

# *Design of Community Public Space Environment Based on Public Management*

Yuanchao Lai<sup>1,a,\*</sup>, Lishan He<sup>1,b</sup>

<sup>1</sup>Faculty of Construction, Guangdong Technology College, Zhaoqing, Guangdong, 526070, China

<sup>a</sup>1224251302@qq.com, <sup>b</sup>1549025848@qq.com

\*Corresponding author

**Keywords:** Public Management, Community Public Space, Infrastructure Design, Regional Culture, Ecological Environment

**Abstract:** With the acceleration of urbanization, the growth rate of community public space cannot keep up with the growth rate of urban population, resulting in a relative shortage of public space resources, and the environment of community public space cannot fully meet the needs of residents. The purpose of this article was to study the problems existing in existing community public spaces, find solutions and strategies based on public management, and optimize the safety and environmental quality of public spaces to improve the quality and environmental sustainability of public spaces. This article provided an example of Community A and analyzed the problems that exist in the public space environment of Community A, including monotonous ecological space layout, low satisfaction with facility configuration, and lack of regional culture. Through in-depth research on the application of public management in community public spaces, this paper explored the process of designing the public space environment of Community A under public management, and designed the regional cultural environment, ecological environment, and infrastructure. For example, the edible garden can not only beautify the landscape of community public space, but also promote the interaction of community residents and achieve the goal of environmental sustainable development. Community lighting can facilitate nighttime travel for the elderly and children. In order to verify that the design of community public space environment based on public management is beneficial to community residents, a survey and analysis were conducted on 155 male and 150 female residents in Community A. 88 male and 95 female residents respectively indicated that the ecological suitability of the designed community was very high. 142 male and 128 female residents were very satisfied with the infrastructure of the designed Community A public space, and 138 male and 138 female residents were very satisfied with the regional culture of the designed public space. Overall, the majority of residents are still satisfied with the infrastructure and transportation of the designed community.

## 1. Introduction

The quality of community public space directly affects the living environment and quality of life, and there are problems such as safety, pollution and landscape. In order to improve its quality and

social benefits, designers and planners need to comprehensively consider the needs of different groups, and use technical means and environmental strategies to carry out high-quality design. This has become an important research topic in the field of public administration.

With the reform of market economy, community has become the focus of urban social development. How to construct sustainable community public space environment to promote social construction and urban civilization is the key issue that needs urgent attention at present.

## 2. Related work

You C [1] Tour C [1] found that the streets, squares and courtyards lacked entertainment facilities, and the traffic layout was unreasonable, which was difficult to meet the needs of children, and put forward planning suggestions. However, there is limited research on the importance of residential streets and associated Spaces. Swapan A Y [2] explores the significance of residential street and front yard Spaces through case studies, highlighting the importance of these Spaces fulfilling social interaction, economic and cultural needs in an increasingly scarce community public space. Lesmana D [3] believes that by planting herbs and developing traditional snack making, the uniqueness of public space is reflected. However, there is blindness in the construction of public space in market-oriented real estate projects.

Public management provides basis and vitality for community public space design. Public space has the function of social interaction, economic activity and cultural appreciation, and strives to maintain the same function and value in the process of modernization. Wiriantari F [4] studied the value of public management in community public space design, emphasizing its role in shaping the built environment and social relations. Link F [5] analyzes the impact of public management and social characteristics on space and sense of belonging. Public management plays a key role in the sustainable development of community public space and has the function of natural balance. Mei I [6] aims to determine the availability of public management in open Spaces and to develop strategies. Kalbarczyk E [7] determined the type of public space by evaluating public management methods and found that communities with better infrastructure had the best public space management.

## 3. Problems in Community Public Space Environment

In order to realize the sustainable development of community public space, it is necessary to understand the needs of residents. The public administration department should collect opinions through interviews and other means, and analyze the problems before the transformation of community A to ensure the smooth implementation of the design.

### 3.1. Community Introduction

Community A, with 20 residential buildings and nearly 3,000 residents, is one of the renovation pilots. This paper interviewed 155 male and 150 female residents and found that the surrounding areas are villages and old communities with few high-rise buildings, which is in line with the planning orientation. The public space environment before the renovation is shown in Figure 1.

