Research on Risk Acceptance of Urban NIMBY Facilities Based on Structural Equation Model-Taking Tianchang City as an Example

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Abstract. Based on the 1,250 pieces of the questionnaire data in Tianchang City, SPSS is used for validity and factor analysis to confirm public "Risk perception", "Government trust", "Public participation" and "Indemnifying measures" as latent variable, and AMOS21.0 software is applied to build Structural Equation Model and analyze the influences of latent variable on risk perception acceptance of NIMBY facilities. The study results show that the public's risk perception ability has the greatest influence on the acceptability of risk perception of public NIMBY facilities, followed by public participation, government trust, and indemnifying measures. In the meantime, the four latent variables interact with each other. Risk perception affects government trust and public participation. Public participation has an influence on indemnifying measures.

1. Introduction
With the acceleration of urbanization, urban public facilities are getting more and more perfect. Some facilities such as waste incineration plants, refuse transfer stations, gas stations and so on have been opposed and resisted by neighboring residents because of the negative externalities. They are called NIMBY facilities. Because of the enhancement of the public's awareness of environmental protection and self-protection awareness, the NIMBY facilities have encountered difficulties in site selection and other aspects. Based on this background, this article studies the acceptability of the risk of the NIMBY facilities of residents in Tianchang City, thereby provide a useful exploration to promote the layout of NIMBY facilities and reduce the risks of the NIMBY. Through the domestic and foreign researches reviewed, it was found that the main focus were on the analysis of the reasons for the avoidance effect from the example and the methods to solve the problem of the adjacent avoidance. Ma Ben and so on analyzed the reasons for the co nflict and avoided the conflict, and studied the foreign cases, and put forward the way to solve the conflict in our country [1]. Hou Lulu and others took Panyu District, Guangzhou City, incineration plant site as an example to explore the role of public participation in the event of changes in the roles of participants and the underlying public participation mechanism [2]. Chen Baosheng studied the causes and nature of the foreign conflict and avoidance of conflict, the argument of neighboring conflict and environmental justice, the governance mechanism of neighboring conflict and its effectiveness, and so on [3]. Zhao Xiaoyan analyzed the research results of foreign conflict avoidance, and provided an important inspiration and basic framework for our research on the problem of neighboring conflict [4]. Taking garbage transfer station as an example; Chen Fobao studied the negative willingness to pay for the urban neighborhood shelter through the spatial difference of second-hand housing prices in Shanghai [5]. Li Chengxuan analyzed the incident of Xiangtan Jiuhua Garbage Incineration Plant in Hunan Province. The study found that ensure the
information disclosure, the use of a variety of negotiations, play the function of social organization, improve consultation system, improve the citizen quality governance can make NIMBY conflict effectively optimization [6].

2. Method

2.1. Measurement Model
The relationship between measurement model description latent variable $\alpha$, $\beta$ and observation index $x$, $y$. The equation expression is:

$$
\begin{align*}
    y &= \varphi_y \beta + \varepsilon \\
    x &= \varphi_x \alpha + \delta
\end{align*}
$$

Wherein: $y$ stands for vector quantity made up of endogenous observational variable; $x$ stands for vector quantity made up of exogenous observational variable; $\beta$ stands for endogenous latent variable; $\alpha$ stands for exogenous latent variable and also has gotten through standardized disposal; $\varphi_y$ stands for the factor load matrix on the endogenous latent variables of endogenous observational variables, indicating the relationship between endogenous latent variables and endogenous observational variables; $\varphi_x$ stands for the factor load matrix on the exogenous latent variables of exogenous observational variables, indicating the relationship between exogenous latent variables and exogenous observational variables; $\varepsilon$, $\delta$ stand for the residual matrix of the observation model.

