

# Satisfaction Evaluation on the Fundamental Public Services for a Large-Scale Indemnificatory Residential Community: A Case Study of Nanjing

Dezhi Li, Peng Cui, Bo Zhang, Tengyuan Chang

**Abstract**—In order to solve the housing problem for the low-income families, the construction of affordable housing is booming in China. However, due to various reasons, the service facilities and systems in the indemnificatory residential community meet many problems. This article established a Satisfaction Evaluation System of the Fundamental Public Services for Large-scale Indemnificatory Residential Community based on the national standards and local criteria and developed evaluation methods and processes. At last, in the case of Huagang project in Nanjing, the satisfaction of basic public service is calculated according to a survey of local residents.

**Keywords**—Indemnificatory residential community, public services, satisfaction evaluation, structural equation modeling.

## I. INTRODUCTION

IN recent years, with the booming of the real estate market, China's housing prices are becoming much higher than the capacity of most families, resulting in a large number of low-income groups no longer afford to purchase.

Since the 17<sup>th</sup> National Congress proposed the goal "affordable housing for all", the government has begun a program to establish affordable housing projects on a large-scale. China has pledged 36 million units of affordable new housing construction as part of the "12<sup>th</sup> Five-Year Plan" period, as well as 10 million units of existing shantytown housing expected to be reconstructed from 2013 to 2017. By the end of September 2014, the government has helped to settle 40 million urban families in need in low-rent housing, public rental housing, shantytown housing and so on [1].

Take the capital of Jiangsu Province, Nanjing City, as an example, four Large-scale Indemnificatory Residential Communities including Daishan, Shangfang, Huagang, and Dingjiazhuang were built in 2010, and consisted of a total of 338 residential buildings with 17,693 sets of resettlement households. By April 2013, the commercial facilities including garbage stations, public toilets, etc., were basically completed in these four regions. However, the supply of fundamental public services has lagged for such large-scale indemnificatory residential communities [2].

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Due to cost restrictions and available land however, most public housing communities are built in the outer suburbs or city fringes, where few existing public services are available. Some of the planned service facilities cannot be completed on time, while the completed ones fail to deliver the required service standards. Moreover, residents in these communities feel there is a lack of basic public services nearby, such as hospitals, transport links, schools and kindergartens which has greatly inconvenienced their daily lives. Thus, some residents chose to move away after experiencing difficulties with education, health care and transportation.

For many residents, after considering available education and healthcare facilities, as well transportation links, chose to move away, and many potential applicants gave up the opportunity to lease or purchase affordable housing for these and other reasons. This phenomenon has led to a serious-level of vacant housing and wasted resources, which has had an adverse social impact. To solve these problems, this paper established the Satisfaction Evaluation System on the Fundamental Public Services for Large-scale Indemnificatory Residential Community based on the relevant national standards and local criteria. Learning from the American Customer Satisfaction Index (ACSI), appropriate evaluation method and processes are established. Finally, it takes the indemnificatory residential community in Nanjing as an example to verify the feasibility of the model and evaluate fundamental public service satisfaction.

This paper provides a reference for the relevant government departments when improving fundamental public services of indemnificatory residential community. It is conducive to residents' participation in management and decision-making processes in the construction of affordable housing, and also promotes positive interaction between residents and the government. Ultimately, it will promote long-term development of affordable housing.

## II. LITERATURE REVIEW

### A. Research on the Fundamental Public Services for Large-Scale Indemnificatory Residential Community

The rise of the Large-scale Indemnificatory Residential Community can be traced back to the 19<sup>th</sup> century, as European nations and other developed countries treated that as an effective way to solve the housing shortage problem [1]. When the community developed to the 1980s, the once highly panegyric system gradually showed a series of problems.

Households were not satisfied with the community, especially for the services, facilities, unit characteristics and surrounding environment. Among the many factors that influence satisfaction, the quality of community facilities, community organization and management, as well as household personal characteristics (such as race, occupation type, etc.) influence household satisfaction most [2]-[4].

