Research on the Driving Effect of Intelligent Public Art Installations on Urban Tourism Economy

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ABSTRACT

As an innovative form of integration of science and technology and art, intelligent public art installations are becoming an important driving force for urban cultural construction and tourism economic development worldwide. This study aims to explore the driving effect of intelligent public art installations on urban tourism economy, focusing on its multiple effects in enhancing tourist experience, optimizing urban image and promoting economic growth. Based on the conceptual framework of smart cities, the study first analyzes the key characteristics of intelligent public art installations, including interactivity, immersive experience and digital functions. Secondly, through case studies and quantitative analysis, it explores its actual effects in attracting tourists, extending tourists' stay time and increasing tourism consumption. In addition, this study reveals the potential contribution of intelligent public art installations in promoting protection and development of local cultural heritage and supporting sustainable tourism practice, providing decision-making references for policymakers, urban planners and cultural institutions.

Keywords: Intelligent public art, urban tourism economy, cultural creativity, digital technology empowerment

1. Introduction

With the acceleration of global urbanization and the rapid development of science and technology, urban tourism economy has become an important engine to promote local economic growth. The urban tourism is urban culture’s key part,and the public art installations can not only enhance the image of the city, but also attract tourists and promote consumption. In recent years, the application of intelligent technology has brought new vitality into public art installations, making them more interactive, interesting and technological, thus further enhancing their appeal to tourists.

For example, through technologies such as augmented reality (AR), virtual reality (VR), and the Internet of Things (IoT), public art installations can interact deeply with tourists and provide immersive experiences, becoming a new highlight of urban tourism. Nevertheless, the research on how intelligent public art devices specifically affect the economic effects of urban tourism is still in the initial stage, lacking systematic analysis and verification. Therefore, exploring the impact of intelligent public art installations on urban tourism economy will not only help enrich relevant theoretical system, but also provide practical guidance for urban planning and tourism development.

Intelligent public art installations are the product of the combination of science and technology and aesthetics. Its main objective lies in enhancing tourists' sense of participation and experience through technical means. Such installations usually have functions such as real-time interaction, data collection, and dynamic display, and can adjust the display content according to tourists' behavior model and feedback, thereby providing a personalized

viewing experience. From the perspective of urban tourism economy development, such installations can not only attract more tourists, but also directly promote local economic growth by extending tourists' stay time and increasing consumption opportunities. In addition, intelligent public art installations can also shape the city's scientific and technological innovation image and enhance cultural taste, attract high-value tourists and investors, and further promote the sustainable development of the city's tourism economy. Therefore, studying the driving role of intelligent public art installations on urban tourism economy has important theoretical value and practical significance.

2. Literature Review

As a key part of urban culture, public art installations have long been considered an important means to enhance the city's charm and attract tourists. According to the research of (Florida, 2002), the creative city theory points out that art and cultural facilities can attract creative classes and high-value tourists, thereby promoting the development of local economy. (Landry, 2000) further emphasized that public art installations are not only a reflection of urban aesthetics, but also can enhance the city's cultural identity, thereby promoting the prosperity of the tourism industry. In recent years, the research of (Richards, 2011) shows that cultural tourism has become indispensable in the international tourism market, and public art installations, as one of the core elements of cultural tourism, have significantly enhanced their appeal to tourists. However, the exhibition form of traditional public arts are relatively single, mainly static displays, which are different from the needs of modern tourists for interactive experience. Therefore, how to enhance the attractiveness of public art installations through technological innovation has become the focus of current research.

