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Analysis of Digital Color Design and Environmental Art Design under the View of Ecological Civilization

Zongyi Dong[1,a], Qinghui Sun[1,b,*]

[1]Faculty of Construction, Guangdong Technology College, Zhaoqing, Guangdong, 526070, China
[a]838629030@qq.com, [b]848766457@qq.com
[*]Corresponding author

Abstract: *Under the background of the continuous development of natural civilization, due to the rapid development of social economy, the concept of natural civilization is gradually integrated into the modern design concept, which undoubtedly has a great impact on the development of nature. With the development of society and people's economy, the material and cultural level of social groups has been continuously improved. Contemporary environmental art design and digital color design are independent fields in the field of contemporary art, which are unanimously recognized by most designers. Compared with traditional environmental design, modern environmental design tends to be more detailed in interior design and more perfect in outdoor design. According to the concept of environmental civilization, modern natural art design should follow the harmonious integration of man and nature, reduce the impact of human activities on the natural environment, and achieve sustainable development of ecology and environmental protection. After investigation and experimentation, the concept of ecological civilization can improve the efficiency of design by 16% for digital color design and environmental art design.*

Keywords: *Ecological Civilization View, Digital Color Design, Environmental Art Design, Digital Design and Environmental Design Analysis*

1. Introduction

With the increasingly prominent problems of resource scarcity and environmental pollution, energy conservation and environmental protection has become a development topic in the modern world. Based on the results of the concept of natural civilization, this paper explores the methods and techniques of the influence of the concept of natural civilization on environmental art design and digital color design, and examines the design methods of modern natural art in this regard. Environmental art design and digital color design are two different art fields closely related to production and human life. With the deterioration of the environment and the improvement of people's psychological needs, the concept of environmental protection and nature is deeply rooted in the hearts of the people, and the relationship between ecological civilization and environmental art design is getting closer and closer. Therefore, based on the concept of natural civilization, creating a healthy, harmonious and sustainable natural environment is the development direction of modern environmental art.

Ecological civilization is a new stage in the development of human civilization, that is, it is a civilization after industrial civilization. Ecological civilization is the sum of material and spiritual achievements in accordance with the objective principle of harmonious development of man, nature and society. Xia L I believes that on the issue of ecological civilization construction, the interdisciplinary research results of liberal arts, sociology, communication and Marxism, as well as the synergistic effect of multidisciplinary interaction, are becoming more and more important [1]. Ju C believes that ecological civilization has evolved into a complex conceptual system [2]. Ju Changhua believes that ecological civilization is another field of civilization parallel to social civilization, and it is a whole composed of four elements of civilization. As a field of civilization, ecological civilization has a constant and systematic content, limited connotation and fundamental value [3]. Sheng C proposes technical methods to reduce market risk for the benefit of investors in market competition. His research provides many methods for reducing market risk measures and prepares for the development of ecological economy [4]. Dou Y pointed out that the key to solving the ecological crisis is to establish organic ecological thinking, community values, class inequality and a long-term holistic view, and under the guidance of these four core principles, he put forward a series of targeted measures to

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establish an ecological civilization towards postmodernism [5]. Zhao M found that the ecological environment quality of a city in 2015 was improved compared with 2013 by measuring the comprehensive index of ecological environment. However, in terms of ecological factors, some indicators have a certain deterioration trend [6]. Yan X encourages the adoption of new technologies and methods to achieve the common prosperity and development of man and nature. At present, the booming information economy takes information as a production factor, which promotes the effective matching of supply and demand in market transactions [7]. The interpretation of the ecological civilization concept in the above studies is relatively specific, but it is not related to digital color design, nor does it talk about environmental art design.