After the reform and opening, China's social, economic and administrative systems changed; meanwhile, the provision model of community public service gradually transformed into the "government, social, community" polycentric mode of supply. Hua believes that government alone cannot meet the increasing demand for public services, and that it should rely on a diverse supplement including both government-based and non-governmental forces [5]; Zhiqiang proposed that government should build an efficient and flexible supply mechanism to ensure the maximum effectiveness of community public service based on different categories of services, and, the polycentric mode of supply [6]; Xiaolian used the Delphi and expert interview methods to establish a satisfaction evaluation system of public sports service with multi-level indicators [7]; Fang took Gu village in Shanghai Baoshan district as an example, and used the factor analysis method to choose key factors affecting the satisfaction of indemnificatory residential community [8].

In foreign countries, "fundamental public services of a residential community" often referred to as social welfare services, social work or social services, such as counseling centers, neighborhood community and youth services centers, women's shelters and other institutions [9]. Scholars have also made a distinction of different types of community service, such as Bayley, who divided social service into two modes based on the service location, one is community service agencies or facilities constructed by government or social organizations that serve for the residents in the community [10] and the second is the so-called "On-site service" provided by government, social organizations, or volunteers, where residents do not need to attend service agencies, but enjoy comprehensive community services at home [11].

#### *B. Research on the Satisfaction*

Satisfaction evaluation theory first emerged in the 1930s based on the social psychology theory of customer satisfaction. In the long-term, the satisfaction evaluation practice, KANO model [12], SERVQUAL model [13], Quadrant & Matrix Model [14], and the Customer satisfaction index models [15] have been derived.

Currently, satisfaction researches focused on three main areas include customer satisfaction, employee satisfaction and citizen satisfaction. For the areas of customer satisfaction, Qing investigated an automobile 4S store, and discussed the key factors influencing customer satisfaction on sales and service [16]; Ling et al. combined customer satisfaction theory with electronic resources of libraries, and discussed how to ensure the evaluation indicators, and how to design and analysis the survey data. For employee satisfaction [17], Long studied employee satisfaction in small and medium-sized

enterprises [18]. On this basis, a general step to evaluate employee satisfaction is proposed; Yingkang et al. used exploratory factor analysis and single-factor analysis methods to study the various factors on hotel employee satisfaction in Shanghai [19]. Zhixin appropriately amended the "employees' salary satisfaction scale" and applied that into the measurement of domestic clinicians' salary satisfaction. For citizens' satisfaction, previous research mainly focused on the satisfaction of public services provided by the government and government performance [20]. Youhao considered the current problems of performance assessment of domestic government and proposed that it should be evaluated by the customer satisfaction [21]. Guofu advocated that public satisfaction should be adopted as internal management indicators adopted in the government performance evaluation system [22].

From the reviews above, it is rare to apply the evaluation model into the practice of methods and on the fundamental public services for large-scale indemnificatory residential community both at home and abroad. Therefore, this paper established a satisfaction evaluation model of China's fundamental public services for large-scale indemnificatory residential community based on the ACSI customer satisfaction index model.

### III. THE ESTABLISHMENT OF THE SATISFACTION EVALUATION MODEL

#### *A. Category Selection*

Indemnificatory residential communities are not only large-scale, but remote and mostly located in urban fringe areas. Thus, fundamental public services at the national or city level tend to fall short of addressing their practical needs, and require the establishment of an effective internal system. The research objects are the poor people whose basic survival, employment, health care and other aspects are primarily needed. To achieve the maximization of social benefits, fundamental public services for a large-scale indemnificatory residential community often pursues a balanced between volume and variety.

Currently, researches on the fundamental public services of residential communities are mainly concentrated on the facilities. On the policy level, "Urban Residential Area Planning Design Code " [23] categorized the public service of a residential community into eight items, namely, education, health, culture, sports, business services, finance and telecommunications, municipal utilities, administration and others. "Nanjing public facilities planning standards" [24] divided functional public facilities into seven categories in accordance with function including education, health, public culture, sports, social welfare and security, administration and community services, business services. The Singapore HDB equipped with living facilities, cultural and educational facilities, medical facilities and other public service facilities, as well as a comprehensive service center with a bank, entertainment center, sports centers and other commercial facilities, to meet the basic needs of daily life among households [25]. Hong Kong's public housing public service

facilities are divided into social recreational and commercial facilities with both centralized public service centers and commercial and entertainment facilities dispersed within the community [25].

