Satisfaction Survey of Environmental Basic Public Services and Study on Influencing Factors in New-type Urbanization Areas

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Abstract. The environmental basic public service is the environmental livelihood guarantee and support service provided by the government for the public. The paper evaluates basic environmental public services from the perspective of public satisfaction. The revised questionnaires are handed out in Suqian of Jiangsu Province, where 275 valid questionnaires are collected. For further analysis, the study use SPSS 22.0 to evaluate environment basic public service satisfaction, and identify the influencing factors. The results show that the level of residents' environmental basic public service satisfaction is average. However, the residents are more satisfied with the he service of the people's livelihood and infrastructure services than with the environmental monitoring-supervision services and information service. Environmental participation has a significant positive effect on satisfaction with environmental basic public service, while age and education level have significant negative effects on satisfaction of environmental basic public service. The study believes that important measures such as strengthening community environmental publicity and education, improving the openness of environmental information and public participation in the environment should be taken to effectively improve residents' satisfaction with various types of environmental basic public services.

1. Introduction
The Chinese State Council implemented the National New Type Urbanization Plan (2014-2020) in March 2014, proposing that new type urbanization is an urbanization process with "urban-rural integration, urban-rural integration, industrial interaction, conservation and intensification, ecological livability, and harmonious development" as its core characteristics. Residents' living conditions have significantly improved as a result of new urbanization, but environmental issues in new urbanized areas have become increasingly prominent as a result of inadequate environmental infrastructure and a lack of ecological awareness among residents, such as the low rate of urban waste and sewage treatment. The environment is an essential component of basic government functions. Environmental basic public services are livelihood protection and bottom-up environmental public services given by the government to ensure the public's access to basic public services, with varying standards at different phases and the
goal of equalization. The study's term "satisfaction with basic environmental public services" refers to the public's perception of the government's basic environmental public services after a long period of accumulation, which can reflect the effect of the government's basic environmental public services in a more realistic and objective way. As a result, the public satisfaction-oriented evaluation model of basic environmental public services can objectively analyze residents' satisfaction with basic environmental public services, identify problems, and make rationalized recommendations in order to improve government performance and protect environmental public rights and interests.

Scholars have done several theoretical and empirical studies on public service satisfaction, including techniques such as correlation analysis, regression analysis, and structural equations to study the elements that influence satisfaction [1-5]. After the county was disbanded and turned to a district in 2004, the Suyu district in Suqian City, Jiangsu Province, saw a quick urbanization process, which is typical of new urbanization areas. The study conducted a survey on satisfaction with environmental basic public services among residents in Suyu district using stratified sampling and questionnaires, analyzed the influencing factors of satisfaction with environmental basic public services in terms of personal characteristics and environmental participation, and proposed targeted measures and suggestions such as strengthening publicity and education and improving the environment.

2. Data and methods

2.1. Research Hypothesis
Research shows that satisfaction with public services is influenced by multiple factors. In addition to factors such as drinking water facilities, domestic waste disposal, farmland water conservancy facilities, road quality and other factors that evaluate the perception of public service programs, individual characteristics of respondents such as gender, age, religion, education level and economic and social factors such as occupation, income, family size, as well as knowledge and trust in government work, environmental awareness, and The satisfaction level may be influenced by factors such as knowledge and trust in government work, environmental awareness, and participation in public affairs.

The study provides the following hypothesis based on the aforementioned comprehension and analysis of the current literature [6-7].

H1: Satisfaction with fundamental environmental public services is influenced by personal variables such as gender, age, education level, occupation, income, and length of local residence.

H2: Environmental participation is a significant influencing factor for satisfaction with environmental basic public services, and it has a positive impact on satisfaction.

2.2. Data collection
Suyu District has 18 townships, and 5 townships were chosen at random from the 18 townships. The survey used a random sample approach to select townships, with the following results: Shunhe town, Lailong town, Xinzhuang town, Guanmiao town, and Economic Development Zone. After that, stratified sampling was used to choose individuals for the sample. Residents aged 12 to 60 with a local household registration or a local residence permit were chosen as survey subjects from the specified townships. After discarding questions that were filled in indiscriminately, blank, substantially lacking answers, or had logical flaws, 275 valid questionnaires were gathered, yielding an effective rate of 91.67 percent. Basic personal information, environmental engagement, and satisfaction evaluation of basic environmental public services were all included of the survey.