Digital Color and Environmental Design summarizes the relationship between natural environment, human environment and color, and analyzes issues such as natural light and artificial light, color rendering of light, the influence of light on environmental color, and color and light mixing and materials. Craig A discussed the use of digital technology to conduct scientific environmental color investigation, research, design and evaluation methods, and believed that color is an important content of landscape architecture planning and design, and color composition is the "first source" of visual perception [8]. Hu T proposed a data-driven intelligent design and simulation model based on primary color feature learning based on the early research on traditional national clothing pattern layout and texture appearance simulation intelligent technology [9]. Sun A Y aims to develop a more precise method for analyzing fashion image digital color under uncertain observation conditions [10]. Xu F believes that with the development of the times, in the environmental design art industry, the traditional environmental design art has been unable to meet the needs of customers. By using virtual reality technology, the quality of design products can be improved [11]. Luo K proposed that environmental art design is a more subtle and emotional art than other design arts. In short, it is a combination of rationality and sensibility [12]. Zhang X explores innovative ways of teaching mode for environmental art design majors. Through theoretical elaboration, combined with the understanding of literature and practical work experience, he innovated from three aspects of teaching concept, teaching system and training objectives, and established an innovative teaching system [13]. Xu Y expounded the application of computational intelligence in indoor environmental art design to improve the natural living environment and improve the quality of life of residents [14]. These discussions on digital color design and environmental art design are relatively comprehensive, but they do not include the concept of ecological civilization.

With the active advancement of the scientific concept of development, the concept of ecological civilization has gradually gained popularity and has been widely used in various human activities. It is necessary to integrate the concept of ecological civilization and effectively participate in the harmonious development of human society and the environment. However, under the artistic concept of environmental civilization, which is closely related to human life, environmental art design and digital color design prevail in modern environmental art design. Perfect consistency in digital color design is an important consideration for modern graphic designers and digital color designers.

2. Elements of the Concept of Ecological Civilization

(1) The connotation of ecological civilization concept

Industrial civilization has brought unprecedented disasters to human society and human settlements. Human beings are the foundation of social civilization. If the concept of ecological civilization is to develop well, the whole society needs to jointly establish the values and concepts of environmental development, environmental protection and sustainable development, and effectively elevate sustainable development and environmental development to a new height of social civilization. To be successful in the construction of ecological civilization, the following points must be done: the first is to save energy and improve the level of resource utilization; the second is to restrain environmental pollution and avoid environmental damage; the third is to develop the natural environment through technical means. In addition, the state should strengthen supervision over the construction of surrounding areas. Finally, environmental construction requires the participation of the whole society, establishes the concept of environmental civilization for all human beings, and realizes the sustainable development of society [15], as shown in Figure 1.

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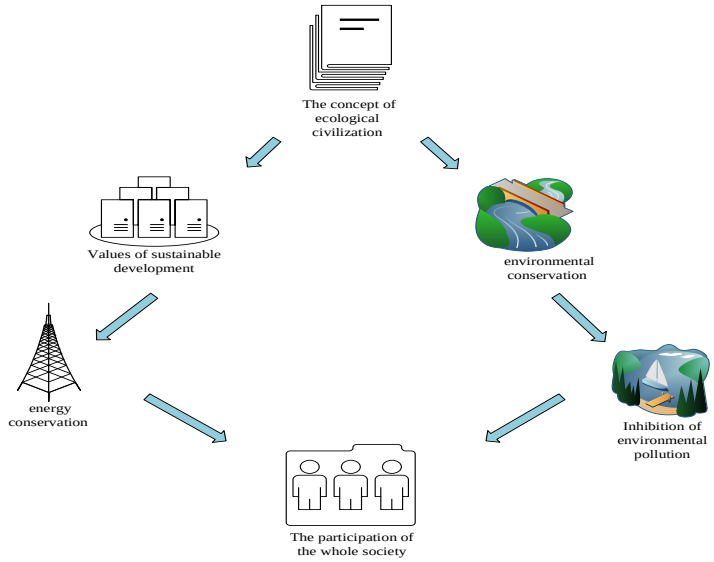

Figure 1: Connotation of ecological civilization view

(2) The impact of population activities on the concept of ecological civilization