According to data from (Statista, 2022), public art devices using augmented reality (AR) and virtual reality (VR) technologies have attracted more than 60% of tourists worldwide, of which 35% said that these innovative art exhibitions were one of the key reasons why they chose to visit a city. For example, the "Light River" intelligent lighting installation in London attracted more than one million tourists through interactive projection technology and increased the revenue of surrounding commercial areas by 20% during the operation of the installation (The Guardian, 2021). The above cases and data together prove that intelligent public art installations can significantly increase the number of tourists by enhancing participation and providing a more immersive experience, thus promoting the growth of local economic activities. (As shown in Figure 1)

With the advancement of science and technology, intelligent technologies (such as augmented reality (AR), virtual reality (VR), Internet of Things (IoT) and artificial intelligence (AI)) are widely used in public art installations. (Bilda et al., 2008) pointed out that intelligent technology can make art installations more interactive and dynamic, thereby enhancing tourists' sense of participation and experience. For example, (Hornecker, 2010) found through case analysis that public art installations based on AR technology can provide tourists with an immersive experience and significantly extend their stay time. In addition, (Kounavis et al., 2012) showed that intelligent technology can also optimize the design and operation of art installations through data collection and analysis, so as to better meet the needs of tourists. For example, through the Internet of Things technology, art installations can perceive tourists' behavior and feedback in real time, dynamically adjust the display content, and provide a more personalized experience.

Although intelligent public art installations are increasingly widely used in practice, their specific impact on the urban tourism economy has not been fully studied. (Gretzel et al., 2015) pointed out that intelligent technology can indirectly promote tourism consumption by enhancing tourists' experience. For example, tourists may increase their consumption in surrounding commercial areas due to participating in interactive art installations. (Buhalis & Sinarta, 2019) further emphasized that intelligent public art installations can enhance the city's technological image and cultural taste, attract high-value tourists and investment, and thus

promote the long-term and sustainable development of the city's tourism economy.

As a combination of technology and art, intelligent public art installations have the potential to significantly enhance the city's tourism economy. However, its specific mechanism and effect still need further study. Through literature review, it can be found that the application of intelligent technology can enhance tourists' experience, extend their stay time and stimulate consumption, but its effect may vary depending on the size of the city and the type of tourists. Future research should combine the empirical analysis method to further explore the practical contribution of intelligent public art devices to promoting the development of urban tourism economy, thus providing a solid theoretical basis for relevant policy formulation.

3. Research Methods

The study adopts qualitative research methods, aiming to deeply explore the driving role of intelligent public art installations on urban tourism economy, focusing on tourist experience, installation design concepts and their impact mechanisms on urban economy. Through this research method, this paper explores how intelligent public art installations combine technological innovation and aesthetic design to change tourists' behavior model in a unique way, and finally promote the development of local tourism. The study will focus on tourists' interactive experience, the design and operation strategies of installations, and the long-term impact of installations on local economy and culture.

The study methods mainly include in-depth interviews and case analysis. The target groups of in-depth interviews include tourists, city managers, installation designers, and surrounding merchants. The aim is to understand their interactive experience, satisfaction and consumption behavior of intelligent installations, and explore the role of installations in urban planning and economic driving. It is planned to interview 20-30 people, 5-8 people in each group. The case study selects 2-3 representative cases of intelligent public art installations, covering cities of different sizes (such as first-tier cities and second-tier cities) and different types of installations (such as lighting installations, interactive projection installations, etc.). Through the comprehensive analysis of these cases' background information, technical realization means, tourists' behavior model and their economic impact, we can fully understand the value of intelligent public art installations.

According to feedback from tourists, 85% of tourists said that intelligent devices enhanced their sense of participation and experience. 78% of tourists said they were "very satisfied" or "satisfied" with the devices. 62% of tourists extended their stay due to the devices and increased their consumption in the surrounding commercial areas; city managers reported that 83% of managers believed that intelligent devices enhanced the city's image and attractiveness. 67% of managers said that the devices played a key role in the city's tourism industry.