2.3. Research method
Stratified sampling and questionnaires were used to collect data on residents' satisfaction with local environmental basic public services in Suyu, and data entry was done using SPSS 22.0 software. To study the differences in satisfaction with environmental fundamental public services among different characteristic groups, a one-way analysis of variance (ANOVA) was used. To examine the factors impacting respondents' individual characteristics, environmental participation, and residents'
satisfaction with fundamental environmental public services, a correlation study was conducted using Pearson's correlation coefficient (including overall satisfaction and four dimensions of satisfaction).

2.4. Questionnaire design
In this paper, the questionnaire is designed into three parts with a total of 26 questions.

The first section has six questions that ask for basic personal information. It contains basic background information such as the respondent's gender, age, level of education, employment, time spent in the local area, and annual income.

The second section has ten questions about environmental engagement. The study's focus on environmental participation is on citizens' desire and conduct to participate in environmental preservation and environmental public affairs. Residents' desire and conduct to participate in waste recycling, multiple uses of one water, involvement in environmental protection activities, take-out ordering, laundry detergent preference, and mode of travel and transportation are all included in the study questionnaire design.

The satisfaction rating of fundamental environmental public services, which consists of ten questions, is the third section. Basic environmental public services are divided into environmental livelihood services, which reflect the government's ability to provide water, air, sound, and ecological environment quality; environmental supervision and monitoring services, which reflect environmental quality monitoring and pollution accident emergency response capability; and environmental information services, which reflect the government's ability to provide environmental information. Residents' evaluations of local drinking water quality, air quality, and ecological environment quality; residents' evaluations of domestic garbage disposal and street sanitation services; residents' evaluations of environmental monitoring and environmental supervision services; and residents' evaluations of the degree of environmental quality information disclosure and community environmental protection knowledge are all part of the questionnaire design for this study.

2.5. Reliability and validity analysis
The study used the Cronbach's Alpha reliability coefficient for testing and analysis of the questionnaire. A larger reliability coefficient indicates a greater degree of confidence in the questionnaire measurement results, and generally, a reliability coefficient greater than 0.8 indicates excellent internal consistency, between 0.7 and 0.8 indicates better, and below 0.7 indicates poor internal consistency[8].

| Indicator System                        | Cronbach's Alpha | Number of questions |
|----------------------------------------|------------------|--------------------|
| Environmental basic public service satisfaction | 0.888            | 10                 |
| Environmental Participation            | 0.649            | 10                 |
| Adjusted Environmental Participation   | 0.793            | 7                  |

The evaluation coefficient of satisfaction with environmental basic public services in the study questionnaire was greater than 0.8, indicating excellent internal consistency of this data; the coefficient of environmental participation was less than 0.6, indicating that the internal consistency of this data was relatively poor. Factor analysis of the index system of environmental participation showed that the factor loadings of the first, fourth and tenth questions in environmental participation were lower than 0.4[9], so these three questions were deleted, and the results showed that the reliability was improved to 0.793, which means that the internal consistency of this data of environmental participation after adjustment was better (as in Table 1). In conclusion, the adjusted data of this questionnaire has good internal reliability and can effectively measure and analyze the evaluation of environmental basic public service satisfaction and influencing factors of regional residents. The first section has six questions that ask for basic personal information. It contains basic background information such as the respondent's gender, age, level of education, employment, time spent in the local area, and annual personal income.
The validity test was conducted using KMO and Bartlett's test in factor analysis, and if the value of KMO was >0.5, then the validity was high. The validity test was done for each part of the questionnaire and the results are shown in Table 2 below:

**Table 2.** KMO and Bartlett's test for satisfaction with basic environmental public services

| Kaiser-Meyer-Olkin metric for sampling adequacy | 0.908 |
|-----------------------------------------------|-------|
| Bartlett test of sphericity                    |       |
| Approximate $\chi^2$ -distribution             | 1332.286 |
| Freedom                                        | 45    |
| Significance                                    | 0.000 |

The value of KMO is 0.908, which indicates that the validity of the evaluation of satisfaction with environmental basic public services is good.

**Table 3.** Adjusted environment participation KMO and Bartlett's test

| Kaiser-Meyer-Olkin metric for sampling adequacy | 0.804 |
|-----------------------------------------------|-------|
| Bartlett test of sphericity                    |       |
| Approximate $\chi^2$ -distribution             | 590.576 |
| Freedom                                        | 21    |
| Significance                                    | 0.000 |

After adjustment, the value of environmental participation KMO is 0.804, which indicates good validity of environmental participation (Table 3). The results of the above tests show that this questionnaire has good validity.

