

## Research Article

# Research on the Influencing Factors of Sustainable Development of Smart Community

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Received 25 May 2022; Revised 25 June 2022; Accepted 2 July 2022; Published 19 August 2022

Academic Editor: Shi Yin

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The sustainable development of China's smart community is the top priority of grassroots governance in China and also the general trend of China's urban modernization. Sustainable development of smart community with the use of the new generation of information technology actively explores the development model of smart community construction and improves the modern level of community governance. The sustainable development of smart communities in China cannot be separated from the participation of residents. This study analyzes the relationship between the sustainable development of smart communities and the participation of Chinese residents. Data were collected through questionnaire survey, and SEM model was used to analyze the impact of different factors of residents' participation on the sustainable development of smart communities as well as the differences among these factors. The results of the study are as follows. Chinese smart community is in the initial stage of development, and the overall participation level of residents is relatively shallow, with few active participation behaviors. To realize the sustainable development of smart community in China, a multilevel governance pattern should be constructed from the perspective of government. Community and residents, the thinking mode of grassroots government, should be changed. The service supply system of smart community should be improved, and the initiative of residents should be given full play to better realize the sustainable development of smart community.

## 1. Introduction

In 2009, IBM put forward the concept of "Smart Earth" and "Smart City" for the first time and issued the plan "Smart Earth Wins in China" [1, 2]. From this, the concept of "Smart Earth" was formally introduced into China and developed rapidly in China, receiving positive response from various governments. In 2010, NingBo took the lead in proposing the construction of "Smart City." Community is not only the basic unit of a city but also the macro epitome of smart city construction. Therefore, the construction and development of "smart community" have also been put on an important agenda. In 2014, the Ministry of Housing and Urban-Rural Development deliberated and issued the Guidelines for the Construction of Smart Communities (Trial), which clearly stipulated the development model, operation system, and

service content of smart communities. In the same year, China issued the Guidelines on Promoting the Healthy Development of Smart Cities, elevating smart cities to a national development strategy [3]. As an important carrier of urban governance, community is a regional and phased community of life for society and people. Therefore, the relevant construction and development of smart community also emerge at the historic moment, which should follow the concept of sustainable development. In 2016, the State Council issued the 13th Five-Year National Science and Technology Innovation Plan, which clearly proposed to "promote the development of smart communities and comprehensively promote the optimization and improvement of living environment." With the issuance of policy documents, governments at all levels actively respond to the call of the state, and the construction of Smart communities

in China has entered a vigorous development stage. By 2015, the number of smart communities in China has reached 386, and the coverage rate of prefecture-level cities has reached 74%, setting off a development boom of smart communities.

The fourth Plenary Session of the 19th Central Committee of the Communist Party of China (CPC) focused on building a multiparty governance system, calling for the building and continuous improvement of a social governance community featuring common governance and shared benefits. We need to focus on improving our capacity for community governance, strengthening the team for community governance, and gradually establishing a system for improving community governance in which all parties participate and work together under the leadership of the government. With the rapid development of economy, China's social relations have undergone great changes. The country has begun to gather strength to actively build a "service-oriented" society. All kinds of nonprofit organizations have given full play to their autonomy, and all kinds of creative community coproduction activities are in full swing [4].

Coproduction is a new mode of service supply. The concept was put forward by Professor Eleanor Estrom [5], which specifically refers to "the process of transforming the input of individuals who do not belong to the same organization into goods and services." Since the 21st century, coproduction has been divided into two parts: broad and narrow [6]. In broad sense, coproduction refers to the public service and value innovation jointly produced by government departments and authorized social organizations. Joint production in narrow sense refers to the public's voluntary and active participation in the behavior. Community governance is a practice mode of joint production. It refers to the process and mechanism in which the government, community residents, and various organizations reflect the community's public demands in the form of open discussion, equal participation, and collective consultation based on the awareness of identity and strive to maximize the community's public interests in the process of governance. Community governance emphasizes residents' participation, points to collective action, and focuses on fostering cooperation spirit. However, the construction and development of smart community, as an essential part of community governance, was over administrated in the process of action. In other words, the top-down pushing efforts and stimulation by the government brought inert involvement of residents instead, that is, no involvement or no active participation of residents. The sustainable development of China's smart community is a concrete manifestation of the application of the concept of sustainable development to smart community. The concept of sustainable development is regarded as an important guiding ideology for the construction of smart community, and the goal is to build an urban community with the unified and coordinated development of economy, society, and ecological environment. Residents' participation is the microapplication in smart community, which refers to the process of residents' participation in the affairs in the community. The implementation of residents' participation conditions means strong motivation and enthusiasm for participation, willingness to participate, right to participate, adequate communication

channels, and ability to participate [7]. Based on the concept of coproduction and the theoretical basis of sustainable development, public participation, and planned behavior, the paper aims to improve residents' participation process, enhance residents' sense of identity and belonging, clarify the connotation and characteristics of smart community, and promote the sustainable development of smart community in China.

The current exploration path of China's social governance system is characterized by production and innovation of public service mode. As the joint production of grassroots public service supply mode, it has important theoretical and practical significance for the participation of smart community residents, public service supply system, and innovation of community governance mode. Therefore, enhancing residents' participation, enhancing residents' sense of belonging and identity, and enabling residents to participate in the development and construction of smart communities are the issues that need to be focused on in the future research process of Community governance in China. Based on the theory of sustainable development and citizen participation, this paper constructs a theoretical study on the influencing factors of the sustainable development of Chinese smart communities and residents' participation, in order to provide more theoretical basis for improving the public participation in the sustainable development of Chinese smart communities.

