A Study on Sustainable Development of Digital Community Tourism Based on Landscape Information Modelling

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Abstract. The purpose of this paper is to illustrate how communities can use Landscape Information Modelling (LIM) system in tourism planning to realize sustainable development through case studies, which provides theoretical and practical support for the sustainable development of smart cities by adopting the perspective of community governance innovation model. The thesis firstly introduces the definition and connotation of digital community, and the significance of LIM system applied to digital community tourism planning project. The study takes the Chengdu Xingrong community tourism planning project as an example to demonstrate the implementation basis, implementation process and implementation results of the community governance innovation model. Finally, the study creates a real and accurate digital twin model, which provides a new theoretical perspective for community tourism planning and effective practical experience for digital community construction in future smart cities.

Keywords: landscape information modelling, community tourism, public management, sustainable development.

1 Introduction

Core elements of LIM have been adopted and adapted to tourism research. With the rapid development of digital close-range photogrammetry and LIDAR technologies, digital surveys have also become more widely used in the field of cultural tourism program development and documentation [1]. Meanwhile, with the application of digital survey techniques, field data have become more accurate through the popularization of portable mapping devices, and LIM has become more popular in cultural tourism projects [2, 3].

This community governance innovation research is integrated into the Chengdu Xingrong digital community tourism development practice project, giving full play to the integration of professional development and innovation and creativity ability. This study has gone through data collection, repeated site surveys, expert inquiries, and technical facilities in order to guarantee the smooth progress of this study. As an important implementation site of the project, Xingrong Community's unique geographical location and characteristics make it the focus of the project team's research. The community is located in the core area of Chengdu Hi-Tech Zone, with obvious location advantages. The community covers an area of 0.35 km², with a total of 5,146 households and 12,171 people.

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During the research process, the researcher also made a point of visiting residents and tourists in order to understand their actual needs and opinions (Figure 1). Based on the characteristics and actual situation of the community, as well as the results of the public opinion survey, this study determined a product development strategy focusing on mapping the area and low-tech development, which laid a solid foundation for the next project implementation.

Fig. 1. Focus group interviews conducted in Xingrong community for this study.

The aim of the project is to capture the measurement data of the research object. Digital mapping will allow the processing and analysis of the data to focus not only on the finished information model, but also to see the exact finished data. For example, data captured by Unmanned Aerial Digital Photogrammetry (UAVDP) can stitch, adjust, and correct point cloud models of historic neighborhoods (Figure 2). Data collection for this project will utilize point cloud software called Pix4D. Two sub-packages of this software, Pix4DMapper and Pix4Dcatch, will stitch and calibrate field data captured by digital survey instruments (e.g., UAVs and LiDARs) to enable the acquisition of a complete and accurate point cloud model of the study area. Finally, another sub-package, Pix4Dsurvey, can be used to vectorize the point cloud data and generate Auto CAD and SketchUp data to obtain a 3D informative model of the study area.

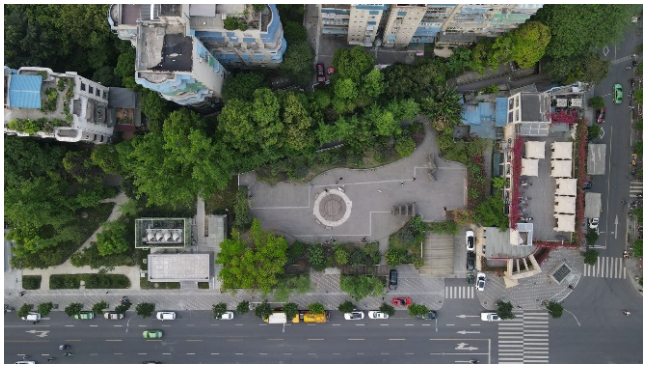

Fig. 2. Digital photogrammetry by UAV.

After the application of LIM as a technology, this study not only provides an in-depth understanding of the site's topography, buildings, roads, and other features, but also provides

the basis for the creation of a realistic and accurate digital twin model (Figure 3). Through the application of hardware equipment such as drones and digital computers and the combination of software equipment, the creation of the digital twin model obtained the necessary data. Based on the above process, this study provides an all-round understanding of the geographic characteristics of the local community, and also clearly identifies various types of buildings, transportation roads and other elements.

Fig. 3. Digital Landscape Model of Chengdu Xingrong Community.

