

# Application and Development of Green Design Concept in Modern Ceramic Design

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**Abstract—Purpose:** this paper aims to explore the application of green design concept in modern ceramic design against the background of post-industrial social construction ecological civilization, and provide useful exploration for its development trend. **Method:** This paper analyzes from the ecological culture view of the object aspect, the organization aspect and the ideological aspect, and uses the modern design research method to solve the implementation of the green concept in modern ceramic design and the possible limitations, and supplement the overall design ecology system of "product-human-environment". **Conclusion:** the integration of green design concept and modern ceramic design has become a necessary requirement for the development of contemporary ceramic industry. It is a powerful balance between human and nature, which is conducive to improving the rational development and utilization of existing resources. It reduces the damage to the environment and reflects the overall pursuit of ethics and the pursuit of "truth, goodness and beauty" in modern design, laying the foundation for the sustainable development of ceramic products and future innovative research.

**Keywords—**green design; ceramics; sustainability; application

## I. INTRODUCTION

The ceramic products bring convenience to people's daily lives, while they also inevitably bring many ecological and environmental problems in the process of production, processing and disposal, which have certain impact on human survival and natural sustainable development. In recent years, modern ceramic design should also conform to the trend of green design and establish a correct and harmonious design concept under the vigorous advocacy of building ecological civilization and green homes, to meet the material needs of consumers and the economic needs of society. It is necessary to meet the needs of sustainable development of all mankind and the ecological environment to the utmost extent, and truly realize the harmonious unity of "truth, goodness and beauty" in design.

## II. OVERVIEW OF GREEN DESIGN

Green design, also known as eco-design, was formed in the 1980s. It starts from the technical level and design concept and aims to maintain the harmonious symbiotic relationship between human and natural ecology. It is an important change in the development of industrial design,

reflecting the designer. The caring about the ecological and environmental problems caused by modern science and technology is also the embodiment of the designers' social morality and responsibility. However, green design also has a certain idealistic characteristics. It requires designers to give up the over-emphasis on commercial interests, change the shape-centered design concept, and combine the low-consumption, high-quality product design together in a simple, convenient and effective way. At the same time, it also requires the joint efforts of national government organizations and consumers.

From the characteristics of universality and relativity of the system, the design can be regarded as a whole organic system of "product-human-environment", and green design is also regarded as a system which aims at "product-human-environment". The organic overall design is a philosophical guide to the comprehensive and systematic design of new concepts and new ideas. It must not only satisfy the basic functions of products, but also fully consider the pleasantness, applicability, usability and natural holistic harmony. Actively create market opportunities, guide green consumption, pay attention to various green issues in product packaging and transportation, improve and strengthen all links in the "design chain", and push green design into to a new stage.

## III. THE IMPORTANCE AND INEVITABILITY OF GREEN DESIGN CONCEPT IN MODERN CERAMIC DESIGN

Friedrich Engels once said: "We should not be too fascinated by our human victory in nature." Nature has retaliated against us for each victory like this.<sup>1</sup> The industrial society brings the rapid development of science and technology and convenient and fast way of life to human beings and consumes a large amount of non-renewable resources on the earth at the same time, which has caused tremendous damage to the ecological balance of nature. The excessive commercialization mode in industrial design also bring a lot of fashion and freshness to consumers, it also produces a lot of industrial pollution and waste. The "planned commodity abolition system" originated from the US consumer design that is a pattern design commonly used

<sup>1</sup> Marx, Engels. The Central Committee of the Communist Party of China Marx and Engels Lenins Dalin Works Compilation Bureau (translated). Marx and Engels Selected Works Volume 4 [M]. Beijing: People's Publishing House, 1966.06.

in the design of modern industrial products, which greatly promotes the development of the market economy and meets the material and psychological needs of consumers. But there are also potential ecological crises, energy crises, and cultural crises, all the designers have to begin to reflect on the nature and meaning of design. In the late 1960s, American design theorist Victor Papanek first proposed the concept of "ethical design" in his book *Design for the Real World*, it emphasizes that "design should seriously consider the limited earth resources and protect the limited resources on earth."<sup>2</sup> It has a direct impact on the green design trend and made a sensible and responsible design blueprint for the increasingly scarce industrial world.