In the process of human existence and development for thousands of years, a complex world view closely related to human social work has been formed, and a large number of different ecological civilization concepts have been formed. To facilitate the implementation of sustainable development strategies, there should be a comprehensive set of guiding concepts as the main support. In theory, the concept of ecological civilization can be divided into five levels. The first is human involvement in the development process. In order to make good use of resources in human social and economic development and production and life, it is necessary to increase the allocation of resources and energy, such as improving the level of production technology, establishing a resource utilization system and implementing the concept of natural civilization. The second is from the individual. From the perspective of environmental civilization, people should try to avoid activities that have a greater impact on the natural environment, control the discharge of pollutants, manage pollution well, and avoid pollution caused by human activities from causing damage to the earth and space resources. The third is to adopt the concept of environmental communication in the development process, and improve the reduction of possible pollution in the production process through a series of new technological processes, and reduce the impact of environmental pollution in the production process. The fourth is that the state plays a major regulatory role in the process of economic development, so it can restrict the production process of related enterprises from an institutional perspective, repair the living environment that is considered to be damaged and affected, and create a place that is in harmony with human activities and nature. Fifth, the concept of human ecological civilization is a concept that adapts to the life and development of modern people, as shown in Figure 2.

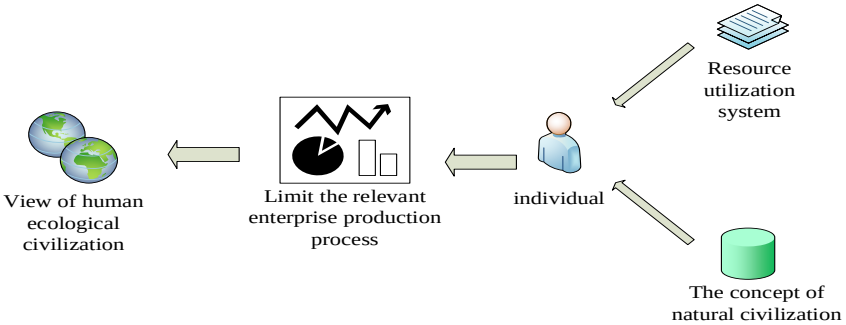

Figure 2: Influence of population activities on ecological civilization view

3. Digital Color Design and Environmental Art Design Elements

(1) The essence of digital color

Digital colors are also called number colors [16]. Generally speaking, digital colors are obtained by

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combining the basic digital codes of 0 and 1 by a computer, and the whole content of color characteristics can be expressed by the combination of various color codes. In terms of digital technology, digital color has many forms of expression. We often use color modes such as "HSB, RGB, CMYK", which can make full use of various digital combinations to express the quality of color. Taking HSB as an example, it basically expresses three color elements: H-hue, S-saturation and B-brightness. H stands for all colors in the range of 0-360°, and SB stands for degrees. Different color mode applications are different. Generally speaking, RGB is used for various displays, while CMYK is used for printing. Moreover, the colors displayed in different places are different. When browsing the Internet, different monitors, operating systems, graphics cards, and browsers mean that even the same color has different physical effects.

(2) The application of digital color in design

Color and light enhance the depth of space, without light there is no visual perception, and the existence of space cannot be visually perceived. In addition to spatial perception, color and light also play a role in conveying depth. For example, in a natural environment, colors are bright and accurate at close range, but dull and gray at a distance. The depth of color space is expressed by the contrast between light and shadow, cold and warm, shadow and space [17]. In design, the concept of interior space is often used in color schemes, some colors are popular now and some will be popular in the future. As shown in Figure 3, the ancient colors create a charming atmosphere, combined with classic style craftsmanship and traditional colors, the design seems to have a long historical value, and the arrangement of old songs and old photos will also evoke the feeling of traveling through time and space. All of this can be done with ease thanks to digital color technology.

