

Research on Multi-agent Participatory Design in Renewal of Urban Public Space with Composite Functions

Taking Tongzhou National Defense Education Square as an Example

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ABSTRACT

With the deepening involvement of public in social governance, public participation in the process of urban public space renewal has become an inevitable trend. In view of the phenomenon that the users of functional complex urban public space are diversified and the demand for renewal is different, either the way to position the roles and tasks of each participant or the path to establish an effective participation mechanism is an important prerequisite to ensure the depth and efficiency of multi-agent public participation and the multi-dimensional adaptability of complex urban public space. In this paper, taking the National Defense Education Square renewal project in Tongzhou district of Beijing as an example, the mode, dilemma and path of multi-agent participation in the construction of urban public space are explored. Research is made from the delineation of participants, demand investigation, multi-directional adaptability of design scheme, organizational mechanism of public participation, etc., so as to improve the service efficiency of renewal results.

Keywords: urban public space, multi-agent participation, urban renewal, composite functions

1.INTRODUCTION

After experiencing large-scale and radical renewal based on physical planning as the core, China's big cities have gradually evolved into a mode with "humanism" as the core, advocating sustainable development, small-scale, community planning and gradual micro-renewal with multiple participation [4], especially focusing on landscape micro-renewal. In August 2021, the General Office of the CPC Beijing Municipal Committee and the General Office of the Beijing Municipal People's Government issued the Beijing Urban Renewal Action Plan (2021-2025), which also mentioned in the first part of the project implementation path, "Coordinating urban renewal with blocks as units": strengthening the design and construction of public space landscape in blocks, and forming a perfect public space system. The document also emphasizes that street furniture configuration should

be optimized, the construction of municipal facilities should be miniaturized, invisible and integrative [9]. From the perspective of urban and social studies, urban public spaces refer to places for public use in daily life and social life of urban residents. In the construction of public space, "the quality of public life and the public purpose it serves are the most important" [5]. The diversity of public space aims makes it have multiple functions. At the same time, the guarantee of public space service quality is based on the balance between supply and demand. Therefore, the purpose of this paper is to analyze the whole process of public participation in the micro-renewal project of National Defense Education Square in Tongzhou District, Beijing, and to explore the path of multi-subject participatory design in functional composite public space.

2.MICRO-RENEWAL PROJECT OF NATIONAL DEFENSE EDUCATION SQUARE BASED ON MULTIPLE INTERESTS DEMANDS

Function provides services for urban public space as a supplier, while demand is the demand of managers and users for urban public space. Therefore, the complexity of functions is inevitably related to the diversification of managers and users. In the process of building urban public space, the depth of multi-agent participatory design is closely related to the service quality of public space, from the stage dimension of public participation, the widely accepted ladder models of public participation are informing participation, consulting participation and active participation [3]. From the aspect of power factors, the balance of power shows that the influence of public participation in the decision-making process is different, which reflects whether public participation is of substantial significance. Therefore, during the process of public space renewal, the subject who participates, the participation stage, and who makes decisions are all important factors in project promotion. Although the projects involved in this paper have some particularity, because the proportion of National Defense Education Square in urban public space is not large, the logic of creating public space can be used for reference. The reason for choosing this project, in addition to its complex functions, its planning manager is also a stakeholder (the staff around the plot), which brings more complexity to the public participation of this project.

2.1 Delimitation of participants

Usually, the participants in urban renewal include the government, the public, professionals and stakeholders. Among them, the government includes planning and management departments and neighborhood committees, including public groups; Professionals include experts in urban renewal and related professional fields. Interested parties include local residents, residents around the plot, developers and investors, and staff in the plot, etc. [6]. For the landscape micro-renewal project, the participation of the above-mentioned public is not high, but the participation of the residents who directly serve and the surrounding staff is high, that is, the participation of stakeholders is high. So, delineation of participants is conducive to understanding the sources of different interests of different participants in urban renewal.