In recent years, China's modern ceramic industry has a rapid development and has become the world's largest country in terms of total ceramic production and total export volume. At the same time, there are also many problems, such as insufficient research and development of advanced science and technology, unreasonable production structure, weak environmental awareness and concepts, lacking of normative management of green ceramics market, etc., all the mentioned factors accelerated the lack of natural resources, and successively produced a series of industrial waste, which caused damage and impact on the ecological environment. Therefore, it has important practical significance in the design and application of green design concept in modern ceramic industry. Developing modern ceramic green design concept in a vigorous way is not only conducive to the protection of ecological environmental and establishment of the sustainable development concept of ceramic industry, but also promotes the prosperity and development of modern ceramic design in China and enhances international competitiveness and influence with great importance and inevitability.

#### IV. APPLICATION OF GREEN DESIGN CONCEPT IN MODERN CERAMIC DESIGN

The green design concept advocates the concept of sustainable development of recycling. Compared with the traditional design concept, it is a two-way thinking process combining forward thinking and reverse thinking. It emphasizes the rationality of design from the perspective of consumption results and environmental benefits. Therefore, it also has a more profound and complex human and social connotation.

The well-known social and anthropologist Mr. Fei Hsiao-tung has proposed three levels of culture, which can be embodied in the following aspects in the establishment of the green ceramic design ecological culture concept:

##### A. Utensil Aspect

The object aspect is for the technical and material level design, the most representative is the "3R" principle, reduce, reuse and recycle. It is the core idea of green design.

1) *The reduce principle*: The design of minimalism is based on the reduction of materials and cost, and it is characterized by "light, thin, short and small" which contains the design concept of "small is beautiful" and "less is more" that has run through the whole production process of material selection-production and processing-packaging materials selection-transportation. It is needed to strive to fundamentally control the waste and pollution of resources and energy to reduce waste discharge, like the scientific mining of kaolin raw materials, energy saving and environmental protection of the bone china, and miniaturization, detachability and modularization of their shapes. The concept of minimalism in green design has emerged since the 1980s and has formed the so-called "Minimalism" (as shown in "Fig. 1"). This set of white porcelain tableware adopts the idea of "minimalism" and perfectly adopted the green concept in the artistic design, it is a classic of modern Finnish green ceramic design.



Fig. 1. White porcelain.

2) *The reuse principle*: It has been reflected in the public art form in recent years. The public art ceramic wall (as shown in "Fig. 2") located in the Sanbao pottery village of Jingdezhen has re-used and created the local waste ceramics, forming a new personalized artistic language, reflecting the artist's inner heart. Self-expression also adds a sense of natural agility. Porcelain art is one of the traditional Chinese ceramic decoration techniques with a profound historical, humanistic and artistic value. It also provides a new green inspiration for modern and contemporary ceramic design, reprocessing and splicing useless and damaged ceramic debris decorated in architecture, walls, products and artworks. It not only has decorative aesthetic value, but also reflects the traditional Chinese cultural connotation. It is the transformation and innovation of modern design ideas to meet the current social and ecological needs. The inheritance of traditional Chinese ancient crafts has become an effective means in modern green environmental protection design. The idea of "adapting to local conditions", "taking local resources" and "conforming to nature" is the perfect embodiment of our excellent traditional concept of creation.

<sup>2</sup> (US) Victor Papanec. Zhou Bo (translation). Design for the real world [M]. Beijing: CITIC Publishing House, 2012.11.



Fig. 2. Jingdezhen Sanbao Pottery Wall.

3) *The recycle principle*: Products that are required to be discarded after use can be recycled to become available "new" resources, which is difficult to carry out for the ceramic products. In the process of early treatment of ceramic waste, due to the backwardness of technology, common direct landfill methods are often adopted, which lack scientific rigor and cause serious pollution to land and river resources. However, with the development of secondary processing technology, a large number of ceramic fertilizers can be reused in the production of daily-use ceramics and sanitary ceramics, in the production of industrial ceramics, cement and glazes, etc., which makes green ceramic design step forward.