Based on the fundamental public services content from "national fundamental public services system: the second five-year plan", "Nanjing Public Facility Planning Standards", "Beijing public service classification standards" and "Urban Planning and Design Code", the large-scale fundamental public services for indemnificatory residential community are categorized as shown in Table I.

### B. Variable Selection and Model Establishment

Currently, four kinds of customer satisfaction index models are widely used at home and abroad, respectively, the Swedish Customer Satisfaction Barometer (SCSB), American Customer Satisfaction Index (ACSI), European Customer

Satisfaction Index (ECSI) and Chinese Customer Satisfaction Index (CCSI).

This paper defined the Satisfaction Index of Fundamental Public Services for Large-scale Indemnificatory Residential Community (SIFPS) as: the satisfaction with basic public services of residents who have lived in the affordable housing community for three months or more, based on their previous daily experiences.

The SIFPS model consists of two parts, namely the structural model and the observation model, and then establishes the structural model, selecting structural variables that influence resident satisfaction and assumes the relationship between the variables. Since the structure variable cannot directly measure its variables, the observed variables were introduced to acquire the value of the structural variables indirectly.

TABLE I  
THE CATEGORY OF FUNDAMENTAL PUBLIC SERVICES FOR LARGE-SCALE INDEMNIFICATORY RESIDENTIAL COMMUNITY

Service Type	Details
Education	Compulsory education (elementary, middle), National Defense Education, and other public education service regulated.
Healthcare	Health service centers that provide preventive care, general medical care, maternal and child health, rehabilitation, health education, immunization, family planning advice and other services.
PE	Sports center, in/outdoor sports equipment and free space, and national physique monitoring services.
Public Culture	Books read (including study rooms), public electronic reading room, multi-purpose hall, painting workshops, public facilities and cultural heritage, scientific knowledge propaganda services, etc.
Public Transportation	Bus depot station, public bicycle service points.
Social Welfare and Social Assistance	Residential nursing homes, elderly day care centers for the elderly, the disabled, orphans and abandoned children and other specific groups to provide conservation, rehabilitation, hosting services.
Public Safety Services	Residential security services, fire safety, traffic safety services and security services in public places.
Others	Other public services in public communications services, postal services, public toilets.

TABLE II  
STRUCTURAL AND OBSERVED VARIABLES IN THE SIFPS MODEL

Structural variables	Observed variables	Symbols
	Overall expects for the fundamental public services.	$x_1$
Household expects( $\xi$ )	Reliability for fundamental public services	$x_2$
	Individual needs expectations for fundamental public services.	$x_3$
	Scale of fundamental public services facility.	$y_{11}$
Hardware quality perception ( $\eta_1$ )	Integrity of type for fundamental public services facility.	$y_{12}$
	Timeliness of fundamental public services.	$y_{13}$
	Reasonable spatial distribution of fundamental public services facilities.	$y_{14}$
Software quality perception ( $\eta_2$ )	Accessibility of fundamental public services facilities.	$y_{15}$
	Functions of fundamental public services.	$y_{21}$
	Attitudes of fundamental public services.	$y_{22}$
	Response speed of fundamental public services.	$y_{23}$
Household satisfaction ( $\eta_3$ )	Regulatory of fundamental public services.	$y_{24}$
	Overall satisfaction of fundamental public services	$y_{31}$
	Compared with the expected quality level of satisfaction.	$y_{32}$
Residential community image ( $\eta_4$ )	Compared with the desired quality level of satisfaction.	$y_{33}$
	The overall residents' image perception of settlements.	$y_{41}$
	Convenience of complaints for the residents.	$y_{42}$
Household confidence ( $\eta_5$ )	The improvement degree of fundamental public services.	$y_{43}$
	The trust of fundamental public services in the settlements.	$y_{51}$
	The possibility to promote fundamental public services to the general public.	$y_{52}$