As shown in Figure 1, the public space is old, the roads are badly damaged, the ground is uneven when it rains, and the entrance is only a concrete road. Improper vegetation planning leads to disordered distribution.



Figure 1: Community A public space environment before renovation

### 3.2. Ecological Space Layout

Spatial scale directly affects the public environment, but many infrastructures are not sound, resulting in disorderly distribution of public space [8]. The traditional community public space mainly meets the basic needs, and the greening rate directly affects the environment. The monotony of ecological spatial layout is shown in Table 1.

Table 1: Degree of monotony in ecological spatial layout

Degree of monotonicity	Male	Female
Very monotonous	76	65
Relatively monotonous	52	63
Rich	15	17
Very rich	12	5

As shown in Table 1, 76 male and 65 female residents believed that the layout of community ecological space was monotonous, 52 male and 63 female residents said that the layout was monotonous, and only 12 male and 5 female residents thought that the layout was rich. With the improvement of the quality of life, the original living space is less and less adaptable to the demand [9]. Some public space construction only pursues the form, ignoring the user's feelings, resulting in low utilization and loss of function [10-11].

### 3.3. Satisfaction with Facility Configuration

The lack of seats causes residents to stay outdoors for a short time, old fitness equipment, and uneven ground affect the use and cleaning. Services in the new areas are inadequate, the quality of life is reduced, and sewage treatment and safety management are inadequate. It is necessary to increase investment, improve facility quality and improve management mechanism [12]. Figure 2 shows the satisfaction with the facility configuration of Community A in 2019.

Figure 2 shows that among the residents who were very satisfied with the community infrastructure in 2019, 9 were males and 8 were females aged 12-16; 22 to 26 years old male 11, female 15; There were 6 males and 5 females aged 57 to 61. The lack of public toilets in many communities inconveniences the elderly, especially on floors without elevators. Barrier-free facilities should be strengthened to improve comfort and convenience [13-14]. The design of public space should consider natural factors and psychological needs, create comfortable and diverse Spaces, pay attention to psychological needs, and design small humanized Spaces to meet the communication needs of different people [15].

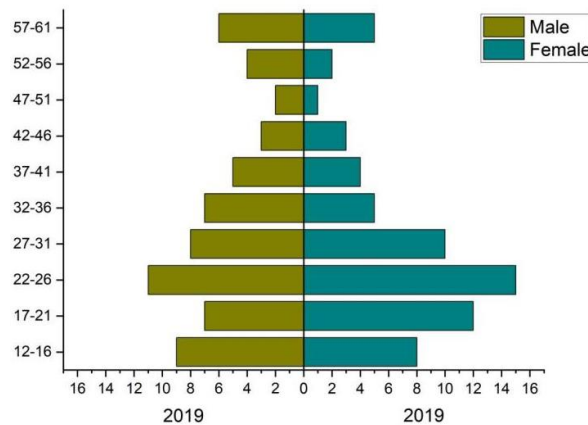


Figure 2: Satisfaction of residents of different age groups with the configuration of Community A facilities in 2019

### 3.4. Lack of Regional Culture

The development of modern society leads to the convergence of community appearance, and traditional culture is gradually forgotten. Regional culture is not naturally integrated into the community [16]. The lack of community public space environment is shown in Table 2.

Table 2: Lack of various environmental types (multiple choice)

Type	Male	Female
Regional culture	102	113
Performance	43	37
Traffic	59	51
Exercise and fitness	40	32
Leisure	33	26

As shown in Table 2, 102 men and 113 women think that community public space lacks regional culture. 43 men and 37 women cited a lack of performance space; 59 men and 51 women cited lack of transportation; Thirty-three men and 26 women cited a lack of leisure facilities.

## 4. Design Scheme Based on Public Management

In order to achieve sustainable development of the community, the design of the A community, based on the existing building under economic constraints, began at the end of 2019, completed at the end of 2020, and opened in January 2021. Public administrations need to provide suitable and sustainable Spaces and coordinate resources to ensure environmental protection, safety and quality.