The rest of this article is organized as follows. In the second section, the theoretical background and hypotheses are developed. The research methodology and data analysis are described in the third section, followed by the results and analyses in the fourth section. The fifth section puts forward the research countermeasures. Finally, in conclusions, the theoretical implications and limitations of this study, as well as the direction for future research, were discussed in brief in the sixth section.

## 2. Theoretical Basis and Research Hypothesis

### 2.1. Theoretical Basis

*2.1.1. Sustainable Development Theory.* Sustainable development theory originated in the 1950s and 1960s. At the beginning, it proposed a targeted development model based on the environmental pressure caused by economic growth, urbanization, population, and resources [8]. In 1978, the United Nations Environment Programme (UNEP) clearly pointed out in its environmental impact assessment that "representatives of local communities need to know the adverse impact of development and construction and how the impact affects their living environment and quality," and the participation of the public and residents is needed to alleviate this phenomenon. For a long time in the past, public resident participation only stayed at the level of cherishing nature and protecting the environment. In the 1980s, the United Nations Commission on World and Environment Development published "Our Common Future". This was the first time that the concept of sustainable development was formally and explicitly presented. Sustainable

development requires development that meets the needs of the present without jeopardizing the ability of future generations to meet their own needs. It has the principles of fairness, continuity and commonality [9]. The concept of sustainable development has become an idealized strategic choice for the survival and development of human society since the 20th century. Implementing sustainable development strategy has become the common responsibility and mission of the whole society and even every social unit. The concept of sustainable development has taken root in people's minds. The change of public-resident participation consciousness and concept also makes the concept of sustainable development continue and deepen. First, the participation of residents in sustainable development can ensure that the government and social organizations are widely involved in the construction of smart communities and pool wisdom, broaden the channels for residents to participate, and promote scientific and democratic decision making. Second, residents' participation in sustainable development is an important and effective way to construct smart community. In addition, residents' participation is an important and decisive force for the sustainable development of smart communities. Residents' participation is directly related to the realization of smart community strategic planning. Therefore, based on the theory of sustainable development, it is clear that residents' participation is the driving force to promote the sustainable development of smart communities.

*2.1.2. Citizen Participation Theory.* The theory of civic participation originated in the 19th century. At the beginning, it meant that all citizens had the right to participate in national affairs; that is, they had the right to vote on major national events. Since then, civic participation has gradually become an important way to formulate national policies, decide public affairs, and organize political life. Three basic elements of the theory are widely used to describe civic participation. The first element is the subject of participation. In the theory of civic participation, the subject of participation refers to "who participates," which mainly includes individual citizens and civic organizations. The second element is the field of participation. At the beginning, civic participation was mainly in the field of policy. With the progress of social civilization and the development of politics and economy, civic participation was increasingly applied to various fields such as economy, society, and culture, and also gradually expanded from community participation at the microlevel to social participation at the macrolevel. The third element is the channels of participation. Citizens engage in sustainable participation through various channels and ways, such as consultation, dialogue, and petition. The diversification and variety of channels and ways of participation enable residents to participate in community life in a more orderly manner.

Knowing and understanding the theory of civic participation is of theoretical guidance significance to the research of this paper. The theory of civic participation provides a detailed explanation of the subject, field, content,

and form of civic participation, which is highly consistent with the research on the relationship between the sustainable development of smart communities and the influencing factors of Chinese residents' participation. Community is the main gathering place for residents and also an important carrier for the extension of public services to grassroots level in China. Residents, as the subjects of grassroots social governance, are the consumers and beneficiaries of the community. It can be said that residents' participation is the driving force and dominant force for the sustainable development of smart communities [10]. When residents' individual thinks to participate in the activities of community construction, which is conducive to meet their diversified needs, improve cultural quality, rich daily life, enhance interpersonal communication [11], and would have a trust to the community, so as to promote sustainable development of the intelligence community and deepen the development of power, governance is of great significance to the modernization of Chinese cities.

## 2.2. Research Hypothesis

*2.2.1. Community Satisfaction.* Community satisfaction is a subjective evaluation of the overall community made by individual residents based on their own internal standards, reflecting the objective level of residents' existing life. Residents actually feel the value of various services, environment, and facilities provided by the community from a psychological perspective, and it is an important indicator to measure the participation of Chinese residents. Wu et al. take tourism communities as an example to explore the impact of participation satisfaction on participation level, and the results show that higher overall community satisfaction means higher participation level [12]. Ren et al. based on community space resources; emphasized the importance of community activity space, landscape greening, activity facilities, and other factors to the improvement of satisfaction by constructing structural equation model (SEM); and indirectly pointed out the positive role of community satisfaction in community development and construction [13]. Han studied the connection between residents' participation and community development in rural community governance through social investigation, and concluded that community satisfaction is significantly correlated with community identity and residents' satisfaction. According to the research of scholars Wu and Han, community satisfaction has a great impact on community development [14]. Therefore, this paper considers that there are three main factors affecting the satisfaction of community development and construction: community services (including education, medical care, pension, and entertainment), community environment (including green environment and infrastructure), and community management (including public security management and property management).