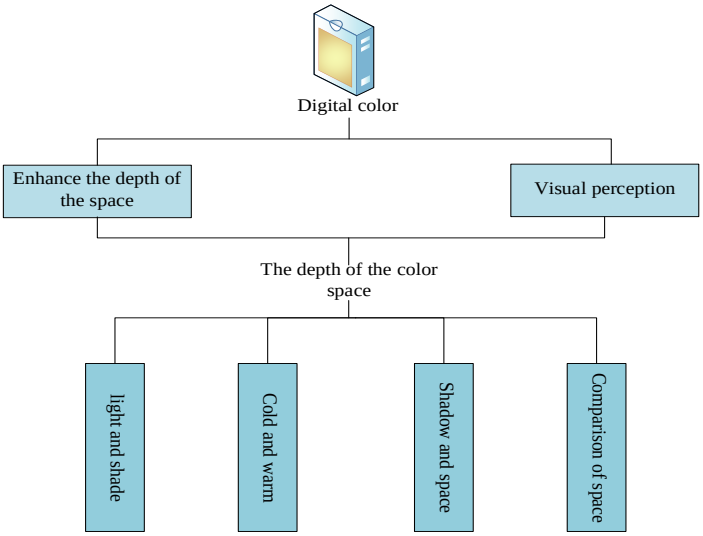

Figure 3: The application of digital color in design

(3) The current concept of environmental art design

The environmental design that appeared in this stage is gradually changing to a people-oriented way, that is, environmental design must have high requirements to meet people's various living needs, conform to appropriate design concepts, respect historical laws, and create natural designs [18]. It has a lot to do with people's lives. Designing art for nature is a long-term project that must be based on the principles of sustainable development. The economic development of a city is closely related to environmental issues and should be carried out simultaneously and at a constant pace in order to meet environmental and economic goals at the same time. In order to carry out the environmental impact assessment of urban planning in an all-round way, strong public support and active participation are required. Urban planners should actively consider public opinion, effectively manage the rights and interests of all aspects, and promote the healthy development of the city. In addition, all those involved in the creation of natural art must discuss and develop a design plan to meet the needs of all stakeholders.

(4) The role of aesthetic features in environmental art design

Environmental art design is an important part of art, and environmental art design does not mean decorative art [19]. Like any other art form, environmental art design originates from life and is

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designed to meet the actual needs of people's daily lives. In other words, environmental art design is based on functionality and practicality, so in order to express aesthetic value, environmental art design must have these two attributes at the same time. If it is just a natural decoration, it has no value in itself, such a design is a waste of materials and has no aesthetic value. In today's era of rapid economic development, people's demand for beauty continues to increase. Environmental art design is not only related to nature, but can be better integrated with nature. From an aesthetic point of view, artistic design should be in harmony with the environment. In addition, environmental art design should make full use of the environment to better reflect its aesthetic value. The difference between artistic design and natural materials will have a certain impact on the surrounding artistic composition and artistic atmosphere. This requires landscape architects to combine the professional knowledge they have learned with relevant cultural symbols, and at the same time make scientific and rational use of each part of the structure to enhance the beauty of the design object, showing its integrity and cultural appeal, as shown in Figure 4. For example, in traditional ancient gardens, in addition to the artistic conception of the building itself, the surrounding environment will further enhance the aesthetic sense.

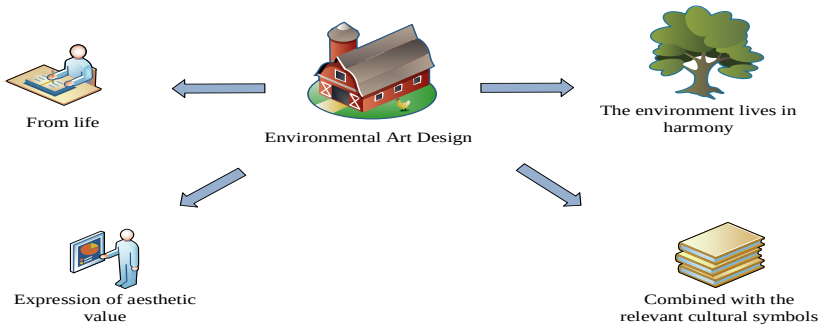

Figure 4: The role of the aesthetic characteristics of environmental art design

4. Influence of Ecological Civilization Concept on Digital Color Design and Environmental Art Design

(1) Environmental art design under the concept of ecological civilization

With the development of social economy and human civilization, environmental art design has gradually developed into an independent art category. The artistic conception of the place is closely related to the work of the people, and the artistic conception of the place is based on the ideas and requirements of the work of the people. The artistic vision of human activity space, that is, the consciousness of the mind and the desire for human activities, affects the concept of natural art. On the other hand, the design of nature art can have a great impact on the changes in people's activities and consciousness. The sustainable development of modern society requires the scientific and rational application of the concept of natural civilization in the concept of modern natural art. Effectively linking the design principles of ecology and environmental protection with the continuous development of modern environmental art and the concept of natural civilization can establish a harmonious development relationship between environmental civilization and modern natural art concepts.

