

Research of collaborative planning for J village in Zhejiang province based on digital technology

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ABSTRACT

Taking J Village in Zhejiang province as an example, this paper discussed the application scenarios, methods and effects of digital technology in village planning and design practice from the perspective of collaborative planning. The results show that: (1) digital technology plays an important role in improving the collaboration levels, and can effectively reduce the spatial and temporal cost of multi-party collaboration in village planning; (2) The three stages of preliminary investigation, planning scheme comments and dynamic feedback of planning implementation are the main scenes of digital technology application; (3) How to reduce the application threshold of digital technology and enable ordinary villagers to participate in village planning without barriers is still a difficult problem that needs to be tackled in this field.

Keywords: Digital technology, collaborative planning, village planning, planning method

1. INTRODUCTION

For a long time, how to improve the level of public participation in village planning and improve the cooperation level of multiple subjects in village planning has been one of the important difficulties faced by village planning. The research results of many scholars have pointed out that the main reasons restricting public participation in villages include the weak level of villagers' own professional knowledge¹, weak awareness of participation², high spatial and temporal cost of participation process³, etc. And around these problems, many literatures have put forward corresponding optimization strategies⁴⁻⁷. However, in the process of planning practice, the coordination level of village planning has not been significantly optimized. Fundamentally, village collaborative planning is a complex system engineering, which requires not only the innovation of technical methods, but also the optimization of planning workflow and the corresponding policy support. Among them, the core key lies in the innovation of technical methods and the optimization of corresponding workflow.

In recent years, with the continuous improvement of the level of digital technology, and under the influence of digital rural construction and land spatial planning reform, the transformation of urban and rural planning to the digital direction has become an important trend⁸⁻⁹. Digital technology, especially virtual reality technology, telecommunication technology and artificial intelligence technology have developed rapidly since they were introduced into the field of planning, and have played a huge role in planning management, urban design and other fields. Their advantages of convenience, efficiency, visualization and interaction provide good technical support for the innovation of village collaborative planning. In the field of digital development of village collaborative planning, many scholars have carried out corresponding exploration. Generally speaking, although the current relevant research has made a lot of innovations in planning technology and management, which has made a certain contribution to reducing space-time costs and improving public participation in village planning, most of the planning technologies and methods in the existing research are too professional, and the developed system is not lightweight enough. As a result, the popularity of mobile terminals is too high, the calling system is not convenient, and the attraction to villagers is still insufficient. In addition, the supporting policies for the application of technology platforms are insufficient, and the granting of public participation rights and the supervision and guarantee mechanism are not in place in the context of new technology, resulting in the lack of subjective power of the public (especially villagers) in both the virtual planning platform and the real planning process. Their participation is mostly passive participation, and it is still difficult to substantially improve villagers' participation.

Based on this, according to the system thinking, according to the basic principle of lightweight technology application,

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this paper focuses on the application of digital technology in the collaborative planning. Taking J village in Zhejiang Province as a practical case, this paper puts forward a village collaborative planning method based on digital technology, discusses the application of digital technology in all aspects of village planning, and optimizes the method through reflection and summary.

2. APPLICATION OF DIGITAL TECHNOLOGY IN THE COLLABORATIVE PLANNING OF J VILLAGE

2.1 Development and application ideas of digital technology for collaborative planning of J Village

2.1.1 Digital Application Requirements. In the planning and design process of J Village, the public cooperation mainly includes three stages: planning research, scheme communication and implementation feedback (Table 1). In the survey stage, on the basis of the field survey conducted by the planner, it is necessary to accurately collect the building and site information that is difficult to confirm on the site, as well as other issues that the villagers are concerned about the village planning and need to be solved in this planning. In the scheme stage, it is necessary to accurately push the planning and design scheme determined by the planner to the stakeholders. In addition, it is also necessary to achieve efficient communication among planners, experts, villagers and managers. The implementation feedback stage is to supervise the implementation of the plan, and also to give timely feedback on the new changes that have occurred in the implementation of the plan, and organize relevant planners, experts and village managers to conduct online discussion on the new changes, so as to determine whether the plan needs to be optimized locally. The above three stages involve a large number of multi-party collaborative work. Offline meetings, telephone and video conferences and other collaborative work methods consume high time and space costs, and the information transmission completeness is low. To a large extent, it will affect the efficiency of collaboration, and then lead to the problem of difficult implementation of planning plans. Therefore, the introduction of digital technology in this process will effectively solve this problem to a large extent, and in this process, digital technology should effectively solve the needs of visual transmission of site information, remote barrier free communication, smooth information transmission channels 24 hours a day, and channel communication feedback with supervision and evaluation.