It can be seen from the area map (as shown in Fig. 1) that the north and east sides of the National Defense Education Square are close to the government office area and the south side is a residential area, so the main participants involved in this project are the government,

professionals and surrounding residents. Compared with the stakeholders of public space in general blocks, the government in this project is not only a stakeholder, because the street planning management department belongs to the staff around the plot at the same time, they also belong to the planning management department and decision makers. In this case, the protection of the interests of "vulnerable groups" in public participation will face more difficulties, especially when there is a conflict of interests between them, which forms a game. Under such a circumstances, as an interest-neutral participant, the design team should play an important coordinating role in the process of project promotion. Design is not only the result of the renewal of public space, but also a means of cooperating with multiple demands.



Figure1. Bitmap of national defense education square area

2.2 Organizations with public participation

Because the grass-roots management mode in China has been in the interactive trapezoidal power structure of "three cores as the mainstay and multi-subject participation" among streets, community neighborhood committees and community residents for a long time [7]. Even under the background of advocating "building a social governance system of co-construction, co-governance and sharing", public participation organizations still have to rely on streets and community neighborhood committees. For example, in this public space micro-renewal project, public participation is divided into three stages, namely, demand investigation, scheme comparison and use benefit evaluation. Besides on-site observation, residents' discussion is the most important way to investigate residents' needs in the reconstruction of National Defense Education Square. The forum was mainly organized by neighborhood committees in streets and communities. Participants are resident representatives and design teams. Obviously, in the choice of residents' representatives, the guiding or leading role of streets and community neighborhood committees exists, which to some extent affects the scientificity and objectivity of public participation.

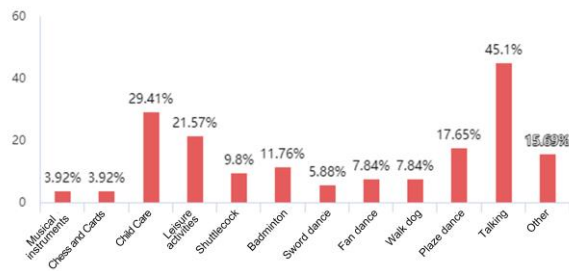


Figure 2. Survey on the needs of surrounding residents and office workers

2.2.1 Demand research

The demand investigation of functional public space is more complicated. The National Defense Square needs to undertake public activities organized by the district government, streets and other government departments,

and is also one of the leisure places for the surrounding residents. Therefore, the educational function of National Defense Education Square requires it to be educational, demonstrative and commemorative, however, as a leisure square for the surrounding residents, the square needs flexibility, beauty and amenity in the use of space. In this project, on-site observation and investigation, discussion and questionnaire were used to investigate the needs of the people served by the square, including residents and surrounding staff. According to the demand investigation, the simple updating method has completely failed to meet the diverse needs (Fig.2). Different behaviors of different people in different time and space dimensions should be taken into account in the updating scheme. Only by humanizing, refining and compounding the space can the contradictory points of demand be effectively adjusted (Table1) .

Table1. The urgency of the need to be addressed

Needs	Average Composite Score	Percentage
lack of activity space	4.41	88.20%
Poor lighting at night	4.41	88.20%
the defense theme is not obvious	3.96	79.20%
the stage is in need of repair	3.31	62%
adjustment of the seats in the square	2.88	57.60%
rose transplanting in front of the stage	2.39	47.80%
Deslicking treatment of the activity space	2.37	47.40%
non-barrier design	2.08	41.60%

2.2.2 Scheme comparison

Multi-subject participatory design requires higher viscosity for design leaders (professionals) and participants (government and surrounding residents), which is also the main breakthrough point to avoid the formalization and stylization of public participation. At the early stage of the project start-up, the design team establishes a preliminary contact with the surrounding residents and staff through observing the site use status. In the scheme design, on the basis of demand satisfaction, the design leader will add new technologies and materials or endow it with cultural and artistic attributes for the sake of individuality, demonstration and innovation of the project. Therefore, timely communication with participants is an important measure to ensure the promotion of the program. In this process, scheme comparison can be carried out by means of scheme display, scheme explanation and participation in subject voting.