(2) Indoor and outdoor environmental art design under the concept of ecological civilization

When designing interior landscape art, it needs to pay attention to the logical planning of the space. Under the guidance of the concept of ecological civilization, designing the indoor free space according to the structure of the building can simplify the content and processing of interior decoration and reduce the pollution of interior decoration to the environment. In the interior process of environmental art design, it is necessary to create a place suitable for human activities while reducing decorations. This is suitable for indoor environmental art designers to create new designs, use new formats that can ensure the quality of indoor environmental art design and preserve decorative materials, and effectively use the concept of ecological civilization in modern environmental art design. Currently, land resources are very limited. Therefore, when designing outdoor natural art, it is necessary to make rational use of earth resources and make full use of the excess corners that appear in the design, which can be designed for flower beds, small lawns, etc., to effectively utilize land resources, which also contributes to urban development. At the same time, we have to prepare the environment, using plants, rocks, wells, etc., to create natural habitats for people, respecting the natural characteristics of the flora and fauna that live in the designed area. Landscape design is an important part of designing outdoor natural art. In

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order to reduce the design cost, the design of the area should be carried out under the guidance of the concept of ecological civilization. The design and site selection of a large-area site must be scientific and reasonable to avoid wasting building materials and land, as shown in Figure 5.

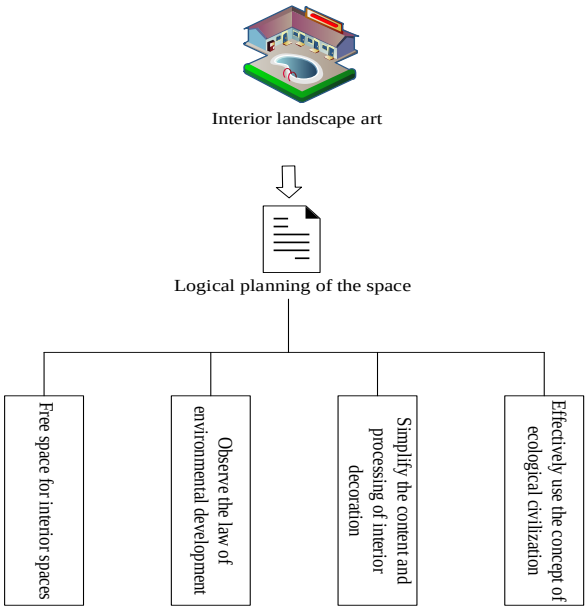

Figure 5: Indoor and outdoor environment art design under the ecological civilization view

(3) Digital color design under the view of ecological civilization

The concept of natural civilization pursues the principles of harmony, diversity and stability, and enriches the color design system of behavior, which is the most likely to be introduced in the design color system and the most important [20]. Especially in the current situation of serious color pollution, there are problems such as the distortion of the rationality of the inherent social value of the color theme, the lack of environmental protection methods, and the lack of resources of traditional principles. The solution of these problems requires a careful understanding of the core meaning of the concept of natural civilization. It is believed that it is very important to use the concept of natural civilization in color design, improve the current color design value system, break the original limited value system, establish a win-win value between man and nature, and open a new situation of harmonious coexistence between man and nature. Digital color design plays an important role in building a harmonious society. Introducing natural value into color design can improve the value structure of traditional planning and realize the scientific nature of design.

5. Application of Optimal Algorithm in Digital Color Design and Environmental Art Design

Using the optimal algorithm can ensure that the humanistic environment can help people obtain the best humanistic effect. The space can be further developed by using monoliths in the space and displaying the full functional information there.