**3. Results and discussion**

3.1. **Characterization of factors influencing satisfaction with basic environmental public services**

3.1.1. **Analysis of the characteristics of respondents' basic personal information.** The basic information covered in this survey questionnaire is shown in Table 4. After verification with the actual situation, the data distribution is close to the actual local situation, indicating that the data of this survey and research are representative.

**Table 4.** Respondents' basic information

| Information                          | Category                      | Frequency | Percentage (%) |
|--------------------------------------|-------------------------------|-----------|----------------|
| Sex                                  | Male                          | 123       | 44.7           |
|                                      | Female                        | 152       | 55.3           |
|                                      | Less than 18 years old        | 30        | 10.9           |
|                                      | 19~24 years old               | 26        | 9.5            |
| Age                                  | 25~35 years old               | 133       | 48.4           |
|                                      | 36~50 years old               | 70        | 25.5           |
|                                      | More than 50 years old        | 16        | 5.8            |
| Education level                      | Elementary school and below   | 50        | 18.2           |
|                                      | Junior High School            | 34        | 12.4           |
| Education level                      | High School                   | 42        | 15.3           |
|                                      | Junior College                | 75        | 27.3           |
|                                      | Bachelor's degree or above    | 74        | 26.9           |
|                                      | No work                       | 96        | 34.9           |
| Career                               | Businessmen                   | 8         | 2.9            |
|                                      | Business leaders              | 8         | 2.9            |
|                                      | Government employees          | 35        | 12.7           |
| Local residence time                 | Less than 1 year              | 14        | 5.1            |
3.1.2. Analysis of the characteristics of respondents' environmental participation level. The respondents' level of environmental involvement ranges from moderate to high, according to the survey's findings. The mean score of respondents' environmental involvement level was 27.75 (total score of 35), with a median score of 28 and a plurality score of 28, indicating that the respondents' environmental awareness level was relatively high; both the Kolmogorov-Smirnov and Shapiro-Wilk normal distribution tests were significant, indicating that the respondents' environmental awareness level score had a normal distribution in general (Figure 1a), and the skewness value was 0. The environmental awareness level score of the respondents ranges from 17 to 35, with the top and lower quartiles ranging from 25 to 31, showing that the majority of the respondents have a relatively high level of environmental awareness.

![Figure 1. a) Distribution of respondents' environmental participation level; b) Distribution of satisfaction scores of basic environmental public services evaluation](image)

3.1.3. Descriptive analysis of satisfaction level of environmental basic public services. The degree of fundamental public services for the environment in Suyu District is generally satisfactory, according to respondents. The mean satisfaction score of survey respondents for basic environmental public services is 38.53 (total score of 50), with a median score of 38 and a plurality score of 40, indicating that residents in Suyu district are moderately satisfied with the level of basic environmental public services; both the Kolmogorov-Smirnov and Shapiro-Wilk normal distribution tests are significant, indicating that basic environmental public services are of moderate quality. The total satisfaction scores are normally distributed (Figure 1b), with a skewness of -0.019 (slight left skewness) and a kurtosis of -0.558 (slight flat top peak), demonstrating Suyu's unusually concentrated level of satisfaction with fundamental environmental public services. The minimum and greatest levels of satisfaction with basic environmental public services are 23 and 50 points, respectively, with the upper and lower quartiles spanning from 34 to 42, showing that most respondents in Suyu District are relatively satisfied with basic environmental public services.

Environmental livelihood services, environmental basic services, environmental monitoring and supervisory services, and environmental information services are all grouped into four categories in this article. Analysis of the respondents' satisfaction with the four areas of service shows that: (1) The total

