Research on the Satisfaction of Urban Public Green Space Renovation Services Based on the "Process-Result" Dual-Dimensional Framework

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Abstract: This study takes Yiwu City as a case study, focusing on public satisfaction with urban public green space renovation services. Through questionnaire surveys, 200 valid samples were collected, and methods such as descriptive statistics, reliability and validity tests, and factor analysis were used to analyze satisfaction characteristics from the perspective of public management. The results showed that the overall satisfaction rate was 3.89 (5-point scale), with the highest score for greenery quality (4.48) and the lowest score for temporary access during the renovation process (3.29); The reliability and validity test indicated that the scale had good reliability (Cronbach'sα=0.662) and structural validity (KMO=0.713). The study provided empirical evidence for the refined supply of public green space renovation services.

Keywords: Urban Public Green Space; Renovation Services; Process-Outcome; Service Satisfaction; Yiwu City

1. Research Overview

1.1 Research Background and Core Content

Urban green space transformation is an important carrier of public service supply, and its quality is directly related to the public life experience. Urban green Spaces create a place for residents to relax, enjoy nature and temporarily escape from urban life [1]. From the perspective of public administration, renovation services encompass two dimensions: process management (processes such as construction organization and public communication) and outcome effectiveness (outputs such as functional realization and user experience). The satisfaction of the people is the sole criterion for measuring the success of urban renewal [2].

As China accelerates its urban renewal initiatives, there are huge opportunities and challenges for the high-quality development of county towns [3]. Yiwu, a commercial city, has seen a surge in demand for public green space renovation in recent years, but there are problems such as insufficient public participation and lagging service response. Based on the "process-outcome" two-dimensional framework, this study delves into the factors influencing satisfaction with renovation services, aiming to provide useful references for the public sector to improve service supply.

1.2 Current Status of Research at Home and Abroad

Foreign research focuses on co-governance of public services and equitable access to public services [4]. Emphasizing the role of public participation in enhancing satisfaction, such as incorporating demands through community hearings to narrow the supply-demand gap [5]; Domestic research has shifted from the "outcome evaluation" perspective to the "service supply" perspective, focusing on the association between facility maintenance frequency, accessibility, etc. and satisfaction [6-8].There are two limitations in the existing research: one is insufficient coverage of process management indicators; The second is the scarcity of cases in small and medium-sized cities.

1.3 Research Methods

Data collection: Stratified random sampling was used. 220 questionnaires were distributed around three renovated green Spaces in Yiwu, and 200 valid samples were retrieved (valid rate 90.9%). The sample size exceeded the variable by 10 times and met the sample size requirements [9]. This sample covers all age groups and occupational types and is representative.

Analysis tools: Statistical analysis was performed using SPSS 26.0, including descriptive statistics (distribution of satisfaction scores), reliability and validity tests (scale reliability), and factor analysis (dimension structure validation).

2. Evaluation Indicators and Data Statistics

2.1 Evaluation Index System

Based on the "process-result" dimension, 20 indicators were selected by three urban facilities experts, with 10 for process and 10 for result. Through online questionnaire voting, the top 7 indicators with the highest number of votes in process and result were selected respectively to construct 14 evaluation indicators, as shown in Table 1.

2.2 Describe the Statistical Results

Overall satisfaction: The mean was 3.81 (±0.98), in the "fairly satisfied" range, with the transformation results (4.15) scoring higher than the transformation process (3.64).

The differences in indicator scores, as shown in Table 2.

Highest score: Greening quality (4.47) scored the highest, reflecting the public's high recognition of ecological value, possibly due to the fact that in the design selection, Yiwu City pays more attention to the use of native plants with good growth conditions.

