

# *Rural Street Space Renewal Strategy Based on Human-centered Concepts: A Case Study of Shizikou Village, Jinan*

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**Keywords:** Rural Streets, Spatial Renewal, Human-centered Concepts, Renewal Strategy, Rural Street Space, Rural Revitalization

**Abstract:** This study takes Jinan's Shizikou Village in China as an example, conducting field investigations and data analyses to explore the necessity and feasibility of rural street space renewal. The primary findings reveal that the functionality of Shizikou Village's streets is suboptimal, with issues such as road damage and insufficient lighting facilities. Based on the survey results, the study propose a rural street space renewal plan grounded in human-centered design principles. Our goal is to create a rural street space that meets the villagers' needs, aligns with local culture, and fosters sustainable development.

## **1. Introduction**

With the deep implementation of the rural revitalization strategy, the living environment of rural residents has attracted significant national and social attention. Especially the village street space, "Solving the village road traffic problem is an essential content for promoting village industrial development" [1]. Its condition directly affects the quality of life of farmers. Although preliminary achievements have been made in rural renewal, many rural streets still face problems such as outdated infrastructure and poor environmental conditions due to a lack of human-centered design concepts.

This research seeks to inform street renewal in Shizikou Village and analogous rural settings. Through fieldwork and rigorous data analysis, we discerned the utilization and challenges of Shizikou's streets. Consequently, we advocate human-centered rural street renewal strategies, offering novel theoretical and practical insights for rural street design. This work aspires to invigorate rural streets, aligning them with the broader rural revitalization strategy and underscoring its significance.

## 2. Research Methods (Field Investigation Methods)

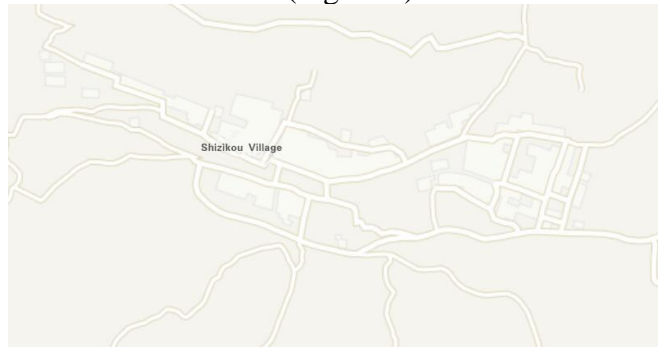
### 2.1. The importance of field research methods

This study utilized field research to deeply understand Shizikou Village streets. Direct observations captured the street's conditions, like damaged pavements and inadequate lighting. Unlike relying on secondary data, this method yielded richer, firsthand insights. Direct interactions with villagers provided feedback on their needs and sentiments, ensuring the proposed updates were aligned with actual requirements. Emphasizing a human-centric design, field research allowed experiencing the street from a user's viewpoint, understanding its cultural and geographical context. This approach ensured data authenticity and contributed to a street update plan harmonizing with local culture and environment.

### 2.2. Field Observation Records

Shizikou Village is located at the southernmost tip of Zhangqiu District, Jinan City, at the west of Jinyang Pass and at the foot of Qi Great Wall. The village is surrounded by mountains on three sides, with dense vegetation and shades of trees. It is a small mountain village with beautiful scenery. More than 95% of the land in Shizikou Village is mountainous and thin, and it is a poor village at the city level in Jinan [2]. The environment is very beautiful, and the regional characteristics are obvious. The whole village is basically formed by stone masonry.

Located on Jinan City's outskirts, the village street layout embodies traditional rural features. Influenced by the terrain, the primary and secondary streets run parallel to contour lines, while support alleys intersect them, creating a three-tiered road system. This layout demonstrates adaptability to the mountainous environment. (Figure 1).



(Source: Shandong Provincial Geographic Information Public Service Platform)

Figure 1: Shizikou Village Road Planning

This layout aids residents' daily commute but limits street space development potential [Figure 2 (a), (b), (c), (d)]. The village's infrastructure is outdated; streets, originally paved with stones, have deteriorated due to weathering and human activity, making them hazardous. The drainage system is inefficient in places, causing water accumulation during rains [Figure 2 (a), (b), (c), (d)]. Insufficient street lighting poses nighttime safety risks. Public facilities are scarce, with few rest areas and trash cans, affecting sanitation. The absence of clear signposts can confuse non-locals and tourists.