The optimal mode of space: according to a certain proportion p, selecting ∂, δ space from the population F, then the optimal F_n mode can be defined as:

$$F_n = F_{n_1} + P\sum_{n=1} sim\left(\partial^2, \delta^2\right) \times \left(F_n - F_{n_1}\right) \tag{1}$$

$$F = \frac{1}{\sum_{n=1} sim\left(F - F^2\right)} \tag{2}$$

$$sim\left(F_n\right) = \sum_{i=1}^{n} P\left(\partial_1^n - \delta^2\right) \tag{3}$$

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Generating an initial population P, whose size is n, and set n=1. Assuming that there is a lack of genes in (p_n), then compensate for the genes, and we can get:

$$(p_n)=\frac{\sum_{n=1}(p_i-p_j)(p_i-p_j)}{\sum_{i=1}(p_i-p_j)^2\sum_{j=2}(p_n-p_i)^2} \tag{4}$$

$$(p_n)=\frac{1}{f_n}\sum p_{n,i-1},\ p_n=\frac{1}{f_n}\sum f_{n,j-1} \tag{5}$$

$$(p_n)=\frac{\sum_{i=1} sim(\alpha,\beta)P}{\sum_{i=2}^{n} sim(\alpha,\beta)} \tag{6}$$

Using the objective function to calculate the fitness of each space.

$$sim(\partial,\delta)=\frac{\sum_{n=1}\left(p_i^{\,2}-f_j\right)\left(p_i^{\,2}-f_j\right)}{\sqrt{\sum_{n=1}\left(p_i-f_j\right)^2}} \tag{7}$$

$$sim(\partial,\delta)\frac{\sum_{n=1}\left(p_i-f_j\right)}{\sqrt{\sum_{n=1_h}\left(p_i-f_j\right)^2\sum_{n=1_h}\left(p_i-f_j\right)^2}} \tag{8}$$

Calculating the global optimal mode PF, which exists in space:

$$PF=\frac{\sum_{n=1} sim(\partial,\delta)p_i}{\sum_{i=1} pf} \tag{9}$$

$$\partial,\quad \delta=p_n=\sum_{n=1}^{n} f_n f_m \tag{10}$$

For the optimal algorithm mentioned in this paper, it is necessary to verify its effectiveness, test its performance through the following typical functions, and compare the obtained results with the standard culture algorithm.

$$P_n=-2p_n+2\partial_i \tag{11}$$

$$P_n=-2p_n+\delta_i \tag{12}$$

$$P_n=\partial_{n,m}+\delta(p-p_n) \tag{13}$$

$$P_n=\delta_n+\partial(p-p_n) \tag{14}$$

$$P_{\mathrm{n}}=\partial\delta(f_i,p_n)\sum_{n=1}\frac{p_i}{p_n} \tag{15}$$

6. Result Analysis Based on Optimal Algorithm and Practical Application

In order to further investigate the design trends of digital color design and environmental art design, relying on the optimal algorithm analysis technology to investigate the use of software and materials in digital color design and environmental art design. Through the optimal algorithm, relevant information can be collected faster, and the development trend of information collection and evaluation of digital

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color design and environmental art design can be promoted. In order to further investigate the current status of digital color design and environmental art design, the design status between 2014 and 2017 was investigated. 100 digital color design and environmental art designers were surveyed, and the survey content was mainly summarized in four points, namely: material waste rate, user satisfaction, environmental pollution rate, color system perfection. From these four points to investigate the development of digital color design and environmental art design, the investigation is shown in Table 1.

As can be seen from Table 1, digital color design and environmental art design are gradually improving, and the digital color design and environmental art design industry is changing rapidly. Bringing the concept of ecological civilization into digital color design and environmental art design will solve common problems such as environmental pollution and simplify the construction process of design. Environmental protection needs and user needs are increasing day by day, and the concept of ecological civilization is now favored by the digital color design industry and the environmental art design industry.