Table 1. Evaluation Index System for Satisfaction with Public Green Space Renovation Services

Dimensions	Secondary metrics	Core content
Transformation process	Reasonableness of construction time	The degree of mismatch between construction periods and the peak of residents' activities
	Construction anti-disturbance control	Control of negative impacts such as noise and dust
	Construction safety management	Safety measures such as fencing and warning signs
	Notice of Construction Progress	The degree of information disclosure regarding renovation plans and progress
	Communication and Notification	Adequacy of prior notification of the renovation plan
	Channels for collecting opinions	The convenience of public opinion expression channels
	Temporary access guarantee	Reasonableness of reserved travel routes during construction
Renovation results	Greening quality	Vegetation survival status and diversity
	Spatial layout	The rationality of functional zoning (rest and activity areas) and the richness of greenery layers
	Facilities configuration	Adequacy of seating, fitness equipment, children's recreation facilities, etc
	Facility maintenance	The timeliness of repairing damaged facilities and the frequency of maintenance and renovation of old facilities
	Spatial accessibility	The walking distance from residential areas to green Spaces, the setting of entrances and exits, and transportation connections
	Landscape harmony	The degree of integration of natural and artificial elements
	Ease of use	The ease with which various activities are carried out and the degree of fair use among different groups of people

The lowest score: Temporary access control (3.29) was the lowest among 14 indicators, revealing shortcomings in process management and inadequate consideration of the external environment;

Standard deviation: The standard deviations of construction disturbance control (1.14) and temporary passage guarantee (1.11) were larger, indicating significant differences in public evaluation of these two indicators, while the standard deviations of greening quality (0.72) and facility configuration (0.74) were the smallest, indicating that public evaluation of greening quality and facility configuration was

relatively consistent.

Table 2. Renovation Service Satisfaction Score Statistics (5-Point Scale)

Dimensions	Secondary metrics	Mean	Standard deviation	Sorting
Transformation process	Reasonableness of construction time	3.90	1.04	8
	Construction anti-disturbance control	3.56	1.14	11
	Construction safety management	4.02	1.03	7
	Notice of Construction Progress	3.82	1.04	9
	Communicating and informing	3.44	1.01	13
	Channels for collecting opinions	3.46	1.10	12
	Temporary passage guarantee	3.29	1.11	14
Retrofit results	Greening quality	4.48	0.72	1
	Spatial layout	4.18	0.91	3
	Facilities configuration	4.41	0.74	2
	Facility maintenance	3.74	1.02	10
	Spatial accessibility	4.04	0.93	6
	Landscape harmony	4.15	0.97	4
	Ease of use	4.07	0.96	5
	-	3.81	0.98	-

3. Reliability and Validity Tests and Factor Analysis

3.1 Reliability Test (Cronbach's α)

The Cronbach's α coefficient for the overall scale was 0.662, and the standardized Cronbach's α coefficient was 0.666, both >0.6. There was no significant increase in the α coefficient after removing any one of the indicators, indicating acceptable internal consistency and good stability of the scale [10]. By dimension, the Cronbachα coefficient of the modification process dimension was 0.723, and that of the modification result dimension was 0.744, both meeting the reliability criteria; Total corrected item correlation (CITC): All indicators >0.4 in the renovation process dimension except "temporary access assurance" (0.343), and all indicators >0.4 in the renovation outcome dimension except "landscape harmony" (0.319) and "spatial layout" (0.354).

It was observed that the reliability in both dimensions of the scale was higher than the overall reliability, and the correlation was better calculated by dimension, possibly because the homogeneity of the items within the dimension was much higher than that of the overall items. Items in the same dimension focus on the same specific concept. In this scale, items in the "renovation process dimension" revolve around similar contents such as "construction time, safety, disturbance control", while items in the "renovation result dimension" revolve around completed renovation results including related contents such as "greening, accessibility, convenience", The items were highly consistent in terms of content, measurement objective, and theoretical correlation, and the correlation coefficient (shared variation) among the items was higher, so the internal consistency reliability coefficient was naturally higher (0.723 and 0.744 > 0.662).This phenomenon further validates the scientific nature of the dimension division.

3.2 Validity Test

KMO and Bartlett test:

The KMO of the full scale is 0.713 (>0.7), the Bartlett sphericity is 715.241, the degree of freedom df is 91, and the Bartlett sphericity test $p<0.001$, indicating that the scale is suitable for factor analysis [11];

Exploratory factor analysis:

Factor analysis of data using exploratory factor analysis, using principal component analysis (PCA) + maximum variance rotation (Varimax). According to the Kaiser criterion, four common factors were extracted, with eigenroots all > 1. As shown in Table 3, the cumulative variance contribution rate of the four factors was 60.60%, indicating that the four factors could reflect most of the variable information.