#### B. Organization Aspect

Start from the formulation of national and government policies, the development and popularization of national design education, and the improvement of designers' self-cultivation. The development of design is not only a one-way effort for product design itself, but also inseparable from the support of national policies and the improvement of professional competence of designers. Bauhaus-Universität Weimar and the Hochschule für Gestaltung have proved the importance of education. Looking at the present, the advanced modern design countries in the world have a complete design education system suitable for the development of the country. Such as Department of Design in Tokyo University of the Arts, School of Design in Chiba University, , California College of Art, Art Center College of Design, etc. Therefore, it is needed to pay attention to it and vigorously develop modern design education to improve the overall design awareness of the people, and change their inappropriate design concepts. Strengthen the professional ability and personal cultivation of professional designers, and meet the needs of the times, innovate on the basis of satisfying the needs of the masses, social development and ecological harmony, and form a modern green design system with Chinese characteristics.

#### C. Thought Aspect

Zhou Li Kao Gong Ji said: "Creation should adapt to the weather, adapt to the climate, good materials, exquisite technology, combined with these four conditions to produce

excellent utensils."<sup>3</sup> Since ancient times, China's creation design contains rich ecological perspective, profound philosophical thoughts and cosmology. The "Tian Gong Kai Wu" proposed by Song Yingxing in the Ming Dynasty and the Ming Dynasty gardening masters in the *Yuanye*: "Although it is made by people, it's just like the work from heaven", it is stressed from the "natural work" to the exquisite "artificial", the two factors are in each other's appearance, taking nature as the basis and the man-centered, creating a life like all things, natural and wishful, and advocating the unscented simplicity. Beauty is an aesthetic experience that is both natural and natural. It is also a reflection of green design and ecological values.

Nowadays, the green design not only requires environmental protection and pollution in the production and use of physical products, but also requires the establishment of an immaterial sustainable development concept, harmonious and unified aesthetic values, as well as social morality and historical responsibility, the concept of inheritance of culture, the mission of the times, etc.. Abandoning the "anthropocentrism" theory or putting human rights above all things, recognizing the independent value of nature, and establishing a "human-product-natural" unity and harmony. The trinity design system helps to promote the development and establishment of the ecological culture concept of modern ceramic design, and provides a solution to the technological ecological alienation that occurs in its production, so that it can develop its technological vision in accordance with ecological laws.

### V. LIMITATIONS AND DEVELOPMENT TRENDS OF GREEN DESIGN CONCEPTS IN MODERN CERAMIC DESIGN

The green design concept has penetrated into various design fields and become the mainstream of design guidance. However, it is not optimistic in the case of combining with specific ceramic design products. Some green ceramic products neglect the practical functions and symbol functions because they simply emphasize environmental protection and ignore the practical function, symbolic function and aesthetic function, coupled with the high cost, high price and other factors, has not been welcomed by the market and consumers, making green ceramic design seems to become an ideal slogan. Therefore, green design should break through its limitations and continuously improve and innovate in the future development trend.

#### A. The Combination of Green Design and New Technologies and Materials

The development and application of new materials have played an important role in promoting design. As a commonly used material, the biggest limitation of Ceramics too fragile to increases the waste of raw materials, which is also the main reason for its increase in scrap rate The pollution of waste products, therefore, the development of new scientific ceramic materials, extending the life cycle of

<sup>3</sup> Zhou Li Kao Gong Ji [M]. Beijing: Zhonghua Book Company, 1991.



ceramic products is the primary key to the development of modern green ceramic design.