Table 1: Design trends of digital color design and environmental Art Design

	2014	2015	2016	2017
Material waste rate	36%	41%	43%	46%
User satisfaction	31%	43%	41%	48%
Environmental pollution rate	21%	37%	39%	42%
Color system perfection degree	29%	31%	41%	38%

In order to examine the effect of bringing the concept of ecological civilization into digital color design and environmental art design, this paper investigates four digital color design companies A, B, C, and D and environmental art design companies. We investigated the influence and effect of the concept of ecological civilization on the process of digital color design and environmental art design. The evaluation result is specifically the role of ecological civilization concept in digital color design and environmental art design. The number of interviews is 400, and the designers' evaluation is very satisfied, good, average, and dissatisfied. The specific results are shown in Figure 6.

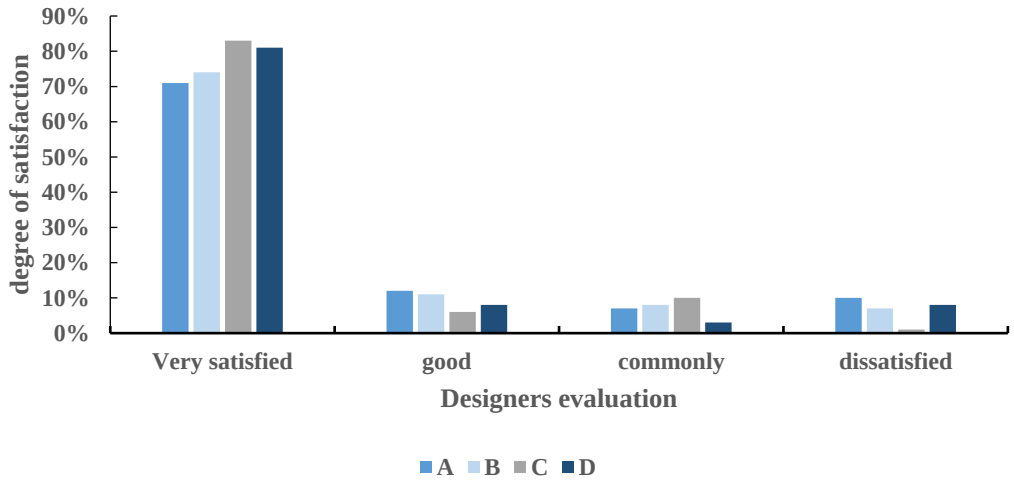

Figure 6: The role of ecological civilization concept in digital color design and environmental art design

From the bar chart in Figure 6, it can be seen that the employees of the four digital color design companies and environmental art design companies are still relatively satisfied with the ecological civilization concept in the design and application process, and most of them are very satisfied. In terms of the application of ecological civilization concept to visual design satisfaction and environmental pollution, most employees believe that this concept has played a great role in the optimization of design, and only a small number of people think that it has not played a role.

Figure 7 shows the help of the ecological civilization concept in digital color design and environmental art design from 2017 to 2020, specifically in four aspects: material waste rate, user satisfaction, environmental pollution rate, and color system perfection. The specific changes are shown in Figure 7.

According to Figure 7, from 2017 to 2020, the influence of ecological civilization concept on digital

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color design and environmental art design maintained an upward trend, which was affected by market changes and development trends. The rise slowed down between 2018 and 2019, but increased rapidly in 2020, which proves that with the passage of time, the concept of ecological civilization will be accepted by more and more digital color design and environmental art design. After investigation and experimentation, the concept of ecological civilization can improve the efficiency of design by 16% for digital color design and environmental art design.

Combined with digital color design and environmental art design under the concept of ecological civilization, great changes have taken place in the planning process and implementation process of the design, and the designer's design process has also been optimized. In order to further test the effect of ecological civilization concept on digital color design and environmental art design, this paper investigates an outdoor architectural project. The investigation direction is the comparison between the environmental pollution rate of traditional outdoor construction projects and the construction project pollution rate under the view of ecological civilization. The survey period was four months, and the results are shown in Figure 8.