### 4.1. Ecological Environment Design of Communities

Community ecodesign covers environmental and sustainable development issues, including energy efficiency, the use of green materials, non-mechanical climate adaptation technologies and renewable energy sources. The design of public space pays special attention to sustainable development, and the schematic diagram of ecological environment design is shown in Figure 3.

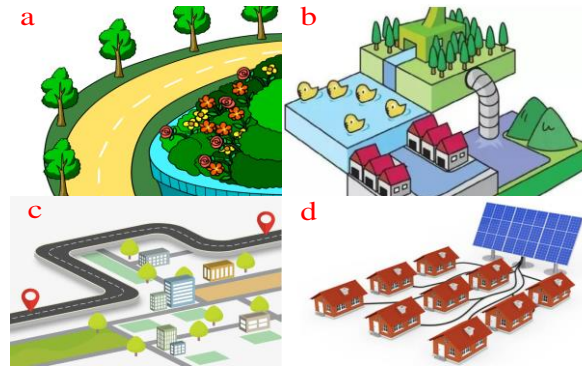


Figure 3: Schematic diagram of ecological environment design

As shown in Figure 3, the design enhances community sustainability by improving the cleanliness of the atmosphere, installing green belts (Figure 3a), establishing sewage treatment stations (Figure 3b), and using energy-efficient Windows and solar energy (Figure 3d). Greening and three-dimensional transportation reduce noise (Figure 3c). These measures aim to balance environmental, economic and social development, improve green coverage and residents' comfort, and ensure the consistency of public space planning.

Community development reflects urban progress, and the history and culture of each city shape the charm of the community. The transformation of A community needs to integrate into regional culture, retain cultural temperament and enhance sense of identity. Successful design is about reflecting regional culture, promoting identity, neighborhood exchange, and community sustainability. Older people should be supported to participate in activities and inherit the historical context, and new community planning needs to combine tradition and modernity, retain historical characteristics, while taking into account the natural environment and socio-economic factors.

#### 4.2. Ecological Environment Design

Eco-design should adopt a green approach, meet cultural, social and recreational needs, and reduce environmental damage. Water features (such as artificial lakes, ponds, fountains, streams) provide entertainment, air purification and cooling. Adjust the terrain to add natural features and promote drainage and vegetation growth. The use of environmentally friendly materials, renewable energy, reasonable planning of building layout, to achieve energy saving and consumption reduction. Establish a garbage sorting system to enhance the reuse of resources, as shown in the food garden in Figure 4.



Figure 4: Schematic diagram of edible garden



As shown in Figure 4, the use of home-grown fruits and vegetables can promote neighborhood communication and food culture. Community public space design should focus on improving residents' physical and mental health and quality of life, reflecting humanistic care and environmental awareness. Rationally layout the space to provide functions for different groups of people, optimize the allocation of resources, improve the quality of life, and create a comfortable and natural atmosphere[18].

#### 4.3. Infrastructure Design

As shown in Figure 4, growing your own fruits and vegetables can promote neighborhood communication and food culture. Most residents travel on foot, and the elderly are easily lost due to poor cognition and sense of direction. Therefore, a convenient road guidance system should be established in the planning, and night lighting construction should be strengthened, as shown in Figure 5. Community public space design should focus on improving residents' physical and mental health and quality of life [17], be people-oriented and ecologically sustainable, create a space with humanistic care and environmental awareness, rationally layout and optimize resource allocation, and create a comfortable and natural atmosphere [18].



Figure 5: Schematic diagram of community lighting system

In the design and renovation, the main entrances and exits of the community and both sides of the road should be adequately lit. Low lighting facilities such as floor lamps are installed in the height difference area to ensure consistent and stable lighting and avoid uneven intensity. Lighting design should be added to activity areas and landscape nodes of public Spaces to create different colors and effects to help the elderly clearly identify the space and improve safety at night [19].

#### 5. Design Effect Verification

After the design was completed and evaluated by experts, the design plan was quickly put into the renovation of Community A, costing approximately 2.8 million yuan. By 2021, residents had already used the new public space. In order to verify the effectiveness of the design based on public management, this article conducted a survey on the experience, participation, and satisfaction of the residents (155 male residents and 150 female residents) who participated in the survey on the renovated community public space environment.