2.1.2 Realization of Digital Technology. In the application scenario of village collaborative planning, the application and implementation of digital technology mainly includes four aspects. First, the visual expression technology of site information, that is, the site information involved in the project is simulated in a certain technical way, and it is transmitted and expressed in a user-friendly way. In this process, virtual reality technology is widely used which rose in the 1980s. it is a new comprehensive information technology that combines computer image processing technology, network and multimedia technology, simulation technology, microelectronics technology and other technologies, and has the characteristics of immersion, interaction and so on, which are different from the above technologies¹⁰. At present, with the popularization of VR technology, the production and online real-time dissemination of VR scenes can be quickly realized by taking photos or videos from mobile phones. For example, VR production based on mobile photos or videos can also be completed more quickly through “Rushi VR” app or software development. Second, the technical realization of the collection and transmission of ordinary text, pictures and voice information is relatively simple. It only needs to follow the process of planning and research information collection, and through the way of customer management, each partner can use the mobile terminal and PC terminal to conveniently transmit the corresponding information according to the set process and requirements, and send a reminder to the designated object. Third, about remote instant messaging and remote scheme co review technology. Although there are instant messaging tools such as Tencent conference, Dingding, zoom and wechat, the professional level of offline scheme discussion environment simulation in the process of map review and scheme discussion is still insufficient, and the effect needs to be further improved, and it needs to be optimized by combining the professional scenarios discussed in the village planning scheme. Therefore, Around the joint review of remote schemes, the research group customized and developed the remote joint review system of village planning, carried out better simulation of offline map evaluation scenarios, and realized layer management in the process of map evaluation. Fourth, since most of the villagers do not care about the overall planning scheme of the village, they only pay more attention to the contents related to themselves. How to decompose the planning scheme in a modular manner and feed the planning results to the relevant subjects in a targeted and accurate manner is the key to improving the efficiency of village planning cooperation. Therefore, in the process of platform development, the technology of keyword management and information intelligent classification is used to realize this part.

Table 1. Application and demand of digital technology in collaborative planning of J Village.

Stage	Concrete content	Main technology	Problems to be solved
Survey stage	Information gathering;	Virtual Reality Technology; Information technology (computer, network, multimedia, etc.)	High space-time cost; Low participation of villagers
	Space environment survey;		
	Demand sorting;		
	problem analysis		
Scheme Stage	Conceptual design;	Virtual reality technology; Remote joint review technology; instant messaging technology; etc.	High professional threshold; Formal review
	Scheme review;		
	Scheme publicity		
Implementation feedback stage	Scheme implementation;	Intelligent text segmentation technology; information directional transmission; database management	Pay more attention to blueprint than implementation; Lack of implementation effect feedback path
	Effect evaluation		

2.2 Reconstruction of village collaborative planning process based on digital technology

Under the traditional mode, village planning needs to go through a series of complicated steps such as preliminary preparation, basic investigation and analysis, determination of development objectives, scheme preparation, villagers' opinion consultation, demonstration review, planning submission and planning implementation. Most of the work needs to be carried out offline, with high space-time cost and difficult cooperation between people. On this basis, the village planning under the digital technology background divides the traditional village planning process into three stages: survey, scheme communication and implementation feedback. The survey stage mainly constructs the online information interactive collection workflow based on the field investigation. The scheme communication stage is mainly to build the process of accurate scheme transmission and communication with the same platform. The implementation feedback stage is mainly to build the new change feedback of planning implementation and the process of online multi-party discussion to determine the optimization scheme (The platform interface is shown in Figure 1).

2.2.1 Survey Stage Process. Planners coordinate with government departments to upload the basic data information required for planning, and establish the virtual environment of the village with the help of virtual reality technology. Then villagers, village cadres and non-governmental organizations upload their respective needs on the platform. Through the integration of the platform, planners can intuitively see all the demand information and the current situation of the village environment on the platform, and draw the main problems of village planning through the combination of the two, And rely on the established virtual environment to carry out the following work, such as the goal conception of village planning. Compared with the planning and research under the traditional mode, the planning and research with the introduction of digital technology can also accurately collect the information that is difficult to collect and process on the site without frequent site visits, avoiding repeated and inefficient site visits, optimizing the top-down elite planning problem to a certain extent, and greatly improving the efficiency of the research.