Factor 1: Construction time rationality (0.814), construction progress disclosure (0.720), etc., explains 20.93% of the variance. According to the content of the indicators, the four indicators can be classified as process management;

Factor 2: Communication and notification (0.73), opinion collection channels (0.80), etc., explain

18.47% variance. According to the content of the indicators, four indicators can be classified as public participation;

Factor 3: Facility configuration (0.79), ease of use (0.82), etc., explains 11.74% of the variance. According to the content of the indicators, four indicators can be classified as functional effectiveness;

Factor 4: Spatial layout (0.83), landscape harmony (0.80), etc., explains 9.47% variance. According to the content of the indicators, the four indicators can be summarized as landscape fit.

Table 3. Factor Loading Matrix after Rotation (n=200)

Name	Factor loading coefficient				Commonality (h2)
	Factor 1	Factor 2	Factor 3	Factor 4	
1. Construction time rationality	-	0.814	-	-	0.671
4. Construction progress announcement	-	0.720	-	-	0.533
2. Construction anti-disturbance control	-	0.667	-	-	**0.495**
3. Construction safety management	-	0.636	-	-	**0.439**
6. Channels for collecting opinions	-	-	0.803	-	0.673
5 Communicate and inform	-	-	0.731	-	0.590
7. Temporary passage assurance	-	-	0.814	-	0.688
8. Greening quality	0.829	-	-	-	0.710
14. Ease of use	0.800	-	-	-	0.644
12. Spatial accessibility	0.774	-	-	-	0.628
10. Facilities configuration	0.680	-	-	-	0.501
11. Facility maintenance	0.540	-	-	0.489	0.552
9. Spatial layout	-	-	-	0.833	0.702
13. Landscape harmony	-	-	-	0.804	0.659
Characteristic root values (before rotation)	2.930	2.585	1.643	1.326	-
Variance interpretation rate % (before rotation)	20.926%	18.465%	11.736%	9.474%	-
Cumulative % (before rotation)	20.926%	39.392%	51.127%	60.602%	-
Feature root values (after rotation)	2.735	2.202	1.943	1.605	-
Variance interpretation rate % (after rotation)	19.532%	15.729%	13.878%	11.462%	-
Cumulative % (after rotation)	19.532%	35.261%	49.139%	60.602%	-

Note: If the numbers in the table are bolded, it indicates that the common degree (variance of the common factor) is less than 0.5.

4. Results Discussion

Through the analysis of the questionnaire data, we can see that the evaluation index system of satisfaction with urban public green space renovation services based on the "process-result" two-dimension focuses on the provision process of urban public green space renovation services and the effectiveness of the actual renovation results, and this scale can well reflect the satisfaction level of residents with urban public green space renovation. It is as follows:

4.1 Analysis of Satisfaction Characteristics

Outcome effectiveness outperforms process management: The transformation outcome score (4.15) is significantly higher than the process score (3.64), reflecting the tendency of the public sector to "emphasize input over process". The high scores of visible outputs such as green quality (4.47) and facility configuration (4.41) may be directly related to the resource input of Yiwu's inclusion of green space renovation in people's livelihood projects [12]. In addition, the psychological logic of people evaluating based on gains and losses provides feedback on the results and processes of urban public green space renovation services. On the one hand, residents rated favorable outcomes such as "improved greening quality" and "improved facilities" highly, that is, a strong perception of benefits, while they rated harmful processes such as "construction noise" and "blocked passage" poorly, that is, a significant perception of costs [13]; On the other hand, residents' high evaluation of "improved spatial accessibility" (beneficial) and low evaluation of "construction disturbance" (harmful) are essentially manifestations of the instinct to seek benefits and avoid harm in the evaluation of public services, guiding their own behavioral choices through evaluation differences to maximize benefits and minimize damage [14].

