic street lights. The water was collected to water the garden, and even turning several rubbish hills into parks where flowers are in blossom. The Sydney people's understanding of the "Green Olympics" gives us a lot of inspiration.

3.2. Economy Principle - In the Environmental Art Design, the Simplified Design should be Implemented as Much as Possible to Avoid the Excessive Consumption and Occupation of Resources Due to the Complexity of Design and Increase the Use Efficiency and Number Of Resources.

Minimization of material use, maximization of product durability and minimization of energy consumption are our goals. However, simplified design is not equal to simple design, and does not mean to give up the pursuit of art aesthetics. Therefore, simplifying design, saving resources, and meeting the requirements of function and aesthetics have become important criteria for testing the quality of environmental art design. The building design the environmental load can be reduced and the lifetime resource consumption after the design is completed is minimized on the basis of creating comfortable communication space by coordinating the modeling with the surrounding environment and adjusting the setting distance appropriately.

3.3. Social Principle - Avoid Excessive Design and Waste of Resources, Even Environmentally Protection Materials should be used as much as Possible.

With the enforcement of awareness of environmental protection, environmental art designers have upgraded design practice and theory to the heights of lifestyle design, cultural model design and system design, that is, using system theory as the guiding ideology to create a reasonable and healthy survival mode and living environment, and oppose to pursue the so-called "pure art" of environmental art design at the expense of social resources.

4. Implementation Countermeasures of Green Design

The idea of vigorously promoting green technology and green design in all fields of social production activities plays an important role in future economic development. In order to better implement the thought of green design in the whole society, produce more green products and design more green buildings, and the following countermeasures are proposed:

4.1. Insist on Establishment of New Ecological Ethics.

Firstly, through environmental legislation, the development of green design ideas is promoted, the functions of internationally advanced green design technologies and products are carefully analyzed and studied, and technologies suitable for China's national conditions are actively introduced. The state should encourage and support the development of green products in terms of policy and economy, and acceleration of industrialization process and expansion of city scale have resulted in regional environmental pollution, ecological damage and resource depletion, bringing huge impacts on the limited resources and fragile ecological environment on the earth. Green design and environmental protection are complementary to each other.

4.2. Adhere to the Concept of Resource Conservation and Resource Recycling Use.

In order to reflect the concept of green resource conservation in building design, the recycling of resources shall be persisted. Resource conservation is not only a control of engineering cost, but also a practical way to save construction resources in the later stage of the project. It is very important for the application of green design to realize the rational utilization of resources and display the concept of green design while designing.

4.3. Adhere to Energy Conservation and Environmental Protection as the Basis.

In the green design concept, the emphasis is placed on the improvement of design concept. The former high consumption is transformed into low consumption. With the help of energy-saving technology, we can improve the effective utilization of resources, make innovations of building resources, avoid excessive reliance on existing resources and realize self-sufficiency in some resources. The current environmental pollution is closely related to building industry, which not only includes air pollution, but also light pollution and electromagnetic pollution. Therefore, the introduction of green design concept of the building needs to examine the entire construction cycle, assess the environmental pollution caused by the entire cycle of the construction process, improve the concept of resource conservation, strengthen the innovation of building materials, and enhance the protection effort of architectural environment.

5. Implementation Examples of Green Design

Now, the concept of green design has been widely recognized and promoted by countries all over the world. In this paper, the residence, restaurant and kindergarten design are used as an example for discussion.

5.1. Green Design in Residential Environment.

The construction of green residence environment will strive to create a green residential environment guided by “life, vitality and healthy development” with “the improvement of living environment in the residential environment” as the goal. The green residential environment can be understood not only as the urban residential environment with life and vitality, as well as optimized, high-quality living conditions and living space where people can develop in a sustainable and healthy manner, but also the residential space with high living quality, high performance, high living grade and cultural charm, which is characterized by low consumption of natural resources, less energy consumption, pollution-free, non- pollution.³

The design principle of green residential environment is the core of green design. All design factors are “people-oriented and nature-rooted”, taking from nature and using in nature. Modern residential environment is not only a space for urban human living, but also condensed and divergent point of residential culture. Therefore, the emphasis on cultural communication in the planning and design of green settlement environment is to cultivate the healthy and noble sentiment of the residents in the residential area, and create a cultural atmosphere of the green environment of residential area at the same time.

5.2. Low Carbon Green Experience Restaurant Design.

The fluidity of air flow. The restaurant is the environment for dining, and the primary task is to reflect its own superiority to attract customers to experience low-carbon environment and green restaurants, while this restaurant atmosphere is extremely important as the first impression. Therefore, the fluidity of the air flow is of the utmost importance in the restaurant environment. The main reason of mature design on ventilation performance of the building is the particularity of restaurant and the mobility of restaurant population. If the air does not flow or the flowing performance is poor, it is easy to cause bacteria to grow and spread in the air.⁴ Therefore, reasonable natural ventilation as well as supplementation and rational planning of artificial ventilation system greatly reflect the concept of green design.

About the issue of lighting. On the premise that it is possible to use natural light as far as possible, natural light is taken as the main body of lighting design, because natural light itself is softer relatively to artificial lighting, which is suitable for use in the environment like a restaurant. Secondly, the reasonable use of lighting can fully optimize the space of restaurant. Therefore, a large number of French window can be design to increase the lighting quantity, and the intelligent lighting systems

³ Zhou Lan. Urban Space Aesthetics [M]. Nanjing: Southeast University Press, 2001

⁴ Kong Xiaodan. Discussion on Design Principles of “Green” Interior Design [J]. Journal of Wenzhou Vocational & Technical College, 2014(02):38

such as the more popular optical control lamp are chose at the same time. The use of energy saving products can also reflect the design concept of low-carbon green experience restaurant.⁵

The selection of green and low carbon furniture. For the design of low carbon green experience restaurant, environmental protection and low carbon green furniture must be the first choice. In the premise of not considering the cost, green furniture can reflect the design concept and create a low-carbon atmosphere. As the demand for furniture in the restaurant is increasing, the furniture made of bamboo is the most practical and relatively low cost combined with cost consideration, which can play a very good role in promoting green and low carbon environmental protection propaganda at the same time.

5.3. Indoor Space Environment Green Design in Kindergarten.

The design of indoor space in kindergarten should take children philosophy to make children's activities harmonious with indoor space environment. The design of indoor space environment in kindergarten should be based on the needs of the children, take into full account the physiological, psychological and behavioral characteristics of the children, follow the principles of promoting the healthy development of children, and optimize the efficiency of indoor space environment for the purpose of safety, comfort, convenience, intelligence, green, environmental protection, health, hygiene and energy saving. In the design of indoor space in kindergarten, specificity of indoor space design, security of the space, color and wall decoration of the space should be considered emphatically. In the design of the indoor environment in kindergarten, the indoor air quality should be ensured by scientific selection of green decorative materials, green furniture, moderate decoration, scientific creation of physical environment, and reasonable selection of purification measures for indoor pollutants so that children can grow healthily.

6. Conclusions

Green design is a win-win game between environmental art design and natural environment. It is also a win-win game between designers and the public. Therefore, the advocacy of pursuing and promoting environmental art design based on three dynamic harmonies between people-to-people, people-to-nature and human themselves are in line with the trend of historical development and represents the progress of society. As a consequence, its wide application is inevitable. Nowadays, sustainable development is a major issue facing the whole world, and green design has become our only choice in today's deteriorating ecological environment. Although green design must rely on the support of high and new technology, there is still a long way to go to realize ecological architecture, green design has a very good development prospects, and we should be full of confidence in the future and development of green design.

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