2.2. Variable Selection
Based on 1,250 pieces of data to conduct credit analysis, the results are: The standard coefficient of the total table is 0.859. The coefficients are all greater than 0.7. The inherent reliability of the questionnaire is satisfied, which indicates that the questionnaire has a good consistency and stability. The KMO values were all greater than 0.7, and the Bartlett's sphere test value was obvious. Therefore, the questionnaire has a good structural validity. Because the factors loads of all observed variables and the mean variances extractions (AVE) of each factor are all greater than 0.5 (Table 1), the measurement model has good convergent validity.
### Table 1. Select structural equation model latent variables and observed variables

| Factor              | Index                                                                 | Factor load | AVE | Cronbach's Alpha |
|---------------------|-----------------------------------------------------------------------|-------------|-----|------------------|
| **Risk perception** | Reasons against the layout of NIMBY facilities: Damaging health       | 0.510       |     |                  |
|                     | Reasons against the layout of NIMBY facilities: Affecting reputation  | 0.809       | 0.59| 0.859            |
|                     | Reasons against the layout of NIMBY facilities: Decreasing value of wealth | 0.873       |     |                  |
|                     | Reasons against the layout of NIMBY facilities: Feeling unfair treatment | 0.831       |     |                  |
|                     | Government cares about the disadvantaged groups                       | 0.646       |     |                  |
|                     | The government attaches great importance to public opinion             | 0.889       | 0.66| 0.778            |
|                     | The government treats every citizen fairly                            | 0.890       | 1   |                  |
| Government trust    | I trust the current government's layout of NIMBYI facilities so much   | 0.803       |     |                  |
|                     | Keeping abreast of the EIA results of the facility                    | 0.823       |     |                  |
|                     | Participating in voting for sites                                     | 0.866       |     |                  |
| Public participation| Visiting regularly to know the status of the NIMBY company's operations | 0.868       | 0.72| 0.871            |
|                     | Conducting NIMBY Facility Discussions on the Official Website Forum   | 0.840       |     |                  |
|                     | Park or greenbelt                                                      | 0.707       |     |                  |
| Indemnifying measures | Library                                                            | 0.768       | 0.58| 0.778            |
|                     | Public bathroom or hot spring                                         | 0.782       | 2   |                  |
|                     | Fitness or entertainment facilities                                   | 0.791       |     |                  |

#### 2.3. Research Assumption

The study identified observational variables that complied with academic norms and theoretical requirements (See Table 1) and brought up research hypotheses (Figure 1). Among them, H1a indicates that risk perception has a significant negative impact on the acceptability of risk perception of the NIMBY facilities; H1b indicates that government trust has a significant positive impact on the acceptability of risk perception of the NIMBY facilities; H1c indicates that public participation has a significant positive impact on the acceptability of risk perception of the NIMBY facilities; H1d indicates that indemnifying measures have a significant positive impact on the acceptability of risk perception of the NIMBY facilities; H2a indicates that risk perception has a significant positive impact on government trust; H2b indicates that risk perception has a significant positive impact on public participation; H3 indicates that public participation has a significant positive impact on indemnifying measures.
3. Questionnaire Results Analysis

3.1. Results of the Models
Table 2 shows the results of the fitting index calculation. All types of indexes are up to the standard values, which indicates that the model fit is feasible.

Table 2. The results of fitting index calculation

| Fitting index | GFI | CFI | NFI | IFI   | RMSEA |
|---------------|-----|-----|-----|-------|-------|
| Standard value | > 0.9 | > 0.9 | > 0.9 | > 0.9 | < 0.08 |
| Results       | 0.945 | 0.943 | 0.930 | 0.943 | 0.055 |

Table 3 shows assuming H1a is true; H1b is true; H1c is not true; H1d is true; H2a is true; H2b is true; H3 is true.

Table 3. Assumption of result test and path coefficient

| Assumptions                                                                 | Standardized path coefficient | Non-standardized path coefficient | SE   | CR  |
|-----------------------------------------------------------------------------|-------------------------------|-----------------------------------|------|-----|
| H1a: Risk perception-Acceptability of risk perception of NIMBY facilities   | -0.147***                    | -0.113***                         | 0.034| -3.343|
| H1b: Government trust-Acceptability of risk perception of NIMBY facilities  | 0.215***                     | 0.217***                          | 0.041| 5.247 |
| H1c: Public participation-Acceptability of risk perception of NIMBY facilities | -0.297***                    | -0.229***                         | 0.038| -6.021|
| H1d: Indemnifying measures-Acceptability of risk perception of NIMBY facilities | 0.166***                     | 0.151***                          | 0.041| 3.683 |
| H2a: Risk perception-Government trust                                      | 0.093**                      | 0.071**                           | 0.025| 2.829 |
| H2b: Risk perception-Public participation                                  | 0.364***                     | 0.361***                          | 0.033| 10.787|
| H3: Public participation-Indemnifying measures                              | 0.332***                     | 0.282***                          | 0.029| 9.574 |