*2.2.2. Participation Attitude.* "Planned behavior theory" holds that attitude and behavior are closely linked, and participation attitude is the behavioral evaluation and

cognition of citizens themselves through continuous participation in social life. Citizens recognize the importance of participating in behaviors based on their behavioral tendency with moral outlook and values. Deng and Ge took the social psychological perspective as the starting point and foothold, based on the establishment of community cognition in China, emphasized the important impact of participation attitude on participation behavior, and strengthened the continuity and continuity of residents' participation [15]. Based on the theory of planned behavior, Lv constructed the influencing mechanism model of Chinese residents' participation behavior and found that the behavior and attitude of continuous and active participation would significantly affect residents' participation behavior [16], that is, changing residents' concept and cognition to further promote the construction and management of communities and promote the sustainable development of communities. Zhan emphasized the importance of China's urban community residents to participate in, through empirical analysis found that the current Chinese community residents to participate in the attitude of indifference are participated in important issues of community residents autonomy, to improve China's community residents' participation enthusiasm, participation, and initiative, and guide the Chinese residents to actively participate in community construction activities [17]. According to the research of Deng et al., the continuous and proactive participation attitude directly or indirectly affects the participation behavior of residents, which is conducive to improving the awareness and knowledge level of residents participating in the sustainable development of the community. This paper argues that the main factors influencing Chinese community development and construction are active participation and residents' trust.

*2.2.3. Participation Ability.* Participation ability is the comprehensive quality reflected by residents in participating in community activities, which plays an important role in influencing the participation of Chinese community residents and promoting the sustainable development of community. Scholar Li, starting from the perspective of interest differentiation of Chinese community groups and taking the actual needs of community residents as the entry point, emphasized the importance of continuously improving residents' participation in community governance [18]. Scholar Yuan combined theory with practice and pointed out that the lack of participation ability of Chinese community residents is an important problem facing community governance at present, and also emphasized the importance of communication and collaboration ability and interpersonal skills for improving residents' participation [19]. Wang and Xiang, by constructing M-O-A model, pointed out that participation consciousness, participation motivation, and participation ability, especially the corresponding learning ability and skill ability, have a significant impact on the participation behavior of Chinese community residents [20]. According to the research of scholars, Li et al. residents' participation ability directly affects community

residents' participation behavior. The stronger residents' participation ability is, the wider the scope of participation is, and the easier it is to participate in decision making, supervision, evaluation, and other deeper stages of participation. Therefore, this paper considers that the participation ability of community development and construction can be divided into four types: understanding and learning ability; logical thinking ability; communication skills; and interpersonal skills.

*2.2.4. Awareness of Participation.* Participation consciousness is the psychological refraction of individual citizen participating in practical social life. Based on the participation consciousness with intermediary nature, individual citizens recognize the value and function of participating in various community activities and experience the necessity of participating in various community activities. Zhang, taking the rapid development of new urbanization in China as the background, conducted a practical survey based on the reconstruction of old residential areas, and concluded that residents' participation consciousness, especially subject consciousness, value consciousness and responsibility consciousness, had a significant impact on improving residents' participation [21]. Scholar Huang found that residents' sense of participation would significantly affect individual participation behaviors by issuing questionnaires to residents [22]. Zhao believes that resident participation is a necessary prerequisite for the smooth development of sustainable community development in China, and also a key indicator reflecting the actual governance situation. To expand the foundation of community governance, it is necessary to further improve the awareness and degree of participation of community residents [23]. Scholar Shi analyzed the impact of the sense of participation on residents' participation degree and participation behavior from the perspective of the community itself, and found that the stronger the sense of participation of community residents, the higher the degree of community participation [24, 25], and the better the degree of community development.

*2.2.5. Neighborhood Relations.* According to some scholars' research findings, neighborhood relationship is an important factor for residents to participate in community governance activities, which will affect the relationship between residents' awareness of participation and sustainable development of the community, and has a moderating effect. Scholars Chen and Min, from the perspective of social interaction, based on the digital development of communities, combined with the construction and development of smart communities, studied the inherent logic of neighborhood effect based on the fixed effect model [26]. Yang and Li explored the impact of community environmental context on residents' participation in public affairs from the perspective of community functional structure and found that neighborhood communication is an important factor in promoting residents' participation in community public affairs, and the more frequent the communication between neighbors, the greater the promoting effect on residents'

participation in community governance [27]. Scholars Liu et al. investigated urban villages and reconstructed housing communities, and found that strong sense of identity and social relations of agglomeration, especially “neighborhood circle,” had a significant impact on residents’ participation in community governance [28]. The closer neighborhood relationship will strengthen residents’ sense of belonging and cohesion, improve residents’ emotional identity tendency, and encourage residents to participate in community construction. According to the research of scholars, Chen et al.’s neighborhood relationship has a great influence on community construction and development.

Therefore, based on the corresponding theoretical basis, the theoretical analysis framework of the influencing factors of the sustainable development of smart community and Chinese residents’ participation is preliminarily constructed (Figure 1).

Based on the actual survey data, combined with the sustainable development theory and citizen participation theory, this paper constructs a statistical model of the influencing factors of the sustainable development of smart communities and the participation of Chinese residents (Figure 2), and puts forward the research hypothesis:

Hypothesis 1: community satisfaction has a positive impact on participation awareness

Hypothesis 2: participation attitude positively affects the sustainable development of smart communities

Hypothesis 3: participation ability positively affects the sustainable development of smart communities

Hypothesis 4: the sense of participation has a positive impact on the sustainable development of smart communities

Hypothesis 5: community satisfaction has a positive impact on the sustainable development of smart communities

Hypothesis 6: neighborhood relations play a regulatory role between participation awareness and sustainable development of smart communities

Hypothesis 7: participation consciousness plays an intermediary role between community satisfaction and sustainable development of smart community.