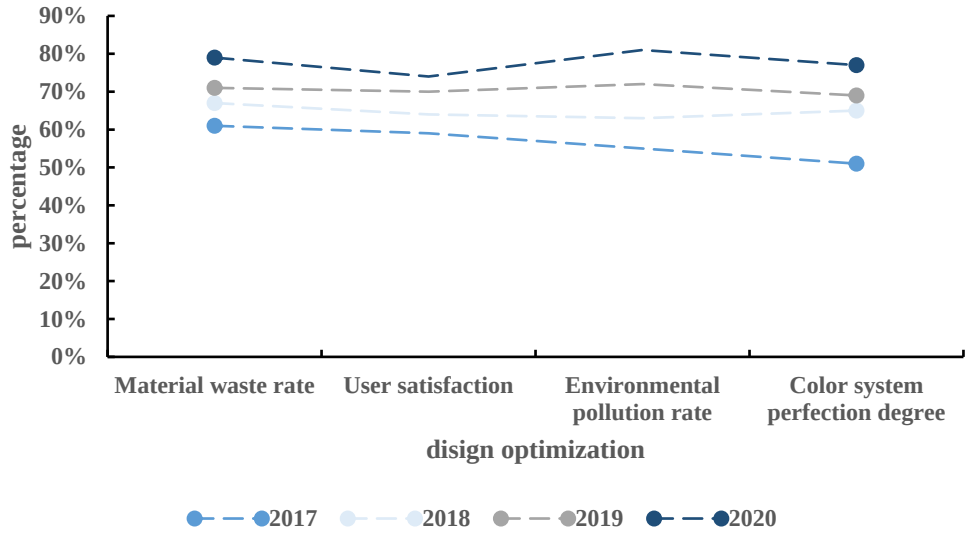

Figure 7: The Influence of Ecological Civilization View on Digital color design and Environmental Art Design

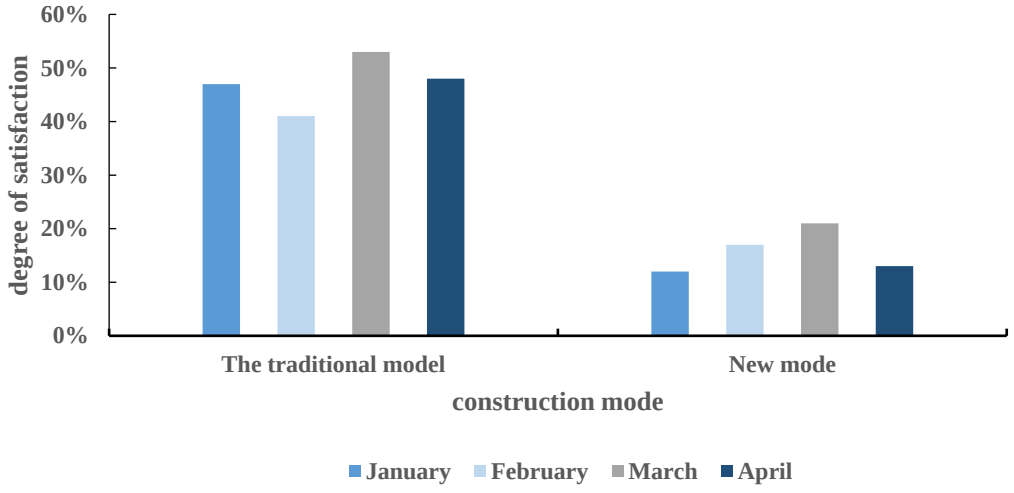

Figure 8: Comparison between traditional architecture and modern architecture

From the comparison chart in Figure 8, it can be seen that the pollution rates of the two construction engineering modes are fluctuating, but this is a normal phenomenon, because the materials used in the construction process are different. However, in contrast, the pollution rate of traditional construction projects fluctuates greatly, and the pollution such as dust during construction is more serious, while the

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pollution rate of construction projects under the concept of ecological civilization fluctuates, but the fluctuations are small.

7. Conclusion

The proposal and implementation of the concept of ecological civilization is the product of sustainable development strategy, energy saving and emission reduction strategy. This concept has been widely used since its birth, and now the concept of environmental protection and natural civilization has gradually entered all aspects of people's lives. The introduction of ecological civilization in digital color design and natural art is very in line with the development trend of modern art design, and helps to provide people with a healthier living space, natural environment and human environment. The digital color design and environmental art of the concept of ecological civilization have broad practical prospects. If used reasonably, natural civilization and human settlements will be better developed in various regions.

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