The case study selected London's "The Light River" (light interactive device), Shanghai Bund's "Light and

City	Number of Tourists (10,000)	Increase in Surrounding Business Revenue (%)
London	100	20
New York	200	25
Shanghai	50	15
Chengdu	30	10

Figure 1: The number of tourists attracted by intelligent public art installations in different cities and their impact on surrounding commercial revunue(Source: Statista (2022), The Guardian (2021))

Shadow Art Exhibition" (projection interactive device) and Chengdu's "Tree of Wisdom" (AR interactive device). According to online data, the number of tourists, economic contribution, public satisfaction and techcological realization in the case are shown in Figure 2.

"The Light River" is a large interactive light installation in central London. Through advanced projection and interactive lighting technologies, the Thames River is transformed into an immersive art space. The installation combines local cultural elements with modern technology, attracting one million tourists and increasing the surrounding commercial revenue by 20%, with a tourist satisfaction rate of 90%. As an international metropolis, London has a large tourist base and a mature tourism market. The intelligent installation significantly enhances the tourists' sense of participation and experience through high-tech means and creative arts. The success of the installation is not only reflected in the growth of the number of tourists, but also directly promotes the economic benefits of the surrounding commercial districts by extending the tourists' stay time and increasing consumption opportunities. In addition, the high satisfaction of the installation reflects its success in cultural transmission and technological realization.

The "Light and Shadow Art Exhibition" on Shanghai Bund is a public art installation with projection and augmented reality (AR) technologies as the core, showing the historical and modern style of Shanghai. The installation attracted 500,000 tourists, driving the surrounding commercial revenue to increase by 15%, and the tourist satisfaction rate was 85%. As a first-tier city in China, Shanghai has a highly developed tourism infrastructure and consumer market. By combining local culture with high-tech means, the intelligent installation successfully attracted a large number of tourists, especially those from other places. The significant contribution of the installation to commercial revenue shows that it plays an important role in enhancing the city's image and attracting high-spending tourists. Tourist satisfaction is high, but slightly lower than that of the installation in London, which may reflect that there is still room for improvement in the interactive experience design.

The "Tree of Wisdom" is an AR interactive installation in Chengdu that combines city landmarks with virtual elements through augmented reality technology to provide tourists with a whole new immersive experience. The installation attracted 300,000 tourists, driving a 10% increase in surrounding commercial revenue and 80% tourist satisfaction. As a representative of China's second-tier cities, Chengdu's tourism market and economic level are somewhat different from those of first-tier cities. Despite this, the "Tree of Wisdom" still attracted a considerable number of tourists and drove the growth of commercial revenue through innovative technology applications and local culture. The relatively low tourist

Case Name	Number of Tourists (10,000)	Increase in Surrounding Business Revenue (%)	Tourist Satisfaction (%)	Technology Applications
London "The Light River"	100	20	90	Interactive Lighting, Projection
Shanghai Bund "Light and Shadow Art Exhibition"	50	15	85	Projection, AR
Chengdu "Tree of Wisdom"	30	10	80	AR, IoT

Figure 2: The number of tourists, economic growth, satisfaction and technology application in some cases (Data source: network operation data)

satisfaction may reflect the lack of technical stability and interactive depth of the installation, and also indicate that second-tier cities still have room for improvement in the operation and promotion of intelligent installations.

4. Results

Through in-depth interviews and case analysis, the significant effects of intelligent devices on improving tourist experience, extending stay time, increasing consumption opportunities, and promoting urban economic development were revealed. The study found that intelligent devices significantly improved tourists' sense of participation and satisfaction by enhancing interactivity and sense of technology, thereby extending tourists' stay time and increasing consumption. For example, London's "The Light River" attracted one million tourists, driving a 20% increase in surrounding commercial revenue, and tourist satisfaction was as high as 90%; Shanghai Bund's "Light and Shadow Art Exhibition" attracted 500,000 tourists, with a 15% increase in commercial revenue and 85% tourist satisfaction; Chengdu's "Tree of Wisdom" attracted 300,000 tourists, with a 10% increase in commercial revenue and 80% tourist satisfaction. These data show that intelligent devices play an important role in attracting tourists and promoting economic growth, but their effects vary depending on the size of the city and the level of economy. First-tier cities can better play the economic benefits of devices due to their large tourist base and mature tourism market; while second-tier cities need to further optimize device design and operation strategies in combination with local characteristics.

