

"Double carbon" under the background of the development of Chinese digital landscape construction industry case studies - to opening the sea chamfort mansion and Shanghai east library as an example

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ABSTRACT

With the proposed "double carbon" goal, China's construction industry is facing unprecedented pressure and opportunities for transformation. Digital landscape technology, as a new technology means, provides a new path for the green development of the construction industry. This paper selects Sanxiang Haishangfu Mansion and Shanghai Library East Hall as cases to deeply analyze the application practice of digital landscape in architectural projects, discuss its impact on the development of the construction industry and the environment, and put forward the problems faced in the application process of digital landscape and possible solutions. The research results show that digital landscape technology not only improves the quality and efficiency of construction projects, but also plays a positive role in energy conservation, emission reduction, resource recycling, etc., which provides a beneficial reference for the sustainable development of the construction industry.

KEYWORDS

Dual carbon target; Digital landscape; Construction industry; Case studies; Sustainable development

1 Introduction

The problem of global warming is becoming more and more serious, and the international community is calling for the reduction of greenhouse gas emissions. As one of the world's largest greenhouse gas emitters, China has actively fulfilled its international obligations and proposed a "dual carbon" goal, that is, carbon peaking and carbon neutrality. As one of the main areas of carbon emissions, the construction industry has become the key to achieve the goal of "double carbon" with energy conservation, emission reduction and sustainable development. Digital landscape technology, as a combination of modern technology and traditional landscape design, realizes landscape intelligence, high efficiency and environmental protection through digital means, and provides a new path for the green development of the construction industry. This paper takes Sanxiang Haishangfu Mansion and Shanghai Library East Hall as cases to deeply discuss the application practice of digital landscape in architectural projects and its impact on the development of construction industry and environment.

2 Literature review

2.1 Theoretical exploration of digital landscape

In recent years, domestic scholars have achieved fruitful results in the research on the path of green development in the construction industry. For example, some scholars have conducted in-depth research on the application of digital landscape technology and the combination of urban design^[1], providing methodological guidance for future urban landscape design in the context of the development and evolution of digital landscape technology. Some other scholars analyzed the application of digital landscape in Jiangnan Province from three modules: natural environment information, urban environment information and human environment information^[2], providing an important perspective for understanding the impact of digital landscape on environment and economy. In foreign countries, the research on the connection between digital landscape and environmental quality has also made great progress. Some scholars pointed out the development of digital tools in landscape design, profession and planning^[3], emphasizing the potential and impact of digital tools on future landscape design, planning and profession, echoing the research of domestic scholars, demonstrating the multiple benefits of digital landscape on the environment.

2.2 Impact of digital landscape on the construction industry

In the context of dual-carbon strategy, the research on the impact of digital landscape on green economy has also achieved remarkable results^[4]. It is pointed out that the green building development plan should be implemented through the method of "carbon peak" and "carbon neutrality", but there are still some limitations in ESG implementation in China, such as the low correlation between ESG and building information, the objectivity of ESG report needs to be

improved, and the standard of ESG report is not uniform. Some studies have pointed out the relationship between ESG performance of enterprises and local environmental quality ^[5], which provides help for subsequent studies. Foreign scholars in the construction industry green economic development path research has also achieved fruitful results. Some other scholars have classified high-quality carbon emission reduction paths and calculated carbon peak and carbon neutrality ^[6], emphasizing the importance of carbon emission reduction for the economy and environment, and formulating solutions to the difficulties faced.

3 Case study

3.1 San Xiang Hai Shang Fu Mansion

San Xiang Hai Shang Fu Mansion is the first residential project in Shanghai to obtain the three-star green building operation mark, and its landscape design adopts digital landscape technology. The project realizes the intelligent and efficient landscape through passive energy saving, active energy enhancement, health intelligence and other technical systems. Among them, the application of high-performance envelope structure, solar water heating system and other technologies effectively reduces the energy consumption of the landscape. At the same time, through the intelligent control system, the remote control and automatic adjustment of landscape equipment are realized, and the operation and maintenance efficiency of landscape is improved. The landscape design of San Xiang Hai Shang fu Mansion not only meets the residents' demand for high-quality living environment, but also realizes the goal of energy saving and emission reduction, providing a new idea for the landscape design of residential projects.^[7]

3.2 East Hall of Shanghai Library

The East Library of Shanghai Library is innovative in the application of digital landscape technology. Through the Internet of Things, artificial intelligence, AR/VR and other advanced technologies, Dongguan successfully combines physical space and virtual services closely to create a series of intelligent scenes. For example, the "Red VR Ride" project uses virtual reality technology to let readers experience Shanghai red cultural tourism in a spinning bike ride and feel the rich red resources. In addition, the East Library has also introduced robot librarian, intelligent library service platform, etc., to realize the intelligent management and service of book resources. The application of these digital landscape technologies not only improves the service level of libraries, but also brings readers a more convenient and efficient reading experience.^[8]

3.3 Similarities and differences between the two cases

San Xiang Hai Shang fu Mansion and Shanghai Library East Hall have both similarities and differences in digital landscape. The common point is that both emphasize intelligent design, environmental protection and energy saving, and improve user experience. The difference lies in the application scenario, technical application and design concept. San Xiang Hai Shang fu Mansion is mainly used in residential landscape, focusing on the comfort and quality of life of residents; The East Library of Shanghai Library focuses on the intelligent service of public space, emphasizing cultural experience and knowledge dissemination.