2 Literature review

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2.1 LIM system

LIM is an information integration system for various landscape projects based on the concept of BIM [4]. 3D digitization is an important driving force for the concept of BIM.Phil Bernstein proposed this concept.Intelligent building components come with a variety of parameters to form a building information model [5]. Generally speaking, LIM is a three-dimensional landscape model with information data, which plays a great role in the life cycle of architectural design, construction, operation, and management [6].The use of LIM will realize the informatization of the whole process of design, construction, and operation and management of landscape engineering projects, and comprehensively coordinate and control the life cycle of the design by means of three-dimensional modeling [7]. Although LIM is still in its infancy in China, the informatization construction in landscape architecture will become an overall trend [8].

2.2 Digital community

A digital community is a network system that organically connects providers of management and services with residents through digital information means [9]. This digital network system allows various forms of information exchange and interaction between socialized information providers, managers and residents of the community, and local tourism services in real time [10]. In recent years, there has been a growing academic interest in LIM practices in cultural tourism projects in digital communities [11]. Many are coming to realize that the composition of cultural

tourism projects is more complex than other buildings [12, 13]. The use of environmental information gathering techniques and quantitative modeling and assessment methods proves that LIM is indispensable in cultural tourism projects in digital communities [7].

2.3 Implications of LIM applied to community tourism planning

LIM is a practical communication tool for planners, engineers and managers to communicate in both directions through planning, construction and management [14]. The construction of digital community is a hotly debated topic nowadays, and the construction of technology-enhanced digital community has become an important part of urban development [15]. Some scholars believe that LIM can be applied to the development process of cultural tourism projects in order to complete the dynamic development process, and managers of tourism projects should invoke LIM systems to support cultural tourism project management [16]. At present, the construction of digital communities in some Chinese tourist cities has been completed, and the level of service and governance has been improved compared to the original, laying a good foundation for the future construction and development of the city [6].

2.4 Implications for digital community tourism development

In recent years, the construction of digital communities has attracted attention, and people realize that it is one of the important factors in the development of urban tourism [17]. The good construction of digital community can improve the ecological environment of tourism culture, visualize the appearance of digital community and optimize the operation and public services [18]. The application of LIM technology can not only help the intelligent management of digital community, but also enhance the high quality of tourism experience and life services for tourists and local residents [19]. In the smart city construction that scholars and city managers focus on, the construction of digital communities has also become one of the most important ways to improve urban management and community management [20]. The combination of technology and urban environment will inject vitality and power to the sustainable development of the city [21].

2.5 Implications for the sustainability of digital communities

Digital communities are one of the important components of smart cities and one of the key factors for sustainable urban development [22]. With the constant change of social environment and tourism market, digital community is facing technological innovation in many aspects [23]. Against the background of the need for sustainable development, digital communities achieve a convenient method of service and management of some areas of the community through advanced technological means [24].The LIM system establishes an open channel between the governmental management of the digital community, the community itself, the local residents and the travelers, and improves the level of intelligent construction and refined service, establishes cooperative business projects and tourist services, and maintains the sustainable development of the community [25].

3 Research findings

Through the application of LIM technology in the digital community, the project team has been able to enhance the community's sense of co-governance and sustainable development, which is reflected in the following aspects.

Using advanced digital twin technology, this study successfully created a landscape information model of Xingrong community in Hi-Tech District of Chengdu City. With the help of LIM technology, this study built a panoramic 3D model of the local community and highly simulated the digital twin model through VR technology. This thesis provides a comprehensive understanding of the overall structure and planning of the local community, and builds an open communication bridge between residents, community managers, and planners. This initiative led to more scientific and targeted governance decisions.

This study focuses on promoting the active participation of community residents to ensure that the development plan can fully take into account the needs and interests of local residents. This researcher initiated extensive communication and exchanges with the local community councils and organized residents' participation in VR planning in order to collect a large number of valuable opinions and suggestions. This research case enables residents to actively participate in the discussion and planning of community development, and also provides strong support for the sustainable development of smart cities to help realize the goals of innovative models of community governance. With the help of VR technology, residents were able to experience first-hand the effects of the development program, thus gaining a deeper understanding of its impact on the local environment and community. The results of these simulations also serve as an important reference for decision makers in formulating development plans, ensuring that the development plans meet the actual needs and interests of the residents.

4 Conclusion

Firstly, through the use of digital twin technology, this study has enabled this researcher to gain a more in-depth understanding of the site's topography, buildings, roads and other features by creating a realistic and accurate digital twin model, which provides a scientific basis for community planning, and provides effective practical experience for the construction of digital communities in future smart cities. Second, this study effectively promoted resident participation by transforming the VR mobile planning booth cart. This initiative not only attracted more residents to participate in the project discussion, but also established a communication bridge between the community committee and residents, promoting the process of community building and governance. Finally, combining LIM and GIS technologies, this study implemented a comprehensive preliminary research, which provided a solid foundation for the subsequent planning, and by establishing a high-precision 3D information model, it provided rich field data support for community tourism planning.

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