2.2.2 Scheme Stage Process. In the scheme and review stage, it mainly relies on the platform to accurately push the planning scheme determined by the planner and conduct multi-party online communication. First of all, the planner prepares the planning scheme according to the information collected in the survey stage, and forms the first draft of the planning results, then the first draft of the planning is accurately transmitted to various subject accounts through the platform classification. At the scheme review stage, the planners accurately transmit the planning results to the review experts and other subjects through the platform. At the same time, the villagers who were unable to participate in the planning review stage were introduced into the stage through live broadcast and other forms. The villagers put forward their opinions and suggestions in the live broadcast, forming a new scene for the common review of the planning scheme. The planners modified the contents according to the opinions of the joint review, and finally obtained the planning results that absorbed the opinions of various subjects. Compared with the village planning under the traditional mode, the planning

scheme and review process are more transparent and efficient, and public participation can be better guaranteed by the system.

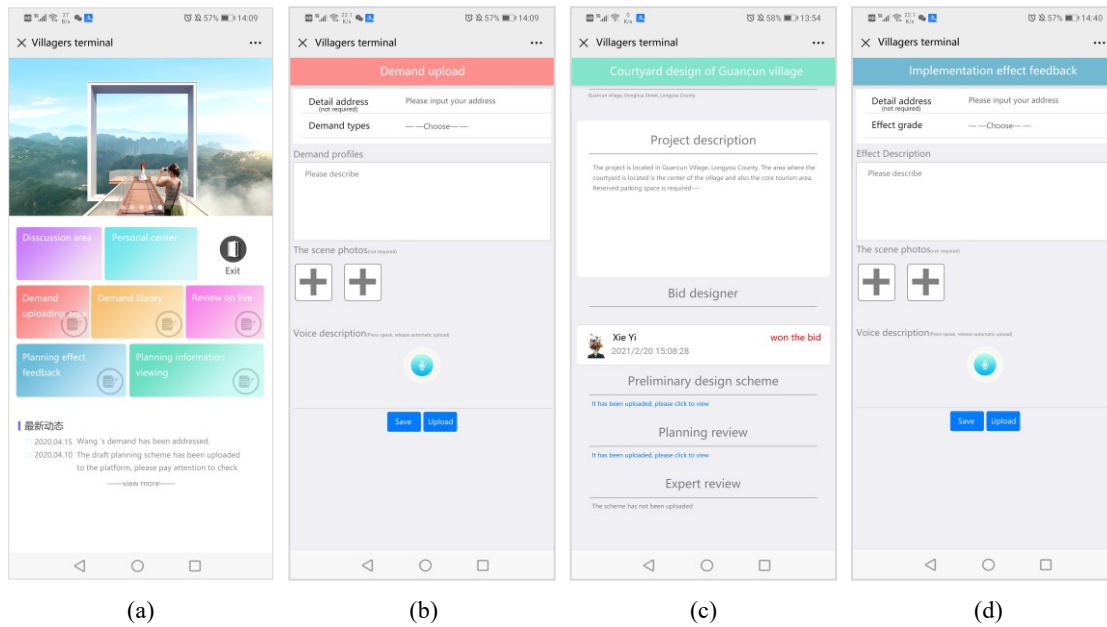


Figure 1. User interface of villagers' mobile terminal on Lian Xiang platform.

2.2.3 Implementation and Feedback Stage Process. This stage is the process of supervision, feedback and optimization of the planning effect. The government organizes the implementation of the plan, and villagers, village cadres and others feedback, the new changes generated during the implementation of the plan on the platform, and automatically uploads them to the platform database. Planners can log on the platform at any time to check the feedback information collected in the database, and organize experts, villagers, government administrators and other subjects to conduct online discussions according to the reflected situation. Through online discussion, we will discuss and judge the impact of new changes on the planning implementation effect, and determine whether local optimization of the planning content is required. If so, the local optimization of village planning will be organized by the government and coordinated by the planners, forming a virtuous circle of continuous optimization of the planning scheme. Compared with traditional methods of village planning, the implementation feedback mechanism of this method is more perfect and the implementation obstacles are smaller, which can form a planning implementation effect that is more in line with the planning objectives.

3. CONCLUSION AND DISCUSSION

3.1 Conclusion

Taking the village planning of J village in Zhejiang Province as an example, this paper combs the process of village collaborative planning based on digital technology, puts forward the key digital technology and its implementation methods to promote collaborative planning, and demonstrates the important role of digital technology in promoting the level of village collaborative planning through the evaluation of the practical results of J village. Although it has been preliminarily discussed and demonstrated in practice that the application of digital technology can help improve the level of public participation in village planning and enhance the villagers' satisfaction with the planning, and from the perspective of theoretical prediction, the village collaborative planning based on digital technology may realize the dynamic planning of the village to a certain extent and improve the level of planning toughness, but in fact, it still needs a lot of exploration to truly realize this planning goal, and it also needs to adjust the village planning and management policies simultaneously.