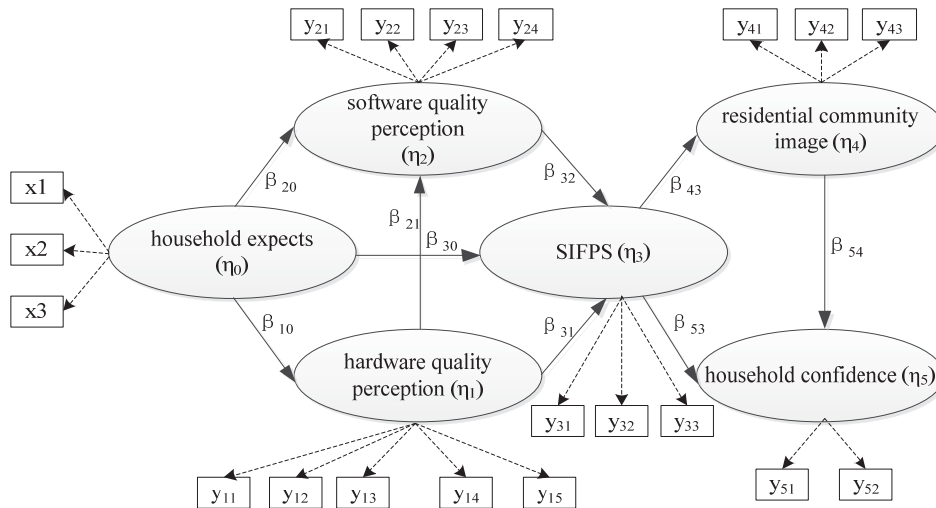


Fig. 1 The Structural Variables and the Relationships in SIFPS model

In the customer satisfaction model, structural variables can be divided into antecedents, center and consequence variables. Individual expectations for fundamental public services may be different among residents due to their own characteristics, such as age, education level, income level, personal needs, and thus, the "expect - difference model" can better evaluate their satisfaction. Herein, by reference ACSI, this paper selected "household satisfaction" as the central variable in the SIFPS model; selected "household expects," "hardware quality perception" and "software quality perception", as the antecedent; and selected "residential community image" and "household confidence", as the result variables [26]. Therefore, this paper established the SIFPS model, as Table II demonstrates, as well as the SIFPS model is constructed containing a total of six structural variables and nine correlations, as shown in Fig. 1. Among the structural variables, "household expectations" is an exogenous structural variable, while the other five are endogenous structural variables. In this paper, SmartPLS software was used for solving the partial least squares structural equation modeling (PLS-SEM), to quantify the SIFPS model.

#### IV. CASE STUDIES

Huagang large-scale indemnificatory residential community in Nanjing has a total gross floor area of about 2.2 million square meters, and consists of many types of affordable housing of about 1.7 million units. Although its construction has made remarkable achievements, the actual progress of public services facilities construction has lagged. Fundamental public healthcare services are poor, and the limited sports facilities, public cultural, social welfare and security services facilities are not put into use. The overall status of fundamental public services facilities is not optimistic. According to this problem, 100 questionnaires about the needs of fundamental public services were sent out to the residents of affordable housing. Of the total, 98 were valid. The questions on the fundamental public services of large-scale

indemnificatory residential community included: awareness of the situation, frequency of use, the type of needs as well as the service categories that require improvement. The basic information of the survey is shown in Table III. Respondents belonging to the young and middle-aged bracket between 25-55 years old account for 76%, while respondents' over-55 years account for 18%. The overall education backgrounds are low, over half of the respondents only attained secondary school diplomas or below, and less than 10% of respondents had a bachelor degree or above, which is consistent with the characteristics of the residents living in the PHC. For the occupation and salary, about 70% of the respondents are grass-roots workers, 50% did not meet the threshold of personal income tax, wherein 55% earned less than 1,500 RMB or less per month, and 16% people are unemployed or recently laid off.

Based on the results of model parameter estimations, as well as the index scores of the structure variable, the following conclusions can be drawn:

- 1) In the structural model, the path coefficients of "household expectations" for both software quality perception and household satisfaction are small (-0.023 and -0.146), which indicates that household expectation has little impact on these two variables. The main reason is that fundamental public services in settlements in China are still a new thing [27], especially in large-scale indemnificatory residential community. Many households had the right to live in public housing for the first time, and therefore, were enjoying a level of service they had never experienced before. Thus, they had limited expectations with regard to basic public services. Such an outcome could not reasonably reflect individual expectations for the basic public services, according to their own living experience.

