



Research on the Countermeasures of Urban Community Renewal Design under the Background of Digitalization

Meijun Jin* , Xiaokai Guo

Taiyuan University of Technology, Shanxi, Taiyuan, 030000, China.

*Correspondence: jinmeijun@tyut.edu.cn (Meijun Jin)
xk15340670160@163.com (Xiaokai Guo)

Abstract. Against the backdrop of digital transformation, urban development has also been stepping up from large-scale and rapid construction to a phase of high-quality enhancement. This paper discusses the renewal design of community space which is directly related to individual life, bearing great significance. Via sorting out the existing problems of community renewal and community neighborhood participation, this paper puts forward a community renewal path based on three dimensions: material environment, humanistic environment and long-term time, and constructs a community digital renewal design framework from three aspects: upgrading digital environments, improving public service facilities and material environment, and regenerating community space vitality, as a means to provide support for the research and practice of urban community digital renewal design in China.

Keywords: Community Renewal; Digital Transformation; Space Design

1 Introduction

Chinese society is embarking on a historical stage punctuated by digitalization, and the industrial changes triggered by digital technology are permeating all fields at an accelerating pace. Urban construction also ushered in a new era of improving inventory functions and enhancing value. As the physical space of residents' lives, the community serves as the basic field of urban renewal and construction; it is also a living space bearing neighborhood interaction and interpersonal network, which is inextricably intertwined with people's growing needs for a better life. Under the context of digitalization and inventory construction, the discussion of community digitalization and intelligent renewal design has increasingly become the focus of universal attention.

2 Research progress of community renewal

“Community” is a shared community and its activity area formed by interrelated people in a certain field, which has a certain force of interactive relationship and common cultural sustainment. Under the digital background, the research on community renewal

© The Author(s) 2024

R. Appleby et al. (eds.), *Proceedings of the 2nd International Conference on Intelligent Design and Innovative Technology (ICIDIT 2023)*, Atlantis Highlights in Intelligent Systems 10,
https://doi.org/10.2991/978-94-6463-266-8_42

design and community residents' participation presents the characteristics of multi-angle and multi-discipline research.

2.1 Research progress of community renewal under the background of digitalization

Chinese cities have entered the stage of inventory development, and community renewal has become a necessity for development. Under this bandwagon, scholars mainly carry out research from two perspectives: (1) Material level: In the renovation of old urban communities, the old renovation model is only oriented to solve urgent needs, and today's communities should attach emphasis on the improvement of cultural quality and cultivate the self-renewal ability of communities [1,2]; at the same time, the optimization and protection of scenarios in the community have also received widespread attention [3,4]; in addition, the micro-renewal of project actions and institutional environment for the community is also a major thrust [5,6,7]; (2) Community renewal under the digital background: It is mainly carried out from three aspects, i.e., urban intelligence and organic renewal, digital community renewal and future community. Ren [8] and Geng [9] re-recognized urban renewal under the concept of smart community, aiming at boosting double promotion; the emergence of digital community has blazed new trails for community renewal and reconstruction [10,11]; Song [12] and Li [13] et al. foresaw the future community and study its development trend. As the mainstream development direction, digital community renewal is inevitably dependent on diversity, professionalism and innovation, for which the development path is tailored to the local condition and adherence to the living dimension.

2.2 Research progress of community humanistic environment and neighborhood relationship under the background of digitalization

Under the background of a society filled with strangers, the humanistic environment of the community is becoming increasingly complex and diverse, the neighborhood relationship has also given birth to a variety of new models, and the geographical blood relationship has gradually disintegrated. With the rapid development of digital technology, the dual models of virtual community and physical community have gradually formed in the community. (1) Traditional community humanistic environment: Liu [14] and Chen [15] took Beijing Xinqinghe Experiment as an example to put forward the development path and reflections; through investigating residents' actual community participation, Zhang [16] deeply explored the breakthrough point of participation starting from the demand, while Long [17] discussed the community co-governance mechanism under residents' participation starting from the community. (2) New community humanistic environment and neighborhood relationship: Under the new development opportunities, more scholars pay attention to the community humanistic environment and neighborhood relationship under the digital platform. Li [18] studied residents' participation and integration under the virtual community; Yang [19] paid more attention to the multiple experience benefits brought by the digital platform; New neighborhood relations often create a symbiosis with the community. In this regard, Shao [20]

constructed the development source of new neighborhood relations based on specific cases. The construction of new neighborhood relations and community participation are seamlessly compatible and mutually reinforcing, with their integration being the path to win-win development.