### 3. Questionnaire Design and Implementation

**3.1. Questionnaire Design of Survey Content.** According to the sustainable development of the intelligence community and the residents to participate in the theoretical research framework of influencing factors questionnaire design, questionnaire consists of three parts: the first part is the investigation of the basic information of the intelligence community residents for China, including gender, age, level of education, living time, monthly income, health status, and other information; the second part is the measurement of the influencing factors, starting from the five aspects of community satisfaction, participation attitude, participation ability, participation consciousness, and neighborhood relationship, and all adopt the Likert 5-point scale, aiming to

collect the corresponding data through the specific answers of the respondents; and the third part measures the sustainable development of smart communities in China, including smart community construction, smart community demand, and smart community evaluation, using the form of Likert 5-point scale.

#### 3.2. Investigation Implementation and Reliability and Validity Analysis

**3.2.1. Implementation of the Survey.** The questionnaire was distributed through the network platform. From December 10, 2021, to December 18, 2021, a total of 242 questionnaires were distributed. The collected questionnaires were screened and sorted out, and 231 valid questionnaires were obtained, with a response rate of 95%. Among the respondents, 161 (69.7%) were female and 70 (30.3%) were male; in terms of age, residents aged 31–50 are the main respondents, accounting for 76.44% of the total sample, followed by those aged 18–30, accounting for 15.29% of the total sample. In terms of education level, 52.89% had a bachelor’s degree or above, and only 8.68% had junior high school or below. 75.62% of the residents have lived for more than 5 years and are permanent residents. Most of the residents surveyed by the questionnaire are healthy and 92.56% can live independently.

**3.2.2. Reliability and Validity Analysis.** Statistical analysis of data reliability is mainly used to evaluate whether the results of the whole scale are true and valid. SPSS 26.0 software was used to analyze the reliability of the scale data in the questionnaire. The sample statistics are shown in Tables 1 and 2. According to the statistical results, the alpha coefficient of Cronbach’s  $\alpha$  was 0.977, and the alpha coefficient of Cronbach’s  $\alpha$  of community satisfaction, participation attitude, participation ability, participation consciousness, and neighborhood relationship was all greater than 0.7, indicating that the scale data of this questionnaire had high reliability.

Validity refers to the validity of things measured by questionnaire data, which is used to test whether the final statistical results of the questionnaire reflect the content it wants to measure. It is generally believed that the higher the consistency between the final results of questionnaire research data and the content to be investigated, the better the validity of statistical analysis of data. Factor analysis was used to test the degree of the questionnaire’s internal explanation for the influencing factors of the sustainable development of smart community and Chinese residents’ participation. KMO and Bartlett tests were carried out on the samples (Table 3). The number of KMO sampling suitability of the sample data was  $0.946 > 0.7$ , and the significance of sphericity test was  $P < 0.001$ , which reached the significance level when the degree of freedom was 276, indicating that the data could be used for factor analysis and could better represent the characteristics of the measured object.

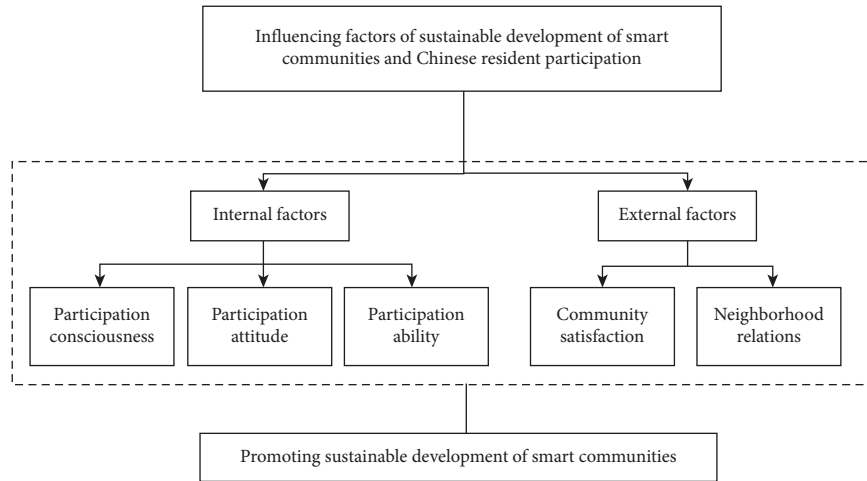


FIGURE 1: Analysis framework of influencing factors on sustainable development of smart communities and participation of Chinese residents.

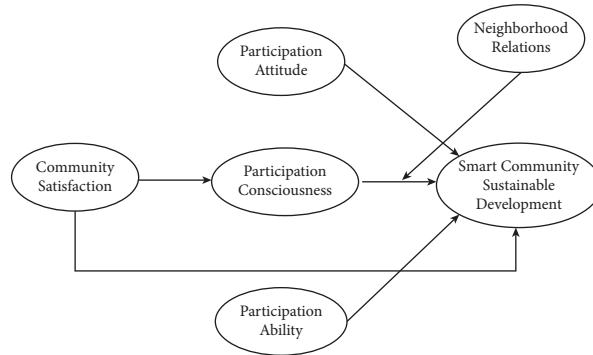


FIGURE 2: Research model.

TABLE 1: Reliability test analysis.

Cronbach alpha	Cronbach alpha based on normalization term	Number of items
0.977	0.978	24

TABLE 2: Reliability analysis of each influencing factor.

Influence factor	Cronbach alpha	Cronbach alpha based on normalization term	Number of items
Community satisfaction	0.934	0.935	3
Participation attitude	0.939	0.939	3
Participation ability	0.953	0.954	4
Participation consciousness	0.953	0.954	5
Neighborhood relations	0.937	0.940	4

TABLE 3: KMO and Bartlett test.