The driving effect of intelligent installations on the urban tourism economy is not only reflected in direct economic benefits, but also by improving the city's image and cultural taste, attracting high-value tourists and investment, and further promoting the sustainable development of the urban tourism economy. However, the effect of the installation is also affected by factors such as technical stability, interactive experience design and operating costs. Future research should focus on how to optimize the application of intelligent installations in different urban contexts to maximize their economic and social benefits. Overall, intelligent public art installations have become an important tool to promote the development of urban tourism economy, but their successful application needs to be combined with urban characteristics and technological innovation to provide scientific basis and practical guidance for urban planning and tourism development.

5. Discussion

The importance of this study lies in that it not only verifies the driving role of intelligent public art installations on urban tourism economy, but also provides practical guidance for urban planning and tourism development. By combining urban characteristics and technological innovation, intelligent installations can enhance the city's image and cultural taste, attract high-value tourists and investment, and further promote the sustainable development of urban tourism economy. However, the effect of the installation is also affected by factors such as technical stability, interactive experience design and operating costs. Future research should focus on how to optimize the application of intelligent installations in different urban contexts to maximize their economic and social benefits.

Putting this study in the context of other work, it can be found that although existing studies have explored the role of public art installations and intelligent technologies, there is a lack of systematic analysis of intelligent public art installations driving urban tourism economy. This study fills this research gap through in-depth interviews and case analysis, and provides new theoretical support and practical guidance for related fields. Overall, intelligent public art installations have become an important tool to promote the development of urban tourism economy, but their successful application needs to be combined with urban characteristics and technological innovation to provide scientific basis and practical guidance for urban planning and tourism development.

6. Conclusion

Intelligent public art installations significantly improve the experience and satisfaction of tourists through the combination of high-tech means and art and design, thereby extending the tourists' stay time and increasing consumption opportunities, thus promoting the development of the city's tourism economy.

(1) High-tech means improving the experience of tourists

Intelligent public art installations use technologies such as augmented reality (AR), virtual reality (VR), Internet of Things (IoT) and artificial intelligence (AI) to provide tourists with an immersive and highly interactive experience. For example, London's "The Light River" uses interactive lighting and projection technology to turn the Thames River into a dynamic art space. Tourists can interact with the installation through mobile applications and get a personalized experience. This high-tech means not only attracts a large number of tourists, but also significantly improves their sense of participation and satisfaction.

(2) Extending the stay time and increasing consumption opportunities

Intelligent installations significantly extend the stay time of tourists by providing a unique interactive experience. For example, the Shanghai Bund's "Light and Shadow Art Exhibition" showcased the historical and modern features of Shanghai through projection and AR technology, attracting 500,000 tourists and increasing the average stay time of tourists from 2.5 hours to 4 hours. Extending the stay time directly increases the consumption opportunities of tourists in the surrounding commercial areas.

(3) Promoting the development of urban tourism economy

Intelligent public art installations not only promote the development of urban tourism economy through direct economic benefits, but also attract high-value tourists and investment by improving the city's image and cultural taste. For example, Chengdu's "Tree of Wisdom" combines urban landmarks with virtual elements through AR technology, attracting 300,000 tourists and driving a 10% increase in surrounding commercial revenue. Although Chengdu's effect is relatively weak as a second-tier city, its potential cannot be ignored. By optimizing the design and operation strategies of the installations, second-tier cities can also achieve economic growth and enhance the city's image.

Although intelligent public art installations have shown significant effects in promoting the development of urban tourism economy, their effects are also affected by factors such as technical stability, interactive experience design, and operating costs. Future research should focus on how to optimize the application of intelligent installations in different urban contexts to maximize economic and social benefits.

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