3 Thinking path of community renewal driven by digital technology

The application of digital technology in community renewal can not only propel the improvement of the material environment and strengthen people's sense of belonging and attention to the community, but also establish a long-term mechanism to ensure sustainable development. Through literature and case studies, the existing urban community renewal theories and projects are deeply analyzed, and the renewal ideas can be excavated from three dimensions: material, humanities and time:

3.1 Improvement of the physical environment

Through the application of digital technology tools and platforms, the digitalization of urban facilities and data interconnection can be accessible. Smart city construction and other means are available to upgrade conventional service facilities, intending to improve the accuracy of natural environment remediation. Data analysis can also help community planners predict the future, and thus prepare for community renewal in a timely manner.

3.2 Renewal of the human environment

Community renewal also includes the renewal of residents' ideas. Digital technology can push forward social and cultural renewal and strengthen residents' investment in community renewal. Community online platforms can enable community members to participate in community deliberations, increase communication and interaction, and thus enhance community cohesion and vitality. Digital technology can also enable residents to participate in the process of community renewal and design through the application of virtual reality, video or graphics technology, and strengthen their participation in the community works and environment created by them.

3.3 Establishment of a long-term sustainable mechanism

Community renewal always needs to follow the principle of sustainable development and strengthen the rational allocation of resource utilization, human capital and economic input, for the sake of achieving lasting results. The application of digital technology can assist management tasks such as data analysis, scheme optimization, resource cost accounting, etc., and provide more comprehensive support for the importance of establishing a long-term sustainable mechanism.

4 Discussion on the design countermeasures of community renewal space

The application of digital technology provides a new round of change opportunities for promoting community renewal, which not only contributes to the improvement of the urban material environment but also enables community residents to devote themselves to the creation of brand-new communities with a more positive attitude, which is conducive to the sustainable development of cities and the successful construction of innovative communities. The specific space renewal design can be started from the following three aspects, The overall framework is shown in the table 1 below :

Table 1. Thinking path of community renewal driven by digital technology

Physical environment dimension	Human environment dimension	Time dimension
Levels	Design countermeasure	
Community digital environments	intelligent management of urban facilities community online service platform community online interactive platform smart community data analysis evaluates the gaps in current service facilities fills the blind spots of basic services with wisdom	
Physical environments of the community	pay attention to the higher dependence of the elderly and children slow-moving transportation network low-carbon public travel community cultural heritage virtual reality Online community virtual interaction information sharing among community residents online community social networks	
Vitality regeneration of community space	diverse interaction in community public space Digitalization technology strengthens cultural consensus Digitalization highlights local culture Digitalization catalyzes local festival activities in the community	

4.1 Creation of community digital environments

Digital transformation, such as the Internet of Things, cloud computing and data analytics, can improve the quality of public services in online communities. (1) Intelligent facility management: fully integrate modern information technology into urban basic management, real-time supervision of municipal infrastructure. (2) Community online service and interactive platform: residents can put forward their own opinions or ideas

on community renewal, exchange views with each other, enhance residents' joint deliberation, strengthen exchanges and interactions among community members, and actively support the organization and joint exploration of community renewal programs. At the same time, it can also promote close integration between residents and communities and produce the nature of collective action. (3) Smart community data analysis can integrate and process the data, find out the bottleneck of governance and improvement of urban operation mode, and put forward the corresponding decision-making experience based on the data.

4.2 Enhancement of public service facilities and physical environments of the community

Digital technology improves the public service facilities in the community and improves the overall service level of the community. (1) Digital technology evaluates the gaps in current service facilities, fills the blind spots of basic services with wisdom. (2) Pay attention to the elderly and children, Combined with the development trend of the community, commitment should be made to pay attention to the higher dependence of the elderly and children in the near-earth life circle as well as enrich and improve the connotation and quality of related services. (3) Digital technology combs the transportation network, builds a slow-moving transportation network, and stimulates the effective activities of residents; it guides low-carbon public travel and promotes healthy lifestyles of residents. (4) Digital technology protects community cultural heritage and disseminates relevant information and knowledge in time. Virtual reality technology restores historical scenes and displays local folk culture.

4.3 Vitality regeneration of community space

(1) Digital technology boosts residents' online and offline communication and interaction, and digital community platform provides residents with online community services and information sharing, thus promoting the formation of closer social networks among residents. Also, it is favorable to improve the interactive experience and convenience of residents in community public space and promote the innovation and interaction between public space and community, Then promote the formation of a new neighborhood relationship. (2) Digitalization technology strengthens cultural consensus, highlights local culture, identifies local cultural elements of the community and intervenes in space design to enhance community identity. (3) Digitalization catalyzes local festival activities in the community, raises the organization, management and cooperation level of activities in the community, better customizes community activities, unites community members, and forms closer ties in the community. In general, strengthening community participation and building a new type of neighborhood relationship are seamlessly compatible and complementary. By increasing community participation online and offline, the vitality of community space is improved, thus building a new type of neighborhood relationship.

5 Conclusion

No matter from the perspective of digital transformation or the improvement of inventory construction, the renewal needs of urban communities are increasingly highlighted. This paper is based on three dimensions of community renewal path: material environment, humanistic environment and long-term time, and constructs a community digital renewal design framework from three aspects: upgrading digital environments, improving public service facilities and material environment, and regenerating community space vitality, as a means to provide support for the research and practice of urban community digital renewal design in China.