## 5.1. Ecological Nature of Space

The ecological suitability of community public space includes natural ecological protection, landscape planning, green coverage and biodiversity. In the design of A community, emphasis should be placed on the use of natural environment and resources, expanding green areas, reducing building coverage, and improving environment and air quality. The ecological suitability after the transformation is shown in Table 3.

Table 3: Ecological suitability of Community A after renovation (multiple choices)

Degree of suitability	Male	Female
Very high	88	95
Relatively high	60	53
Low	5	1
Very low	2	1

As shown in Table 3, the ecological suitability of community A after renovation is very high, with 88 male residents and 95 female residents. There were 60 men and 53 women with high ecological suitability after the transformation. The residents with low ecological suitability are 2 men and 1 woman.

When planning community public space, the color of plants should be used to create a quiet environment, and the distance and density of plants should be rationally allocated. The seasonal changes of plants bring differences in sight, smell and touch, enhancing residents' sense of identity.

## 5.2. Residents' Participation Level

Public authorities encourage residents to participate in the design of public Spaces through discussion groups and voting. Basic information on survey respondents was recorded in 2019 so that the survey could continue in 2021. By 2021, the age of the respondents will increase by two years, and the number of residents aged 14-18 will increase from 12-16 in 2019. Age groups are based on 2021. Figure 6 shows how seven community managers rated the participation of residents in different age groups in 2019 and 2021.

Figure 6 (a) shows that before the design and renovation in 2019, the scores of community managers on the participation enthusiasm of residents of all ages were below 60 points, indicating that residents' insufficient attention to public space affected its social value.

Figure 6 (b) shows that after the renovation in 2021, the participation enthusiasm scores of residents of all ages are above 60 points, indicating that the renovation plan has improved the ecological suitability and residents' sense of participation.

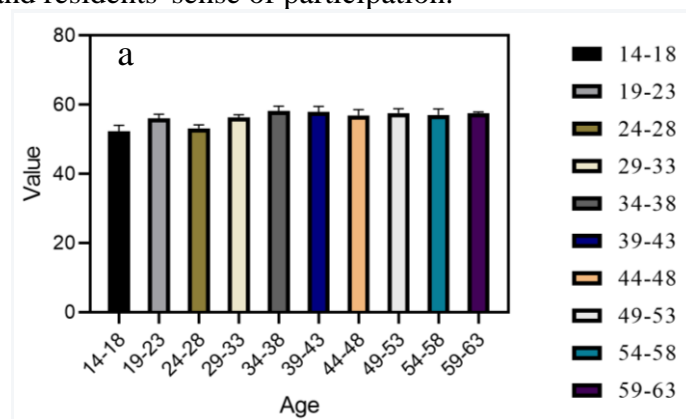


Figure 6 (a): Participation enthusiasm scores of residents of different age groups in 2019

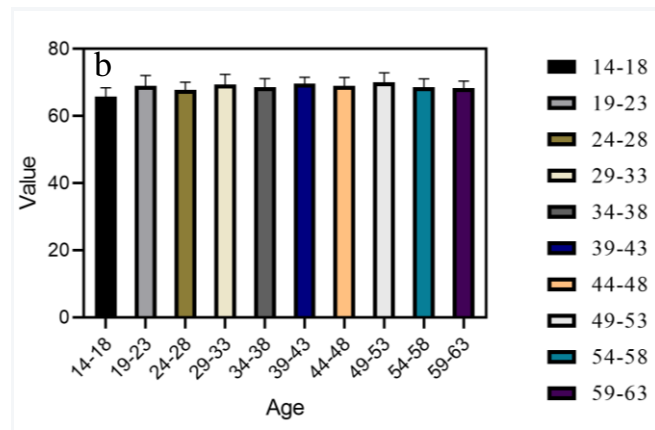


Figure 6 (b): Participation enthusiasm scores of residents of different age groups in 2021

Figure 6: Participation enthusiasm scores of residents of different age groups in 2019 and 2021

Public management enhances the scientific and democratic nature of design and management, and improves the utilization efficiency and satisfaction of public space by considering the needs and suggestions of residents. Public participation can help resolve conflicts of interest and enhance social cohesion. Relevant departments should improve information disclosure and management transparency to enhance public trust and satisfaction.