Notes: **P<0.01; ***P<0.001;
Among the latent variables affecting the perception of acceptability of public NIMBY facilities (See Table 4), the impact of "risk perception" (-0.262) is the most important. The second is "public participation" (-0.242), which is inconsistent with the theoretical results. General speaking, public participation has a positive correlation with the impact on the acceptability of risk perception of NIMBY facilities. The influence coefficient of "government trust" is 0.215, which indicates that the more the government works, the more the government respects public opinion, and the higher the public's acceptance of NIMBY facilities will be. The impact coefficient of "indemnifying measures" is 0.166, which indicates that the establishment of compensation facilities can enhance the public's acceptance of NIMBY facilities; Latent variables interact each other at the same time. The influence coefficient of "risk perception" to "government trust" is 0.093. "Risk perception" also affects "public participation". The stronger the public risk perception is, the more attention to NIMBY facilities the public will pay and the higher the public participation mood will be. "Public participation" affects "indemnifying measures" and the influence coefficient is 0.332. The higher the enthusiasm of public participation is, the higher the expectation value of various types of compensation facilities will be.

Table 4. Direct effects, indirect effects, and total effects among latent variables in the model (standardized results)

| Path descriptions                              | Direct effect | Indirect effect | Total effect |
|------------------------------------------------|---------------|----------------|--------------|
| Risk perception-Acceptability of risk perception of NIMBY facilities | -0.147***     | -0.088***     | -0.262***    |
| Government trust-Acceptability of risk perception of NIMBY facilities | 0.215***     |               | 0.215***    |
| Public participation-Acceptability of risk perception of NIMBY facilities | 0.297***     | 0.055***     | -0.242***    |
| Indemnifying measures-Acceptability of risk perception of NIMBY facilities |          |               | 0.166***    |
| Risk perception-Government trust | 0.166*** |               |              |
| Risk perception-Public participation | 0.093** |               | 0.093**     |
| Public participation-Indemnifying measures | 0.364*** |               | 0.364***    |
| Public participation |          |               |              |

Notes: **P<0.01; ***P<0.001;

4. Conclusions and Policy Suggestions
This article establishes a theoretical model for analyzing the acceptability of the public risk perception of NIMBY facilities in Tianchang City. The model can be used to determine the key factors affecting the acceptability of the public risk perception of NIMBY facilities; Through constructing the structural equation model, it is verified that risk perception, government trust, public participation and indemnifying measures have a significant influence on public acceptance.

However, in the study of this article, public participation has a negative influence on the acceptability of risk perception of NIMBY facilities. This violates some conclusions drawn from the said section. It may be because the residents of Tianchang City do not understand the way of public participation and cannot provide more useful information; meanwhile, this article finds that risk perception has a great impact on government trust and public participation, and public participation has a significant impact on indemnifying measures.

Before the construction of the NIMBY facilities, fully explaining the importance and necessity of the NIMBY facilities to the public in order to ensure that the rights and interests of the public are not threatened, thereby reduce the public's risk perception on NIMBY facilities and improve the acceptance of the NIMBY facilities; When the government and related workers perform layout and site selection work of the NIMBY facilities and other related work, they must attach a great
importance to the public opinion and respect for public opinion. The government and related workers need to publicize vigorously and increase their own credibility, and regularly arrange public to visit NIMBY facilities companies, so that the public can truly understand the NIMBY facilities, thereby the enthusiasm of public participation will be driven and this is also beneficial to help residents accept NIMBY facilities more easily so as to reduce NIMBY conflict.

5. References

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