| Annual income          | 1~3 years | More than 3 years | Less than 10,000 RMB | 10 to 30 thousand RMB | 30 to 60 thousand RMB | 60 to 100 thousand RMB | More than 100,000 RMB |
|------------------------|-----------|-------------------|----------------------|-----------------------|-----------------------|------------------------|------------------------|
| 1~3 years              | 26        | 9.5               |                      |                       |                       |                        |                        |
| More than 3 years      | 235       | 85.4              |                      |                       |                       |                        |                        |
| Less than 10,000 RMB   | 57        | 20.7              |                      |                       |                       |                        |                        |
| 10 to 30 thousand RMB  | 27        | 9.8               |                      |                       |                       |                        |                        |
| 30 to 60 thousand RMB  | 123       | 44.7              |                      |                       |                       |                        |                        |
| 60 to 100 thousand RMB | 57        | 20.7              |                      |                       |                       |                        |                        |
| More than 100,000 RMB  | 11        | 4                 |                      |                       |                       |                        |                        |
score of satisfaction with environmental and livelihood services is 20, and the average score of residents' satisfaction with environmental and livelihood services is 16.21, the standard deviation is 2.51, the median and plural score is 16. This means that the respondents' satisfaction level with environmental and livelihood services is in the middle to upper range, i.e. the residents are more satisfied with the environmental and livelihood services. (2) The total score of satisfaction with environmental basic services is 10, and the mean score of residents' satisfaction with environmental basic services is 8.43, the standard deviation is 1.25, and the median and plural score is 8. It means that the respondents are satisfied with the basic environmental services at a medium to high level, indicating the residents are satisfied with the basic environmental services. (3) The total score of environmental monitoring and supervision services is 10, and the mean score of residents' satisfaction with environmental regulation and monitoring services is 6.76, the standard deviation is 2.56, the median score is 7, and the plural score is 8. It means that the respondents have medium satisfaction scores for environmental regulation and monitoring services, that is, the residents are generally satisfied with environmental regulation and monitoring services. (4) The total score of environmental information service is 10, and the mean score of residents' satisfaction evaluation score of environmental information service is 7.16, the standard deviation is 1.83, the median score is 7, and the plural score is 8. It means that the respondents have a medium satisfaction score with environmental information services. In summary, there are differences in the residents' satisfaction ratings of various basic environmental public services, where satisfaction with environmental basic services (mean score/Full score = 0.843) > satisfaction with environmental livelihood services (mean score/Full score = 0.811) > satisfaction with environmental information services (mean score/Full score = 0.716) > satisfaction with environmental regulation and monitoring services (mean score/Full score = 0.676).

3.2. Analysis of factors influencing satisfaction with basic environmental public services

3.2.1. Analysis of variance of satisfaction with environmental basic public services among respondents with different characteristics. The study classified the survey respondents into different characteristic groups in terms of gender, age, education level, occupation, length of local residence, and annual personal income, and conducted a comparative analysis by means and standard deviation size, using Analysis of variance (ANOVA) for significance testing.

After calculation, we know that: (1) Gender analysis revealed that the mean difference in male and female respondents' satisfaction scores for environmental basic public services was 0.82; ANOVA results revealed that gender has no significant effect on environmental basic public service satisfaction (P=0.311>0.05). (2) In terms of age, the mean value of respondents' satisfaction scores with basic environmental public services was: under 18 years old (45.9) > over 50 years old (38.06) > 36 to 50 years old (37.96) > 19 to 24 years old (37.54) > over 25 to 35 years old (37.47); the ANOVA results revealed that the age difference had a significant effect (P=0<0.05). (3) The mean value of respondents' satisfaction scores with basic environmental public services was: primary and secondary school education (43.14) > bachelor degree and above (39.08) > college education (37.23) > high school education (36.86) > junior high school education (35.71), according to the analysis of education level; the ANOVA results showed that the difference in education level had a significant effect (P=0<0.05). (4) In terms of occupational analysis, jobless (40.91) > employees of institutions or government (40.03) > heads of enterprises (38.75) > workers and company employees (36.53) > businessmen (36.13); the ANOVA results showed that occupational differences had a significant effect on satisfaction with basic environmental public services (P=0<0.05). (5) Analysis of local residence time shows more than 3 years (38.87) > less than 3 years (36.72), it revealed that the local residence time has no significant effect on the satisfaction of basic public services of the environment (P=0.166>0.05). (6) The mean value of respondents' satisfaction scores on the evaluation of basic public services for the environment was: less than 30,000 RMB (40.79) > above 60,000 RMB (38.67) > between 30,000 and 60,000 RMB (36.35), according to the analysis of annual personal income, it shows
that the annual personal income has significant effect on satisfaction with basic public services for the environment.