### 5.3. Satisfaction

In order to cope with social development, community public space must have rich infrastructure. Safe fitness equipment, recreation and learning rooms are set up to meet the daily living and entertainment needs of residents. Figure 7 summarizes the community residents' satisfaction with infrastructure and regional culture and the number of people who are very satisfied after the design transformation.

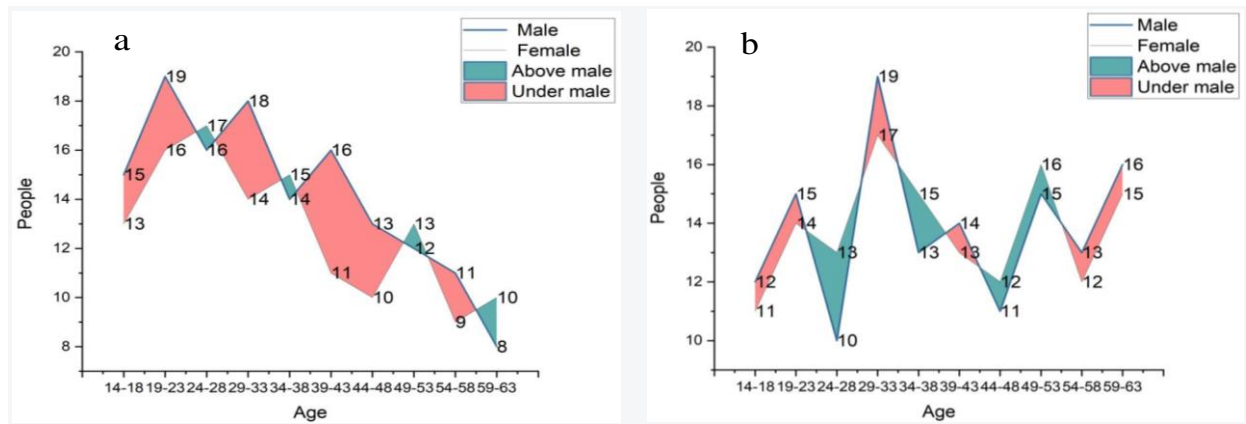


Figure 7 (a): Satisfaction with infrastructure

Figure 7 (b): Satisfaction with regional culture

Figure 7: Satisfaction with infrastructure and regional culture

In Figure 7 (a), 15 males and 13 females aged 14 to 18 were satisfied with the improved infrastructure; Among 19 to 23 years old, 19 males and 16 females were satisfied; Among 34 to 38 years old, 14 men and 15 women were satisfied; Among those aged 59 to 63, eight men and 10 women were satisfied. A total of 142 men and 128 women were very satisfied with the infrastructure.

In Figure 7 (b), 12 male and 11 female residents aged 14 to 18 were satisfied with the regional culture; Among 19 to 23 years old, 15 men and 14 women were satisfied; Among 34 to 38 years old,



13 men and 15 women were satisfied; Among those aged 59 to 63, 16 men and 15 women were satisfied. A total of 138 residents are very satisfied with the local culture.

In the design process, the implementation difficulty, maintenance cost, safety and other aspects were analyzed and kept transparent, to ensure that residents have a clear understanding of the design progress and problems, timely solve feedback problems, and enhance residents' self-awareness and social responsibility.

## 6. Conclusions

Taking Community A as an example, this paper explores the problems before the public space design transformation, including poor infrastructure, single ecological layout and insufficient regional culture. Through in-depth observation of residents and analysis of public management, the optimized design scheme is put forward. Based on public management, Community A has transformed its ecological environment (such as food gardens), regional culture and infrastructure (such as lighting system). In the future, it is necessary to establish a scientific management mechanism, promote advanced concepts and technologies, improve the planning and design quality of community public space, and make it an ideal place to live.