TABLE III  
SCORES FOR STRUCTURAL VARIABLES AND OBSERVED VARIABLES

Structural variables	Score	Observed variables	Symbol	Weight	Average score
Household expects	50.48	Overall expects for the fundamental public services.	X1	0.18	2.60
		Reliability for fundamental public services.	X2	0.37	2.62
		Individual needs expectations for fundamental public services.	X3	0.45	2.22
Hardware quality perception	37.81	Scale of fundamental public services facility.	Y11	0.22	1.73
		Integrity of type for fundamental. public services facility.	Y12	0.22	1.88
		Timeliness of fundamental public services.	Y13	0.27	1.83
		Reasonable spatial distribution of fundamental public services facilities.	Y14	0.17	1.97
		Accessibility of fundamental public services facilities.	Y15	0.13	2.27
Software quality perception	52.46	Functions of fundamental public services.	Y21	0.23	2.03
		Attitudes of fundamental public services.	Y22	0.23	1.82
		Response speed of fundamental public services.	Y23	0.25	1.88
		Regulatory of fundamental public services.	Y24	0.29	1.95
Household satisfaction	60.2	Overall satisfaction of fundamental public services.	Y31	0.38	2.27
		Compared with the expected quality level of satisfaction.	Y32	0.30	2.13
		Compared with the desired quality level of satisfaction.	Y33	0.32	1.67
Residential community image	41	The overall residents' image perception of settlements.	Y41	0.41	1.77
		Convenience of complaints for the residents.	Y42	0.18	2.17
		The improvement degree of fundamental public services.	Y43	0.42	1.37
Household confidence	53.06	The trust of fundamental public services in the settlements.	Y51	0.57	2.50
		The possibility to promote fundamental public services to the general public.	Y52	0.43	1.62