KMO sampling suitability quantity		0.946
KMO sampling suitability quantity	Approximate chi-square	7552.599
	Degrees of freedom	276
	Salience	.000

## 4. Model Analysis

**4.1. Model Fit Analysis.** In this paper, the structural equation model is used to verify the hypothesis. Before the path analysis, the fitting degree of the model needs to be analyzed to determine whether the theoretical model matches the data: CMIN/DF (chi-square to degree of freedom ratio, i.e.,  $\chi^2/DF$ ), RMSEA (approximate root mean square error), GFI (goodness-of-fit index), AGFI (adjusted goodness-of-fit index), CFI (relative goodness-of-fit index), and other indicators. As shown in Table 4,  $\chi^2/DF$  value is 2.292, RMSEA value is 0.075, GFI value is 0.878, AGFI value is 0.820, and CFI value is 0.971. All values comply with appropriate matching standards, indicating that SEM and data fit well.

### 4.2. Path Coefficient Analysis

**4.2.1. Analysis of Influencing Factors.** Before the critical path coefficient analysis, AMOS 26.0 software was used to draw the model path diagram based on the statistical model and basic assumptions proposed above. It can more clearly and intuitively reflect the relationship between the sustainable development of smart communities and the participation of Chinese residents as well as the interaction between various influencing factors, as well as the influence degree of observed variables on latent variables, which is conducive to the subsequent sorting of the relationship between variables. AMOS 26.0 software was used for standardized analysis of the model, and the path chart of structural variables for sustainable development of Chinese smart community residents was obtained as shown in Figure 3. Through the path diagram, the relationship between the development of smart community and resident participation, and the interaction between variables and the influence coefficient can be clearly judged.

In this paper, AMOS 26.0 was used for SEM structural equation model analysis, and path analysis coefficients of various studies in the model were obtained, as shown in Table 5.

It can be seen from the table that the standardized coefficient of community satisfaction on participation consciousness is 0.702, and the  $P$  value is  $<0.001$ , indicating that community satisfaction has a significant positive impact on participation consciousness. Community satisfaction is the evaluation index of residents on community service, basic implementation, and greening management and is an important symbol to measure the development level of smart community. Through the improvement of internal environment, infrastructure governance and management system, and service level, smart community can further improve residents' satisfaction, so as to enhance residents' initiative and enthusiasm, and promote efficient management and refined service of smart community. Therefore, H1 is assumed to be true; the standardized coefficient of community satisfaction on the sustainable development of smart communities is 0.033, but the  $P$  value is  $>0.5$ , indicating that community satisfaction has no significant impact on the sustainable development of smart communities, assuming H2 is not valid. The standardized coefficient of participation attitude on sustainable development

TABLE 4: Fitting index.

Statistical test	Critical value	Detection value	Fit result
$\chi^2/df$	$<3.00$	2.292	Fit
RMSEA	$<0.08$	0.075	Fit
GFI	$>0.8$	0.878	Fit
AGFI	$>0.8$	0.820	Fit
CFI	$>0.9$	0.971	Fit

of smart community was 0.494, and the  $P$  value was  $<0.05$ . This indicates that participation attitude can positively and significantly affect community development, and residents actively participate in smart community planning and governance. It is beneficial to increase residents' sense of trust and identity, and promote residents to directly or indirectly improve the efficiency of participation in activities. It follows that assuming H3 is true. The standardized coefficient of participation ability on the sustainable development of smart community is  $-0.296$ , and  $P < 0.05$ , indicating that participation ability negatively affects the development of smart community. Hypothesis H4 is not valid. The standardized coefficient of participation consciousness to the sustainable development of smart community is 0.692, and the  $P$  value is  $<0.001$ . Participation consciousness is the psychological refraction reflection of individual citizens' participation in practical social life. Citizens recognize the value of participating in community activities based on their intermediary awareness of participation. By showing strong cognitive willingness to participate, residents have a strong sense of belonging to the community, making residents believe that they have the responsibility and obligation to participate in the development and construction of the community. Therefore, hypothesis H5 is established. As an intermediary variable, the standardized coefficient of awareness of participation is 0.536, and  $P < 0.05$ . The improvement of residents' satisfaction with smart communities will be realized through awareness of participation. Residents of intelligence community planning and construction, service, efficiency requirements evaluation, and so on, the more satisfied, more will directly or indirectly affect residents' cognition, strengthen the participation awareness, and strengthen the initiative from the physical and mental, therefore, participation in the community satisfaction, and community sustainable development plays a role of intermediary between wisdom and hypothesis H6, which was established.

**4.2.2. Impacts of Moderating Variables on Residents' Sustainable Participation.** Based on the above basic assumptions, the influence of moderating variables on the sustainable development of smart communities is studied, and the path chart of moderating variables is drawn as shown in Figure 4. The influence of moderating variables on the sustainable development of smart community can be clearly judged by the path diagram. Participation consciousness has a significant impact on the sustainable development of smart communities, and the interaction term between participation consciousness and neighborhood relationship has a significant positive impact on the development of smart communities, so it can be seen that neighborhood relationship has a moderating effect (standardized coefficient 0.589,  $P < 0.05$ ).