## References

- [1] You C. *Research on Urban Community Public Space Design Based on Children's Psychological Needs—A Case Study and Survey of Chengdu Yulin East Road*. *Open Journal of Social Sciences*, 2019, 07 (8): 444-457.
- [2] Swapan A Y, Bay J H, Marinova D. *Importance of the Residential Front Yard for Social Sustainability: Comparing Sense of Community Levels in Semi-Private-Public Open Spaces*. *Journal of green building*, 2019, 14 (2): 177-202.
- [3] Lesmana D, Antariksa, Wulandari L D, H Santosa. *Community Resilience as a Determinant Factor for Improving Limited Urban Public Space*. *Journal of Southwest Jiaotong University*, 2021, 56 (2): 481-490.
- [4] Wiriantari F, Paturusi S A, Ketut N, A Dwijendra, GD Putra. *The Value of Catuspatha as a Public Space for the Balinese Community in the Klungkung City, Bali Indonesia: the Struggle for Activities between Politics, Economics and Socio-Culture*. *PalArch's Journal of Archaeology of Egypt/ Egyptology*, 2020, 17 (7): 11581-11593.
- [5] Link F, Seoret A, Valenzuela F. *From Community to Public Familiarity: Neighborhood, Sociability, and Belonging in the Neoliberal City*. *Urban Affairs Review*, 2022, 58 (4): 960-995.
- [6] Mei I, Sudiana A K, Sumantra K. *Position and Management Strategy for Public Green Open Spaces in the City of Denpasar, Bali Province*. *International Journal of Research -Granthaalayah*, 2021, 9 (7): 75-85.
- [7] Kalbarczyk E. *Transformation of Public Space in Rural Areas - Identification and Assessment of Its Management in Selected Communes of Wielkopolska Province*. *Acta Scientiarum Polonorum Administratio Locorum*, 2020, 19 (2): 77-84.
- [8] Knst A, Melik R V, Verheul W J. *Civic-led public space: Favourable conditions for the management of community gardens*. *Town planning review*, 2018, 89 (6): 575-595.
- [9] Begum H, Sharna F. *Factors Influencing Public Accessibility to Community Open Spaces in Dhaka City: A Case Study of Mirpur Budhhijibi Complex in Dhaka*. *The International Journal of Social Sciences and Humanities Invention*, 2018, 5 (5): 4759-4764.
- [10] Choi H S, Reeve A. *Understanding the impact of economic migrants and landless farmers on mass-produced housing and community space in China, using the case of Zhangjing, Suzhou*. *International Journal of Urban Sustainable Development*, 2018, 10 (1): 60-78.
- [11] Shao F. *Interior Space Design of Community Activity Center Based on Service Function*. *Open Journal of Social Sciences*, 2019, 07 (5): 209-214.
- [12] Fu Z, Chao C, Wang H, Y Wang *Toward the participatory human-centred community an exploration of cyber-physical public design for urban experience*. *IET Cyber-Physical Systems: Theory & Applications*, 2019, 4 (3): 209-213.
- [13] Zhao Z. *Community Public Safety Evaluation System Based on Location Information Service Architecture*. *Mobile Information Systems*, 2021, 2021 (4): 1-10.
- [14] Rosete N, Somuhano N, Romero M. *Participative management model for humanize the public spaces: Analco neighborhood, Historical Center of Puebla, Mexico*. *Bitacora Urbano Territorial*, 2019, 29 (1): 43-52.
- [15] Urban facilities division, Urban Planning Department, National Institute for Land and Infrastructure Management, Ministry of Infrastructure, Transport and Tourism. *Design and evaluation of an urban public space from the point of*

view of city center vitalization. *The Japanese Journal of Real Estate Sciences*, 2019, 33 (2): 52-57.

[16] Al-Atti I V. *Analysis Researches on Development of Public Management in Ukraine within the System of International and Legal Standards. Ukrainian Assembly of Doctors of Sciences in Public Administration*, 2018, 1 (12): 48-62.

[17] Envelope T, Envelope F, Rui P, Envelope N. *Sustainable living neighbourhoods: Measuring public space quality and walking environment in Lisbon. Geography and Sustainability*, 2022, 3 (4): 289-298.

[18] Eb A, Paa B. *Role of public space design on the perception of historical environment: A pilot study in Amasya. Frontiers of Architectural Research*, 2022, 11 (1): 13-30.

[19] Leng J, Yu F, Yu C W. *Natural daylight design for underground public space: Indoor and Built Environment*, 2022, 31 (3): 581-585.