Such as nano-ceramics, alumina ceramics, graphite ceramics, collapsible ceramic materials, etc., the green design will further enhance the functional beauty, form beauty, and technical beauty in ceramic design, and will also add more vitality and fun to our life. With the rapid development of science and technology, the artificial intelligence green design has a very good application prospect. In the design of ceramic products, it can also automatically adjust the temperature and appearance by scientific artificial intelligence technology and automatically upgrade and change, not only satisfying people's sense of freshness, the aesthetic appeal of fashion sense but also minimize the pollution rate in the production process through artificial intelligence design, reduce the disposal of waste materials, and achieve the ultimate goal of green environmental protection. With the rapid development of science and technology, the artificial intelligence green design has a very good application prospect. In the design of ceramic products, it can also automatically adjust the temperature and appearance by scientific artificial intelligence technology and automatically upgrade and change, not only satisfying people's sense of freshness. The aesthetic appeal of fashion sense can also minimize the pollution rate in the production process through artificial intelligence design, reduce the disposal of waste materials, and achieve the ultimate goal of green environmental protection.

#### *B. The Combination of Green Design and Humanized Design*

It has always been emphasized that the design for "people" is to pay attention to the humanized design, emotional design and universal design. Ergonomics has long penetrated into many aspects of our lives, bringing great convenience to our lives. Therefore, the design of green ceramics should also reflect the "people-oriented" design tenet, and become a design that truly blends with "people", rather than design slogans above life. For example, under the premise of environmental protection function, reduce the cost and make it more affordable to the consumers, rather than a "symbolic" high-end design; the privately-owned ceramics according to the different needs of different audiences with different design themes, shapes, colors to meet the material and spiritual needs of consumers, and give green ceramic design a unique emotional meaning, such as designing special products suitable for the elderly, pregnant women, infants and young children, to meet their safety, special needs such as independence and convenience; in the glaze decoration of ceramic products, it also avoids the chemical components containing heavy metals as much as possible, adopts safe, non-toxic, green glaze, and upholds the design attitude of being responsible to society and human beings, creating low consumption of high quality green products. In the future development, green design should be diversified on the basis of ecological and environmental protection principles, more humanization and emotionalization, and truly unifying people and nature.

#### *C. The Combination of Shared Service and Green Design*

Ezio Manzini, a professor at the Politecnico di Milano in Italy, once defined an idealized, non-materialist tendency for "sustainable design". This non-materialist design is a society that based on provides services and non-material products in the information society." The concept of "non-material" is used to express the general trend of future design development, from the design of objects to the design of non-materials, from product design to service design, from possession of products to shared services. With the rapid development of the Internet, the concept of "sharing" is everywhere now. Airbnb's rental platform, Drops a taxi and shared bicycles, charging treasures, umbrellas, and shared electric energy-saving cars, the sharing economy has been inadvertently Infiltration into many aspects of our lives has dramatically changed our way of life, and it is believed that in the near future, ceramic sharing design will also emerge from our lives. With the sharing road, on the one hand, ceramic design works are better, more efficient, more open, lower cost, and more environmentally friendly; on the other hand, there is no time and space constraints for ceramic designers, they can wield greater value. At the same time, it is also available to exchange useless ceramic items such as vases, incense burners, furnishings, tea sets, tableware, etc. with others through the network to obtain their favorite "new" things, from sharing to saving materials and production and reduce the disposal of old things. In this information society, the Internet and cloud data is gradually popularized and the traditional media of design has gradually changed. It's firmly believed that the future non-material design will bring us more surprises and conveniences, creating new development space for green ceramic design.

### VI. CONCLUSION

The continuous penetration and application of the green design concept in the design field has formed a guiding and organizational management model for modern ceramic design, and has drawn a blueprint for its future development. This is a more comprehensive design with a higher level than the specific design also known as "big design", only at this level can it be available to solve the problem of man-made pollution and environmental protection in the modern ceramic design process from the root, establish a scientific production mode, fully realize the functional significance and humanistic value of modern ceramic design, and finally form a higher level of "product-human-environment" harmonious and unified, and better serve people, society and ecological environment. It is believed that with the development and progress of society, modern ceramic green design will gradually become globalized, intelligent and diversified, not only as a scientific and sustainable design concept and mode, but also as a kind of national spirit and harmonious concept. The cultural symbols go global and contribute to the cultural confidence of modern Chinese design.

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