Fund Project

2021 Shanxi Art Science Planning Project (2021A100)

References

1. Wu Z. Q., Wang K., Chen W., etc. "Symposium on Innovations in Fine-tuned Spatial Governance" [J]. *Journal of Urban Planning*, 2020, No.257 (03): 1-14.
2. Liu J. Y., Li Y. J. Research on Optimization Strategy of Integration of Planning, Construction and Management of Community Complex: Based on the Perspective of Community Life Circle and Overall Governance [J]. *Landscape Architecture*, 2021, 28 (04): 15-20.
3. Xi X. S, Gong X. Y., Wang L., etc. Scenario Planning Approach of Urban Community Renewal under the Background of Inventory Optimization and Transformation--Taking the Open Space Renewal of TE Community in Beijing "Huitian Area" as an Example [J]. *Urban Development Research*, 2022, 29 (11): 73-82.
4. Wu J. P., Xiong J., Liu X. Structure and Measurement of Urban Residents' Co-production Behavior-Based on Community Micro-renewal [J]. *Urban Development Research*, 2022, 29 (11): 57-64.
5. Galster G., Levy D. K., Sawyer N., et al. *The Impact of Community Development Corporations on Urban Neighborhoods*[J]. The Urban Institute, 2005.
6. Wang C. H. Community Micro-renewal Mechanism Towards Good Governance [J]. *Planner*, 2018, 34 (02): 5-10.
7. Bu M., Jiang Y. H., Liu Z., etc. Expansion Practice of Community Planners in Community Renewal under the Background of Urban Fine Management--With the Planning of a "Beautiful Hometown" in Cao Yang New Village, Shanghai as an Example [J]. *Shanghai Urban Planning*, 2019, No.149 (06): 60-65.
8. Ren W. X. Promoting the Double Enhancement of Urban Intelligence and Organic Renewal [J]. *Beijing Watch*, 2021, No.374 (12): 22-23.
9. Geng J. H. Exploring the Enlightenment of Green-oriented Smart Community Concept to China's Urban Renewal—Taking Yokohama, Japan as an Example [J]. *Intelligent Building and Smart City*, 2021, No.295 (06): 41-42.
10. Wang Y. W., Li L. B. Functional Requirements and System Construction of Digital Community [J]. *Journal of Harbin Jianzhu University*, 2002 (06): 85-88.

11. Dong Y. F., Wang Y., Han Y. N., etc. Exploration of Community Renewal under the Background of Digital Transformation [J]. *Future Urban Design and Operation*, 2022, No.2 (02): 48-55.
12. Song B., Yang P. R., Jie S., etc. Urban Renewal and Future Community—Humanism, Ecology and Digitalization [J]. *Construction Science and Technology*, 2022, No.456 (13): 35-39 +43.
13. Li Y. G., Liu Y. Z., Ye Y. H., etc. Wisdom Renewal Experiment of Urban Life-Digitalization Empowers the Future Community of Asian Games [J]. *Construction Technology*, 2022, No.456 (13): 29-34.
14. Liu J. Y., Tan X. Y., Cheng Q. Y. Practice and Thinking of Participatory Community Planning under the Background of Transformation—Taking Y Community in Qinghe Street, Beijing as an Example [J]. *Shanghai Urban Planning*, 2017, No.133 (02): 23-28.
15. Chen Y. L., Xiao L., Chen M. P., etc. A Preliminary Study on the Realization of Community Participatory Planning—Taking Beijing’s “New Qinghe Experiment” as an Example [J]. *Journal of Urban Planning*, 2020, No.255 (01): 65-70.
16. Zhang X., Zhang G. Q. Dilemma and Solution of Multi-subject Participation in Property Management of Old Urban Residential Areas [J]. *Chongqing Administration*, 2022, 23 (02): 55-58.
17. Long K. B. Study on the Mechanism of Residents’ Participation in Community Co-governance—Taking Wuhan Central garden club as an Example [J]. *Urban Management and Technology*, 2016, 18 (03): 39-41.
18. Li Z. F., Zhang C. Virtual Community Participation in Urban Community Governance Based on the Investigation of Virtual Community in Urban Renewal [J]. *Governance Research*, 2020, 36 (04): 77-87.
19. Yang X. Y., Zhu X. L., Cao X. Q. Digital Governance Drives Residents’ Community Participation: Effect and Limit—An Empirical Study Based on “National Community Governance and Service Innovation Experimental Zone” [J]. *E-government*, 2023, No.242 (02): 72-82.
20. Shao C. X. The Path of Community Building in Digital Space Based on the Investigation of WeChat Group of Urban Community Owners [J]. *Theory and Reform*, 2022, No.243 (01): 47-58.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