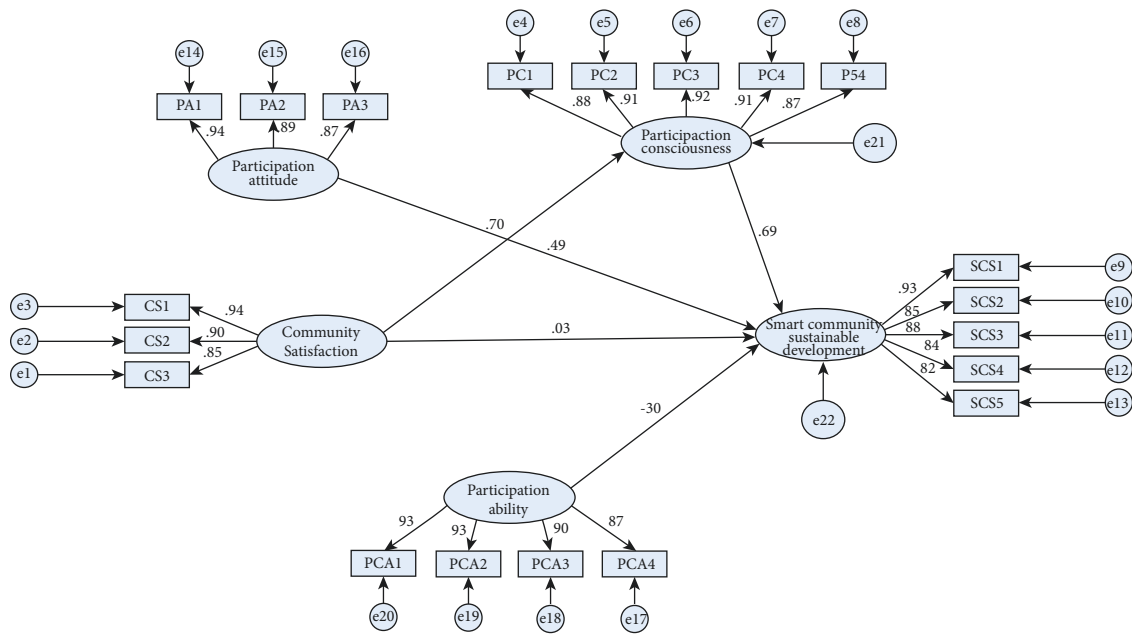


FIGURE 3: Path map of structural variables for sustainable development of smart communities in China. Notes: PA stands for participation attitude, PC stands for participation consciousness, CS stands for community satisfaction, PCA stands for participation ability, and SCS stands for smart community sustainable development.

TABLE 5: Path coefficient table.

Path	Standardized coefficient	Unstandardized coefficients	Standard error	T value	P
Participation ← community satisfaction	0.702	0.671	0.062	10.899	<0.001
Smart community sustainable development ← community satisfaction	0.033	0.037	0.156	0.236	0.813
Smart community sustainable development ← participation attitude	0.494	0.519	0.257	2.022	0.043
Smart community sustainable development ← participation ability	-0.296	-0.398	0.195	-2.040	0.041
Smart community sustainable development ← Participation awareness	0.692	0.798	0.061	13.173	<0.001

Neighborhood relationship is an important link between residents and the community. When the neighborhood relationship is poor, it will directly or indirectly weaken the ideology of residents' participation in the internal affairs of the community, thus changing residents' cognitive concepts and behavior patterns and reducing residents' willingness to participate. When good neighborhood relationship and higher participation influence on the sustainable development of the community, this is because when people think it is better with the surrounding neighborhood residents, especially through to communicate with your neighbors to discuss [29], mutual trust, and to participate in the activities of community organization of neighborhood, which will improve the residents' willingness to participate in cognitive and make the residents to participate in the activities of community construction, and the transaction is own duty. To some extent, the initiative of residents to participate in smart community will be improved [30, 31], and the construction of smart community service system will be promoted to promote the sustainable development of smart community.

### 5. Discussion

The trend of digitalization and intelligentization has brought about rapid changes in grassroots public services in China, putting forward clearer requirements for grassroots governance structures and community service recipients. Chinese communities carry more social functions. As a new type of community, smart community takes big data and the Internet of Things as technological means to promote the development of smart and sustainable communities from the needs of residents. However, it easily becomes the focus of all kinds of interests and contradictions, and also exposes many problems worth pondering in the process of promoting Chinese community governance [32]. Along with the continuous deepening of the reform of Chinese society, the process of community governance has become the top priority of social development in China, and the development of community governance construction if you can in the orbit of smoothly can break through the dilemma of practice sustainable and healthy development [33, 34], and