Reviewing the overall planning practice of J village, it is believed that this study still has some deficiencies in the following aspects. (1) The practice of J village is more experimental. Although the project team has developed the “lianxiang” village collaborative planning software platform, preliminarily realized the application of digital technology in village

collaborative planning, and passed the basic process, the software platform is still version 1.0, which is still far from wide-ranging promotion and application. At present, the software platform is still used for internal testing by the research group. There are still many detailed problems in the use process, and the user experience needs to be further improved. (2) In the scheme communication stage, the modular intelligent segmentation and precise push module of planning scheme information is still dominated by manual background operation, and the relevant automatic algorithms need to be further developed, and the intelligent level needs to be improved. (3) Driven by the application of digital technology, the practice of J Village has effectively improved the level of public participation in the process of village planning and the level of cooperation among various participants in the planning process. However, in addition to the optimization of technology, the corresponding village planning management system and policies still need to be further optimized and adjusted, especially the mechanism and system for planning implementation supervision and local dynamic adjustment and optimization still need to be innovated. (4) There are various types of village planning, including village construction planning, beautiful village construction planning, practical village planning, village renovation planning, traditional village protection and utilization planning, etc. Different types of village planning have different requirements and focuses, and the application scenarios of digital technology required are also different. The practice of J Village discussed in this study is obviously still far from the actual production demand, it is difficult to meet the needs of different types of village planning.

3.2 Discussion

This study believes that the application of digital technology in village planning has potential. With the continuous iteration and upgrading of digital technology and the arrival of 5g era, its impact on the traditional urban and rural planning work mode is inevitable. Driven by the reform of the spatial planning of national land, although the current urban and rural planning work has been accelerated to the direction of digitization and informatization, and one map of the spatial planning of national land is its typical representative, this paper believes that only the digitization of professional content, digital content archiving and intelligent management can not promote the development of the industry. Public participation is an important content and basic requirement of urban and rural planning. How to use digital technology to reduce the technical threshold of urban and rural planning, make professional content more accessible to other public, feedback and transmit public demands in a low-cost way should also be an important research direction of planning digital transformation in the context of the national land spatial planning.

Of course, in the future, with the continuous deepening of the application of digital technology in the field of urban and rural planning, disruptive changes in the traditional planning work mode will also become possible. As the competent department of urban and rural planning, it should make preparations in advance, do the corresponding basic research work in policy and planning management system in advance, and as a planner engaged in the production of planning and design projects, it should also make knowledge reserves in advance, actively embrace all kinds of new work challenges and opportunities that digital technology may bring.

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REFERENCES

- [1] Wang, L. and Zhang, Y., "Villagers' cognition and willingness expression of participation in rural planning in South Jiangsu Province: A case study of Changshu City," *City Planning Review*, 36(02), 66-72(2012).
- [2] Xu, S. G., Wei, J. P., Cao, Y. and Wei, L. H., "Form Selection and Practices of Public Participation in Village Planning in Pearl River Delta," *City Planning Review*, 36(02), 58-65(2012).
- [3] Chu, S. F., "Analysis on Public Participation of Village Planning—Take Maolin Village in Xiamen as Example," *Chinese and Overseas Architecture*, 10, 101-102(2015).
- [4] Guo, J. M. and Duan, D. G., "Study on village planning based on practicality," *Proceedings of 2020 China Urban Planning Annual Conference*, 16, 1746-1755(2021).
- [5] Chen, J. and Wang, X. F., "On public participation in the preparation of village planning--Taking the village planning of Jiulong Town, Luogang District, Guangzhou as an example," *Development of Small Cities and Towns*, 02, 21-23(2009).
- [6] Zhang, C., Xiao, D. W., Huang, Y. and Tao, J., "Villagers' participation method optimization strategy during village planning research period: A case study of the fishing village in Dong'ao Island, Zhuhai," *Development of Small Cities and Towns*,

- 36(10), 67-72+78(2018).
- [7] Wang, Y. J., Chen, H. Y. and Li, X. Y., "Public participation practice with emphasis on encouragement and guidance in village planning: An example of ZhanLi Village in Southeast of Guizhou," *Development of Small Cities and Towns*, 36(07), 11-17(2018).
 - [8] Zhao, G. Y. and Li, C., "Thoughts on the reform of detailed planning within the territory development planning system," *Urban Planning Forum*, 04, 37-46(2019).
 - [9] Ding, L. Y. and Sun, J., "Bite City--Great changes in urban planning," *Planners*, 06, 21-23(2000).
 - [10] Hu, M. X., "Virtual reality technology and its application in urban planning," *Planners*, 06, 19-20+18(2000).