The shortcomings in process management are

obvious: the scores of key indicators such as temporary passage guarantee (3.29 points), construction anti-disturbance control (3.56 points), and opinion collection channels (3.46 points) are relatively low. This might be due to the insufficiency of the public participation mechanism - only a few respondents indicated that they had received the notice before the renovation, while a large number of respondents reported that "they had opinions but had no place to provide feedback". Take Yiwu as an example. Currently, citizens' feedback mainly relies on the "96150" citizen hotline, but the efficiency of the circulation of relevant opinions among public departments is low. In addition, there are certain objective factors. On the one hand, the high temperatures in summer in Yiwu last for a long time, and the season suitable for greening construction throughout the year is relatively short, which leads to the construction of public green Spaces mainly concentrated in spring, but it rains a lot in spring, which affects the construction progress. On the other hand, the materials selected for the greening renovation are complex and difficult to procure. Some construction units have to carry out night construction in order to catch up with the schedule, which has a significant impact on the surrounding residents, especially the greening renovation services near residential areas. At the same time, due to the wide range of public green space renovation, mostly semi-enclosed construction, and the small amount of work and the lack of sufficient protective facilities, it is easy to pollute the surrounding road environment during the rainy season construction, which also reduces the satisfaction of the masses.

Differences in group needs: The 31-50 age group has the strongest demand for facility maintenance (3.73) and space accessibility (4.04), but their satisfaction is lower than that of the group over 51 years old, reflecting a mismatch between service supply and core user demands. The reason might be that in the current urban public green space renovation, more modern design concepts have been incorporated, the choice of color matching has been more intense, and more intelligent facilities and equipment have been added. Among the 31-50 age group, who grew up in the rapid urbanization stage, there are higher expectations for the "modernity" and "innovation" of urban Spaces, and they are more likely to recognize the new functions (such as intelligent facilities, social space expansion) and aesthetic upgrades brought by the transformation, and therefore have a higher evaluation of the transformation results such as the quality of greenery and the convenience of use. People over 65 are more dependent on long-established living habits and are more sensitive to the "changes" brought about by renovations, such as inconvenient access during construction and the removal of existing facilities. They also have a stronger emotional attachment to traditional Spaces and are more likely to lower their evaluation due to "loss of familiarity".

4.2 Analysis of the Mechanism of Influence

The moderating experience of communication transparency indicated that the satisfaction (3.85) of respondents who received the transformation notice (score > 3) was significantly higher than that of respondents who did not receive the notice (3.21) ($t=3.62$, $P<0.01$), verifying the important role of information symmetry in enhancing recognition [15].

Negative impact of the experience process on outcome evaluation: Respondents who were more affected by the construction disturbance (with a score below 3) rated the renovation outcome significantly lower (3.42) than those who were not affected (3.98), and this difference was statistically significant ($t=2.89$, $P<0.01$).This suggests that in urban public green space renovation services, inadequate process management weakens residents' recognition of the quality of green space outcomes, Kahneman and Tversky argue that the psychological utility of loss and benefit is not the same, and objective loss has a greater psychological utility than the same amount of benefit [16].

5. Conclusions and Recommendations

5.1 Research Conclusions

The evaluation index system of satisfaction with urban public green space renovation services based on the "process-outcome" two-dimension is feasible for evaluating urban public green space renovation services. The overall satisfaction of Yiwu residents with public green space renovation services was above average (3.89), but the scores for process management were significantly lower than those for outcome efficiency; The "hard outputs" such as greening quality and facility configuration scored high,

while the "soft processes" such as construction anti-disturbance and opinion collection scored low; Functional utility and communication transparency are key factors affecting satisfaction, and the process experience has a counterproductive effect on outcome evaluation.

5.2 Practical Recommendations

Optimize process management: Implement "off-peak construction" : Schedule noise operations from 10:00 to 15:00, set up the construction schedule for each stage to the next stage, down to the day, and reasonably set up sound insulation barriers to reduce interference; Establish a "three-level communication mechanism" : Publicize the plan 7 days before construction, post it in a prominent position, and make the description voice easy to understand to avoid being official, add dedicated positions, update the progress weekly in the middle stage, and provide feedback every 3 days in the later stage, and incorporate it into the ledger requirements.

Strengthen demand response: Shorten the facility maintenance cycle. For the core group aged 31-50, add the "scan code for repair" function to improve the "identify problems - solve problems" response efficiency. For the high-frequency user group (over 50 years old), add mobile patrol personnel or set up feedback boards at fixed points to collect and summarize problem feedback daily. Based on the principle of "80% of resources allocated to core needs", priority is given to ensuring facility configuration and spatial accessibility, optimizing the layout of urban public green Spaces, improving the efficiency of public green space usage, and enhancing the accessibility and convenience of public green Spaces, such as adding pedestrian walkways in street-side green Spaces and increasing the setting of entrances and exits to public green Spaces.

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