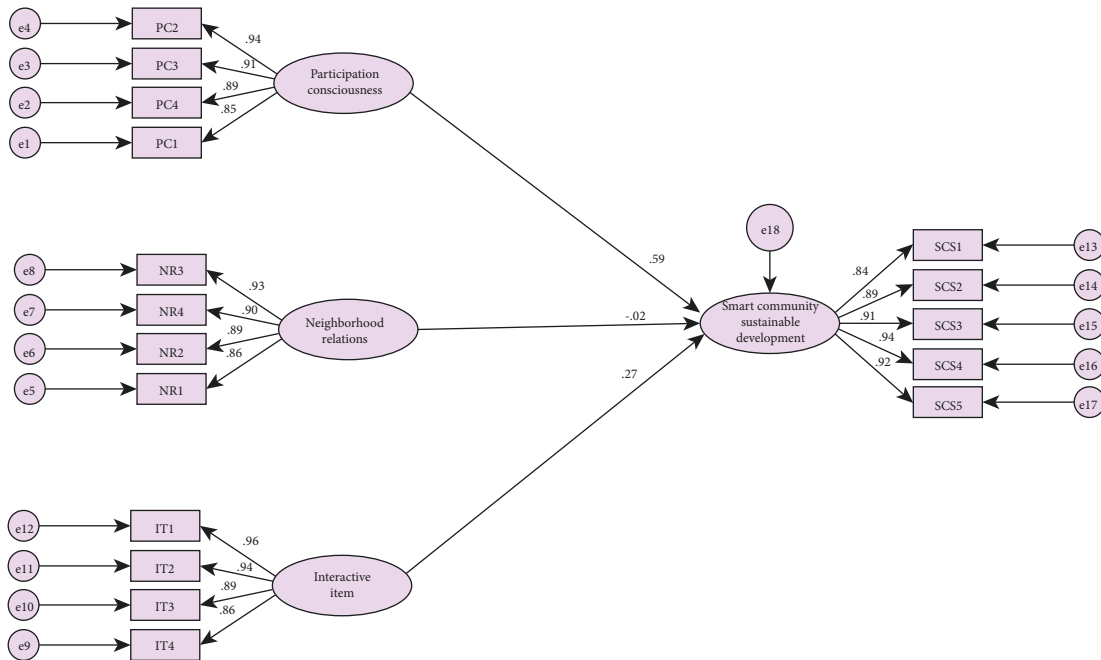


FIGURE 4: Path chart of moderating variables for sustainable development of smart communities in China. Notes: PC stands for participation consciousness, NR stands for neighborhood relations, IT stands for interactive item, and SCS stands for smart community sustainable development.

the emphasis is on clear wisdom community development and the relationship between the residents participate in. In order to promote the sustainable development of smart community, it is necessary to integrate and plan from multiple dimensions and take effective measures.

*5.1. Change the Thinking Mode of Grassroots Government and Clarify the Positioning of Government Functions.* Grassroots community governance is an important part of China’s social governance system, a top-down micro-governance project of the Chinese government, and an innovative practice of social development. The Chinese government should not only do a good job in top-level design and scientific planning but also implement grassroots planning. Therefore, it is necessary to effectively change the thinking mode of the grassroots government, clarify the government function positioning, and promote the development and construction of smart community in an orderly manner according to the basic conditions of the community [35].

We change the thinking concept of the Chinese government and strictly implement the construction of convenient service system. “Serving and satisfying the residents” is the key point of community governance in China. We should clearly understand that the government is no longer the master of community governance, but the motivator and helper of community governance, and respect the wishes and ideas of residents. Community as an autonomous social organizations at the grassroots level has autonomous management and self-service function, and the government should clear their own nature orientation; based on the principle of information sharing, resource communion promotes intelligence community

to establish a perfect service mechanism, improve the service mode, improve the team construction, improve the service level, and promote residents autonomy standard handover.

We promote Chinese community governance gradually. With the rapid development of politics and economy and the deepening of social reform, the needs of community residents have become more diversified, and government functions have become more specialized and refined. At present, the government is transforming from a “leading government” to a “service-oriented government.” On the premise of meeting the needs of residents for production and life services, it will gradually explore a perfect community governance model in accordance with local conditions; promote the coordinated development of ecology, economy, management, and environment of smart communities [36–38]; and promote the green and healthy development of smart communities.

*5.2. Give Full Play to Residents’ Initiative and Improve Residents’ Wisdom.* In essence, community-level governance in China is an adjustment and improvement of people’s way of life and production, which is closely related to the vital interests and demands of residents. Therefore, in the process of promoting community governance in China, it is necessary to fully understand the diversified and diversified needs of residents, give full play to the principal role of residents, actively promote the development of smart community industry, improve the construction of internal infrastructure and supporting system of products and services, and promote the coordinated development of smart community.

First, we enhance residents' awareness of participation. On the one hand, we open cultural sites in smart communities, integrate relevant resources in the community, and actively carry out popular cultural activities to mobilize residents' enthusiasm for participation. Libraries, chess and card fields, sports venues, and other activity venues are set up to meet the spiritual construction needs of residents, make the community governance culture deeply rooted in every corner, close the connection between the community and residents, and enhance the sense of identity and belonging of residents to participate in the development of smart community to a certain extent.

Second, we improve residents' ability to participate. The initiative of residents to participate in community governance activities is mainly reflected in whether residents can give full play to their own participation ability. In previous community activities, participants were mostly elderly people and residents with low education level. Even if these participants participated in community activities, they only stayed on the surface and did not really integrate into the process of community governance activities. Therefore, it is necessary to constantly improve the participation process of residents in smart communities; take into account residents' opinions and suggestions; give full play to their logical thinking, communication, and interpersonal skills; and enhance residents' sense of responsibility and mission to the community.

Finally, we broaden the channels for community participation. The main reason for the absence of sustainable development and residents' participation consciousness in smart communities in China is the lack of complete and reasonable channels of communication and participation. Therefore, it is necessary to broaden information communication channels so that residents can express their interest demands; fully guarantee residents' rights to know, express, participate, and build [39]; form a wide participation mechanism within the community; and improve residents' wisdom level.

*5.3. Improve the Service Supply System of Smart Community and Strengthen the Construction of Working Team.* In essence, the sustainable development of smart communities in China is to provide residents with production life products and services so that residents can enjoy diversified and convenient product effects and convenient services. However, due to the unitary community management system and the imperfect production mechanism inside the community, the implementation of community governance policy is not in place and the implementation of alienation. Therefore, it is necessary to fully tap the internal resources of smart communities, rely on social organizations to promote service supply, enhance the management system and mechanism of smart communities, build professional working teams, and improve the effectiveness of smart community management.