4 The impact of digital landscape on the construction industry

4.1 Technical Aspects

The introduction of digital landscape technology, such as three-dimensional modeling, virtual reality, augmented reality, etc., has promoted technological innovation and upgrading in the construction industry. These technologies not only improve the visualization of the design, but also make the design process more efficient and accurate. For example, through 3D modeling technology, designers can display and modify buildings in a full range in a virtual environment, identify problems in design and optimize them in advance, thereby improving design quality and reducing changes and waste in the construction process.

4.2 Economic Aspects

Digital landscape technology helps to reduce construction costs and improve construction efficiency. Through digital means, intelligent management of urban environment and sustainable development of green ecology can be realized. For example, intelligent control systems can automatically adjust the operating state of building equipment according to

environmental parameters, reducing energy consumption and reducing operating costs. At the same time, digital technology can also optimize the construction process, improve the construction efficiency, shorten the project cycle, so as to bring economic benefits to the enterprise.

4.3 Training talents and enhancing competitiveness

The development of digital landscape technology has put forward new requirements for the training of professionals in the construction industry. The construction industry needs to cultivate talents with digital design, construction and management capabilities to meet the needs of the development of the industry. At the same time, the application of digital landscape technology has also enhanced the competitiveness of the construction industry, making enterprises more advantageous in the market competition.

For example, companies that master digital landscape technology can provide customers with more efficient and environmentally friendly building solutions to meet their needs for green buildings, thus standing out in the market competition.

5 The impact of digital landscape on environment

5.1 Improve environmental monitoring and protection

Digital landscape technology can realize the real-time monitoring and data analysis of environment through the comprehensive application of GIS, remote sensing, telemetry and other digital technologies. For example, through remote sensing technology, environmental indicators such as vegetation cover and air quality around buildings can be monitored, environmental problems can be found in time and corresponding measures can be taken. At the same time, digital landscape technology can also provide scientific basis for environmental planning and management through data analysis, and help government departments to formulate reasonable environmental policies and measures.

5.2 Promoting resource conservation and recycling (sustainable development)

In the process of design and construction, digital landscape pays attention to the conservation and recycling of resources. Through digital means, the required materials can be calculated precisely, reducing waste. For example, in the building design stage, the structure and material use of the building can be optimized through digital simulation, and unnecessary material waste can be reduced. At the same time, digital landscape technology can also realize the whole life cycle management of buildings and landscapes, including design, construction, operation and maintenance, so as to improve the efficiency of resource utilization and achieve sustainable development.

5.3 Strengthen ecological restoration

Digital landscape technology can simulate and analyze the operation law of ecosystem and provide scientific basis for ecological restoration. For example, the ecological model can simulate the ecosystem around the building, analyze the structure and function of the ecosystem, and provide guidance for ecological restoration. At the same time, digital landscape technology can also demonstrate the effect of ecological restoration through virtual reality and other technologies, so that the public can better understand the importance of ecological restoration and improve the public's environmental awareness.

6 Problems and solutions faced by digital landscape in the application process

6.1 Technical Problems

The application of digital landscape technology needs high technical level and equipment support. At present, some digital landscape technologies such as virtual reality and augmented reality are still in the development stage, and there are problems of technical instability and high equipment cost. In addition, the application of digital landscape technology also needs the support of professional and technical personnel, and the current training of relevant talents can not meet the market demand.

Solution: Increase investment in the research and development of digital landscape technology, and promote the continuous innovation and upgrading of technology. At the same time, strengthen personnel training, through college education, vocational training and other ways to cultivate a group of professionals who master digital landscape technology to meet the needs of industry development.

6.2 Cost Issue

The application of digital landscape technology requires a large amount of capital investment, including equipment purchase, technology research and development, personnel training and so on. For some small construction businesses, these costs may be unbearable. In addition, the application of digital landscape technology also requires long-term maintenance and updating, increasing the operating costs of enterprises. Solution: the government may, by way of policy support and subsidies to encourage enterprise technology digital landscape. At the same time, enterprises can reduce the application cost of digital landscape technology by optimizing the technology application scheme and rationally allocating resources.

6.3 Public perception problem

Digital landscape technology as a new technology means, the public awareness of it is low. Some members of the public may have doubts about the effect and security of digital landscape technology, which affects the promotion and application of digital landscape technology. Solution: to strengthen the propaganda and popularization of the technology of the digital landscape, through holding exhibitions, lectures, raise public awareness and acceptance of digital landscape technology. At the same time, enterprises can make the public better understand the advantages and characteristics of digital landscape technology by providing free experiences and other ways.

7 Conclusion

This study takes the "double carbon" strategy as the background, and discusses the development status and future trend of the digital landscape of China's construction industry through case analysis. It is found that digital landscape technology plays an important role in improving building energy efficiency, optimizing user experience, and promoting resource conservation. The cases of Sanxiang Haishang Fudi and Shanghai Library East Hall show that digital landscape technology can effectively promote the green transformation and sustainable development of the construction industry. However, the development of digital landscape technology still faces challenges such as inconsistent technical standards and insufficient interdisciplinary cooperation. Future research should focus on solving these problems, strengthen the formulation and promotion of technical standards, promote interdisciplinary cooperation, and deepen the research on the economic impact and environmental benefits of digital landscape technology. At the same time, personnel training should be strengthened to provide talent support for the digital transformation of the construction industry.

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