3.2.2. Correlation analysis of personal characteristics factors and satisfaction with environmental basic public services. Personal qualities and participation in environmental activities are major determinants of satisfaction with environmental basic public services. Based on the results of the ANOVA, the study chose four personal characteristics factors: age, education level, occupation, and income, and used Pearson correlation coefficients to examine the relationship between personal characteristics, environmental participation, and residents' overall satisfaction with basic environmental public services, as well as four satisfaction aspects of environmental basic services, environmental livelihood services, environmental monitoring, and supervision services and environmental information services.

Table 5 shows the findings of the analysis:(1) The Pearson coefficients of satisfaction with basic environmental services, environmental livelihood services, environmental monitoring and supervision services, and environmental information services are all significant at the 0.01 level. It reveals that the older inhabitants are, the lower their happiness with basic environmental public services.(2) The Pearson coefficients between satisfaction with environmental livelihood services and satisfaction with environmental basic services are -0.219 and -0.145, respectively, and the correlation coefficients are significant at the 0.05 level, indicating that there is a significant negative relationship between education level and residents' satisfaction with basic environmental public services. The Pearson coefficients indicating that the higher the literacy level, the lower their satisfaction with basic environmental public services, environmental livelihood services, and basic services; the Pearson coefficients between literacy level and satisfaction with environmental monitoring and supervision services and environmental information services are not significant, indicating that the higher the literacy level of the residents, the lower their satisfaction with these services.(3) The Pearson correlation coefficients for all four types of services are not significant, indicating that occupation has no significant effect on the basic public services of residents' environment. (4) The Pearson coefficients between income and satisfaction with basic environmental public services, livelihood services, environmental basic services, and environmental monitoring services is -0.171, -0.204, -0.141 and -0.122, indicating that there is a significant negative correlation between personal income and residents' satisfaction with these services.

### Table 5. Correlation of influencing factors and environmental satisfaction with basic public services

| Participation | Livelihood services | Infrastructure Services | Monitoring and regulatory services | Information Services | Basic public service satisfaction |
|---------------|---------------------|------------------------|-----------------------------------|----------------------|----------------------------------|
| Age           | Pearson -0.25**     | -0.184**               | -0.162**                         | -0.264**             | -0.257**                         |
| Education     | Pearson -0.219**    | -0.151*                | -0.052                           | -0.06                | -0.145*                          |
| Career        | Pearson -0.065      | -0.064                 | 0.023                            | -0.031               | -0.038                           |
| Income        | Pearson -0.204**    | -0.141*                | -0.099                           | -0.122*              | -0.171**                         |

Note: ***, **, * indicate significant at 0.001, 0.01, 0.05 levels, respectively
4. Conclusions
The results show that: (1) The average score of environmental livelihood services is 16.21/20, the average score of environmental basic services is 8.43/10, the average score of environmental monitoring and supervision services is 6.76/10, and the average score of environmental information services is 7.16/10, indicating that most of the Suyu residents are moderately satisfied with the local environmental basic public services, relatively satisfied with the regional environmental quality and environmental basic service facilities, and not satisfied with the environmental monitoring and supervision services and environmental information services due to the limited number and influence of local environmental protection inspectors and the lack of government publicity on environmental protection knowledge and environmental information.(2) Personal characteristics affect satisfaction with basic environmental public services. The results of the correlation analysis show that there is a significant negative correlation between age, education level, occupation and personal income and satisfaction with basic environmental public services, reflecting that older residents are not sufficiently involved in the environment and are less satisfied with the content of basic environmental public services; while residents with higher education and income levels are less satisfied with basic environmental public services due to their higher requirements for quality of life and the environment. The residents with higher education and income levels are less satisfied with environmental services because they have higher requirements for quality of life and environment.(3) There is a significant positive relationship between residents' environmental participation and the satisfaction, because residents with higher environmental participation have better environmental awareness and environmental protection consciousness, as well as a deeper knowledge and understanding of basic government environmental public services, and thus are more satisfied with basic environmental public services. (4) Satisfaction with fundamental environmental public services is significantly influenced by age and educational level.

5. Recommendations
(1) Pay attention to community environmental publicity and enhance the level of environmental participation of the elderly. (2) Enhance environmental education by emphasizing the development of students' ecological and environmental consciousness. Environmental education should be included into the teaching content through school-based curriculum and club activities to appropriately guide and successfully promote students' environmental engagement behaviors[10]. (3) Enhance environmental information dissemination and public participation in environmental issues. Strengthen financial support for basic environmental public services.

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