(a) (b) (c) (d)

Figure 2: (a), (b), (c) & (d): Real photos of Shizikou Village

### 2.3. Questionnaire

During the field investigation of Shizikou Village's streets, the study adopted methods such as visiting locals, conducting surveys, collecting and organizing data. First, the researcher randomly selected some villagers for interviews to gain an in-depth understanding of their street usage, satisfaction, existing problems, and improvement suggestions. Then, the researcher designed a detailed questionnaire to distribute to locals during or after the interviews, collecting more specific, quantifiable data. Finally, the researcher used tools like Excel to organize this data, generating tables containing respondents' basic information, feedback on street usage, satisfaction ratings for street facilities, and others. These three steps complement each other, and by integrating various information, the study can have a deeper understanding of the current situation of Shizikou Village's streets, providing a basis for subsequent improvement work (Figure 3).

Survey Statistics										
No	Age	Gender	Length of stay	Satisfaction with current street conditions	Humanized design	Street public facilities	Satisfaction with road conditions	Street Convenience	Wish to preserve traditional regional culture	
1	35	1	20	5	4	3	5	4	1	
2	19	2	19	4	3	4	3	3	2	
3	55	1	30	3	3	3	3	2	1	
4	65	2	40	4	4	3	4	3	3	
5	70	1	35	3	4	4	3	2	1	
6	20	2	20	3	4	3	2	2	1	
7	29	1	0.1	3	4	4	3	3	1	
8	38	2	15	5	5	3	4	2	2	
9	70	1	40	2	2	2	3	3	1	
10	48	2	5	5	5	4	3	4	2	
11	37	1	10	2	2	2	4	4	1	
12	58	2	40	4	4	4	4	5	2	
13	48	1	35	3	3	3	3	3	1	
14	55	2	35	5	3	5	3	2	3	
15	65	1	40	4	3	4	4	3	2	

Notes: Men: 1. Women: 2 Satisfaction (1 Best - 5 Worst) Compliance (1 Best - 5 Worst) Degree of perfection (1 best - 5 worst) Convenience (1 best - 5 worst) degree of hope (1 best - 5 worst)

Figure 3: Survey Statistics

## 3. Data Analysis and Discussion

### 3.1. Analysis of Field Observation Records

Field observations in Shizikou Village revealed that its street layout, while facilitating residents' commute, limits street space development potential, possibly impeding the village's modernization. The constrained development might affect commercial layouts, community amenities, and housing.

Shizikou's outdated infrastructure and insufficient public facilities don't align with residents' needs, potentially diminishing their quality of life. The notable absence of amenities like rest areas and trash bins compromises environmental sanitation. Addressing these concerns requires enhanced public facilities and improved services.

### 3.2. Analysis of Survey Questionnaire Data

In the survey of Shizikou Village's streets, the study collected 15 valid samples. Demographic Information: The age distribution of respondents is quite balanced, slightly more in the 36 to 55 age group. This indicates a mature population, likely having a good understanding of environmental changes over time. The gender distribution is almost equal, providing a balanced perspective of both sexes. Most respondents have lived in their current residence for 31 to 40 years, indicating great familiarity with the area.

Satisfaction Information: The data reveals a noticeable trend of dissatisfaction in several key areas. Most respondents rated the village's human-centered design as "average" or "non-compliant." This significant finding indicates that the village's design may not have met the residents' needs and expectations. According to urban planning theory, human-centered design focuses on creating an environment centered on human needs and experiences [3]. Accessibility, safety, comfort, and aesthetics are vital, with current village design possibly lacking these elements. Most respondents found public facilities and road conditions "average" or below, suggesting unmet needs or required improvements. There's a strong desire among residents to maintain traditional regional culture, reflecting a deep cultural identity. This is an essential factor to consider in any future development or renovation plans, as any changes should respect and integrate the area's cultural heritage [4].