2.2.3 Use benefit evaluation

Multi-participation should not be terminated with the completion of the project, and its whole cycle should be

from demand investigation to after the project is completed and put into use. After being put into use, the follow-up investigation can summarize the problems existing in the process of this project, and provide reference samples for the treatment and solution of similar problems in the future.

2.2.4 Sustainable participation of multiple subjects

During the operation and maintenance of public space micro-renewal project, there are some organizations with soft behaviors, which are living and can inject lasting vitality into public space. For example, designing an activity place for the theme month of National Defense Education in the square requires the organization of street and community activities in September every year, including the planning of activity content, the organization of activity personnel, the publicity of activity results, etc. Therefore, continuous participation is the fundamental to ensure the fresh results of micro-renewal of urban public space.

3.DILEMMA OF MULTI-SUBJECT PARTICIPATORY DESIGN

From the perspective of social governance, the dilemma of multi-subject participation includes institutional dilemma, organizational dilemma and participant dilemma [8]. But from the design dimension, multi-subject participatory design mainly faces the following three dilemmas.

3.1 Residents are mainly middle-aged and elderly residents

The residents' representatives participating in the demand discussion in this project are all middle-aged and elderly people, which makes it difficult for the design goal of "sharing for all ages" to be accurately covered, and even more difficult to achieve the goal of "returning young people to the community". Therefore, how to achieve full-age coverage of public participation is also an important issue in public space construction.

3.2 Professionals' response to multiple demands

Professionals are the bridge between government and non-government entities in urban renewal [6], but in the process of project promotion, the diversity of design demands is a great challenge for designers. The transformation of public space emphasizes people's participation, and the most remarkable feature of people's opinions is that they are difficult to adjust. For example, when the National Defense Education Square needs research, there will be many different voices and demands for the Chinese rose in front of the stage. Some residents say that the Chinese rose in front of the stage has thorns and will stab people, especially children, so it is suggested to remove the Chinese rose. However, some people think that Chinese rose has ornamental value, and the safety of children is the responsibility of parents' care and management. Outside the purely technical level, designers should also control the cost and construction cost from the perspective of the government. Balance democracy and unity from the perspective of neighborhood committees; Implement the implementation and landing from the perspective of the construction party. The work of public space renewal requires designers to have a global perspective of safeguarding social interests, which also requires the designer to be a participant in the "people oriented" design.

3.3 Multiple identities of decision makers

As one of the subjects of public participation, decision makers do not always need to have the initial intention of "serving the people" like streets. In the process of public space construction or community

governance, the differences of decision makers often change with the differences of land use nature, and the direct decision makers may be the government, developers or property companies. When there is contradiction between the needs of this type of decision makers and the needs of the surrounding residents and staff, how decision makers choose between self-interest and altruism will directly affect the effect of later space creation.

4.CONCLUSION

Public spaces with composite functions differ in the way of micro-update mode and target positioning, so that exploring a suitable, humanized and refined renewal method is the key to the successful renewal of functional complex public space. It was mentioned that from the perspective of development concept and demonstration of urban public space projects the demonstration types include all-age sharing, compound utilization, national fitness, green friendliness, cultural shaping, sharing and co-governance. These demonstration sites cover many aspects such as time dimension, space dimension (material space and spiritual space), infrastructure, users and governance mode. Therefore, an in-depth analysis of the location, service subject and supply and demand relationship of public space is an important measure to make urban renewal more accurate and efficient.

Through the study of the whole process of the micro-renewal project of the National Defense Education Square, this paper demonstrates the significance of multi-subject participation in the design of urban renewal. The main participants of project include the government, community residents and professionals. It is characterized by aging participants, extensive participation contents, shallow participation depth and stylized participation forms. Therefore, in order to ensure the participation of multiple subjects in design and promote the community to realize co-construction, governance and sharing, in the follow-up practice and exploration, we should constantly improve the public participation mechanism, realize the diversification of participants, participation paths and participation contents, and achieve the goal of multi-subject deeply participating in the construction of public space.

AUTHORS' CONTRIBUTIONS

The first author contributed 70%, the second 10%, the third 10%, and the rest 5% respectively.

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