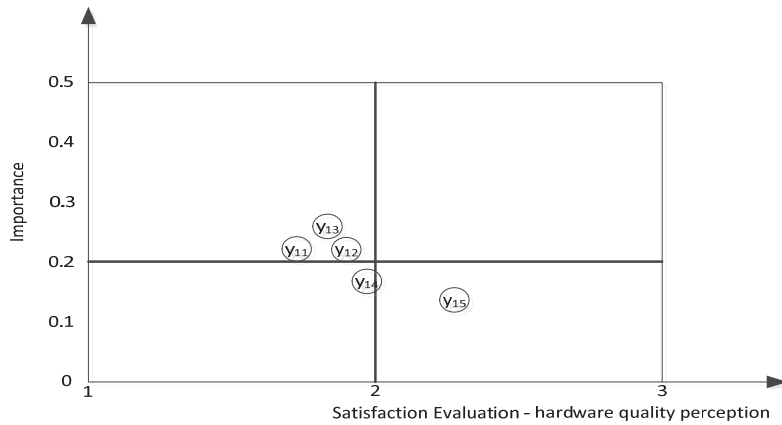


Fig. 2 Importance Satisfaction Matrix of Hardware Quality Perception



Fig. 3 Importance Satisfaction Matrix of Software Quality Perception



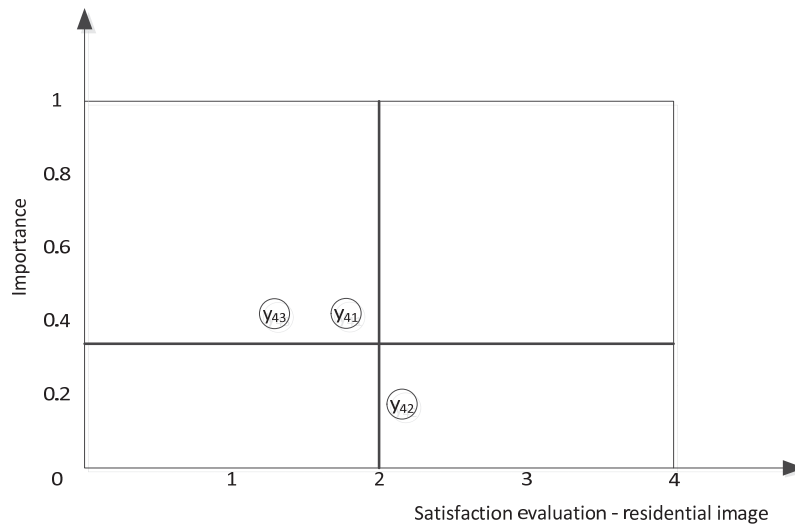


Fig. 4 Importance Satisfaction Matrix of Residential Community Image

- 2) Residential community image has little impact on household confidence with a path coefficient of only -0.102. From the interviews and feedback from households, the possible reason may be that after complaints, the fundamental public services of settlements failed to improve; therefore, resulting in poor residential community image. However, public housing residents do not lose confidence in the community, and choose to believe that the government will continue to improve the level of basic public services for public housing community.
- 3) Although, in the empirical studies, the household expectations did not clearly reflect the software quality perception and household satisfaction, a direct positive impact that software quality perception had on the hardware quality perception and household satisfaction has been verified. In addition, hardware quality perception had a strong positive influence (path coefficient of 0.623) on software quality perception. Software quality perception has a bigger impact than hardware quality perception on household satisfaction, with path coefficients of 0.535 and 0.328, respectively. The above findings show that hardware quality is the prerequisite and basis for software quality.
- 4) Overall, the residents' satisfaction of fundamental public services for large-scale indemnificatory residential community only reached the basic standard of 60.20 points. In contrast, the household expectations level (50.48 points) is not very high. One reason is that these households have not previously enjoyed relatively high-quality fundamental public services, and thus, have lower expectations for such services. As to the hardware quality perception, software quality perception and residential community image, all score low at 37.81, 52.46 and 41.0 point, respectively. The corresponding importance and satisfaction scores of the observations are shown in Figs. 2-4.
- (1) Hardware quality perception obtained the lowest score (37.81 points) is this satisfaction assessment. From Fig. 2, the timeliness (y13), integrity (y12) and the total size (y11)

of fundamental public services facilities influenced the hardware quality perception most. However, these three observed variables are all below the basic requirement of a satisfactory standard, and thus, they need to be improved; especially, the timeliness (y13). Conversely, the rational layout of fundamental public services facilities (y15) and accessibility (y14) performed well.

- (2) Satisfaction evaluation of software quality perception scored high (52.46 points), which is the main reason for household satisfaction recording a satisfactory level. From Fig. 3, the importance satisfaction matrix of these four observed variables is concentrated-distributed. Wherein, the weight of response speed (y23) and supervision (y24) are high. By contrast, the function (y21) and attitudes (y22) obtained good performance, which indicated that residents are satisfied with the service items and the attitude of service personnel. It is noted that numerous fundamental public services are still not in use, and that the supply and management sector should continue to improve service functions and service attitudes, in order to improve the satisfaction scores of software quality perception.
- (3) Satisfaction evaluation of residential community image obtained a low score of only 41 points, as shown in Fig. 4. It demonstrated that the improvement of fundamental public services (y43) was the key factor decreasing the score of residential community image. The convenience degree of household complaints (y42) acquired a good mark. However, after receiving complaints, the improvement failed to make the households satisfied. In some cases, there were not any improvement measures, which led to dissatisfaction among households. This led to a general dissatisfaction for the overall residential community image. Therefore, the Huangang large-scale indemnificatory residential community should accelerate improvement of the fundamental public services complaints mechanism, in order to improve the perception of household image.

## V.CONCLUSION

First, the paper summarized domestic and foreign researches on large-scale indemnificatory residential communities, fundamental public services and customer satisfaction, noting the insufficiencies when combining them together; second, it defined the categories and specific contents of fundamental public services for a large-scale indemnificatory residential community; then, based on the comparison of the classic model of customer satisfaction both at home and abroad, this paper built a SIFPS model and the corresponding evaluation process for public services satisfaction; and finally, it took the Huagang indemnificatory residential community as an example in Nanjing, to analyze the feasibility of satisfaction of fundamental public services, and put forward suggestions for improvement.

This article combined a large-scale indemnificatory residential community, fundamental public services and satisfaction to establish the domestic large-scale SIFPS model, and in the case of the Huagang public housing community in Nanjing, the satisfaction of basic public services would be calculated according to a survey of the residents. For example, the relationship between the structural variables is assumed linear instead of non-linear; some deviations existed between the relationship of households and the quality perception expectations in the original hypothesis of the SIFPS model. This study only described the reasons for the deviation, but did not explore ways of how to improve. In addition, this paper did not consider the main body and means of supply of fundamental public services in the observed index.

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