In summary, while the residents of Shizikou Village have shown a strong desire to retain traditional culture, there is also evident of dissatisfaction in key areas such as human-centered design, public facilities, and road conditions. This indicates a need for improvements that respect and integrate the village's cultural heritage while enhancing the functionality and user-friendliness of public spaces and infrastructure. The data analysis, including age distribution, length of residence, and satisfaction levels, reveals that Shizikou Village's streets indeed lack human-centered design and need improvements in public facilities, road conditions, and convenience. Notably, most respondents expressed a desire or strong desire to preserve traditional regional culture (Figure 4).

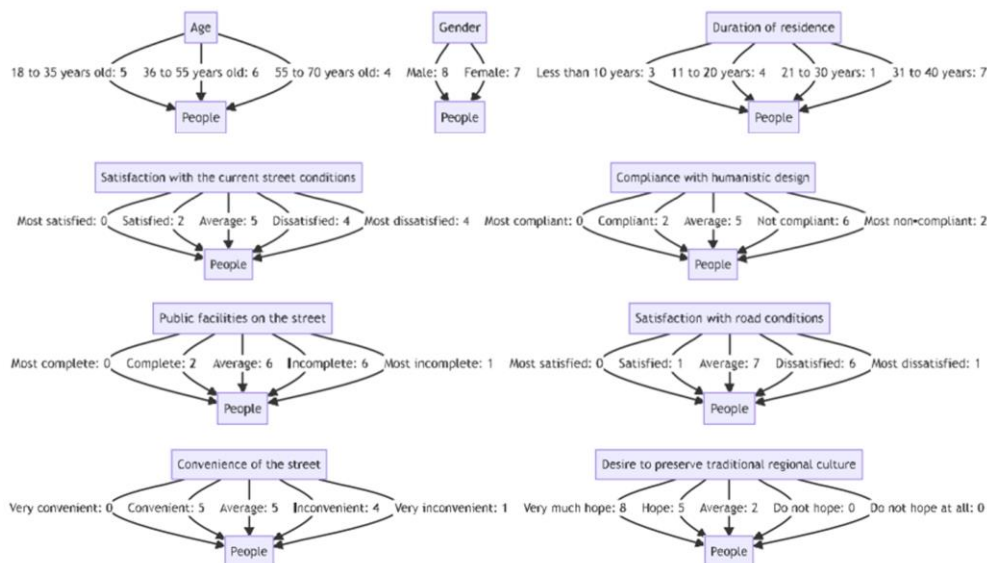


Figure 4: Questionnaire data analysis results

### 3.3. Strategic Discussion

The overall survey results highlight a lack of consideration for human-centered design. Hence, the study should propose the following strategies in the rural street renewal design:

**Focus More on Residents' Needs and Desires:** During the design process, the study needs to delve deeper into understanding the residents' values, including what they consider important in their lives, their moral and ethical beliefs. This Value-Sensitive Design (VSD) [5] approach could assist to comprehend the residents' needs more comprehensively. By involving the residents of Shizikou Village in the design process and soliciting their opinions and feedback, the researcher could design street spaces that better meet their needs [6]. **Adopt a Holistic Design Perspective:** The research should weigh both residents' needs and environmental implications. Street designs should harmonize human requirements with environmental conservation. **Implement Evaluation Protocols:** Post-implementation audits are essential. In Shizikou Village, this entails assessing street spaces to refine human-centric design. **Address Environmental Concerns:** Design should foreground environmental risks. For Shizikou, this means integrating local climate and topographical factors, ensuring features like shade, shelter, and efficient drainage. **Encourage Healthful Behaviors:** Streets should promote physical activity and social engagement, incorporating pedestrian pathways, bike lanes, and communal areas. These strategies, rooted in human-centered design philosophy, emphasize understanding and involving residents while being environmentally conscious, ensuring designs cater to inhabitants and safeguard the environment.

### 4. Conclusion

This study, through fieldwork, interviews, and data analysis, this study comprehensively assessed Shizikou Village's street spaces and residents' needs. Notwithstanding infrastructural challenges and limited public amenities, there's a pronounced inclination to uphold traditional culture. In response, we've proposed human-centered design strategies, encompassing usage evaluations, environmental risk considerations, and designs promoting healthy behaviors. These aim to elevate residents' well-being, safeguard the environment, and conserve regional culture. These insights, while tailored for Shizikou, may also inform street space renewals in other rural contexts.

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