First, we integrate internal resources of smart communities to provide diversified production and living services, for example, community public services such as basic

government affairs, basic security, medical and health care, culture, and education [40]; communication network, water and electricity supply, express delivery, and other convenient services for the people; and volunteering to help vulnerable groups such as children, the elderly, and the disabled. Second, we strengthen the construction of smart community work team; improve the efficiency of community management; improve the staff recruitment mechanism; optimize the recruitment process; enlarge the recruitment channels; explore the build system of professional personnel training; improve intelligence community cognitive level of staff to the community service system; improve the community worker performance evaluation mechanism; establish performance rewards and punishment and compensation system; improve community production way of life; improve residents' satisfaction with the service system, service content, and service quality of smart community; and enhance residents' sense of identity, sense of belonging, and participation enthusiasm, thus playing a great role in promoting the service level of smart community in China and the construction of grassroots community governance.

## 6. Conclusion

The practical dilemma of modern Chinese community governance calls for the sustainable development of smart community, which reflects the development concept of "people-oriented, resident-oriented" as the basis of urban community development. Community based on industry space forms that residents provide production life of the products and services as the core, and the organic combination of material field and social field; establish a resident participation mechanism as the core of sustainable development, the synergy of pluralistic subjectivity, and fully regression residents' autonomy construction; and create beneficial conditions for the intelligence community sustainable development. Truly, we realize the "good governance" of the Chinese community.

*Limitations and Future Research.* First, the selected literature is limited, the theory is not mature enough, and it is in the preliminary research stage. In fact, the sustainable development of smart communities is the main research direction of future social governance. Relevant theories should be improved to make the research more universal. At the same time, this paper only conducted horizontal data research. The impact of smart community development and residents' participation is a dynamic research process, and the results are not comprehensive. In the future, it can be integrated into vertical data for research.

## Data Availability

The data presented in this study are available on request from the corresponding author.

## Conflicts of Interest

The authors declare that there are no conflicts of interest.

## Acknowledgments

The authors acknowledge the National Social Science Fund Project “Research on Shared Governance of Elderly Care in Smart Communities” (No. 18BGL260) and the Heilongjiang Philosophy and Social Planning Key Project “Research on the Collaborative Governance Mechanism of Heilongjiang Urban Community Epidemic Prevention and Control” (No. 21GLA006).

## References

- [1] M. Krsinić Nižić, K. Vodeb, and Z. Šverko Grdić, “The smart city concept for sustainable development of a tourist destination,” *Journal of Maritime & Transportation Science*, vol. 58, no. 1, pp. 111–123, 2020.
- [2] V. Zavrtnik, D. Podjed, J. Trilar, and E. HlebecKosStojmenova Duh, “Sustainable and community-centred development of smart cities and villages,” *Sustainability*, vol. 12, no. 10, p. 3961, 2020.
- [3] P. A. Tedong and A. S. Zyed, “Searching for sustainable cities: residents’ perceptions on the implementation of sustainable cities in malaysia,” *Community Development Journal*, 2021.
- [4] T. Schreiner, M. Poleza, and E. M. D. Costa, “Co-production in public management: a case study towards a smart city,” *International Journal of Knowledge-Based Development*, vol. 12, no. 1, p. 17, 2021.
- [5] Y. Y. Cao, “Research on Co-production in community governance: taking M community in S city as an example,” *Society*, no. 4, pp. 38–42, 2022.
- [6] S. Yin, N. Zhang, K. Ullah, and S. Gao, “Enhancing digital innovation for the sustainable transformation of manufacturing industry: a pressure-state-response system framework to perceptions of digital green innovation and its performance for green and intelligent manufacturing,” *Systems*, vol. 10, no. 3, p. 72, 2022.
- [7] H. C. Tsuang, K. C. Wu, and K. H. Peng, “Social housing residents’ community participation under the impact of lease period restrictions,” *International Review for Spatial Planning and Sustainable Development*, vol. 9, no. 1, pp. 30–46, 2021.
- [8] M. Abdallah, A. Shabib, and A. R. Alozi, “A multisectoral assessment framework for the carbon footprint of integrated sustainable development systems in Dubai. Environment, Development and Sustainability,” *A Multidisciplinary Approach to the Theory and Practice of Sustainable Development*, vol. 24, 2022.
- [9] A. Srivarathan, R. Lund, U. Christensen, and M. Kristiansen, “Social relations, community engagement and potentials: a qualitative study exploring resident engagement in a community-based health promotion intervention in a deprived social housing area,” *International Journal of Environmental Research and Public Health*, vol. 17, no. 7, p. 2341, 2020.
- [10] J. P. Amata, “Extent of community participation in the ecotourism project in caramoan, camarines sur, Philippines,” *Open Access Library Journal*, vol. 8, no. 11, p. 29, 2021.
- [11] Y. X. Yun, J. H. Hu, and L. J. Ren, “Re-Understanding of sustainable urban research—based on review of domestic and foreign literature,” *Southern Architecture*, no. 03, pp. 98–105, 2021.
- [12] X. Y. Wu, W. Li, and H. Li, “Research on community participation satisfaction in tourism poverty alleviation areas—based on ordinal logistic regression analysis,” *Journal of Northwest Normal University*, vol. 57, no. 05, pp. 56–63+76, 2021.
- [13] Y. Ren, B. D. Li, and Q. S. Yang, “The influence mechanism of community space resources on community satisfaction—taking jinshui district of zhengzhou city as an example,” *Regional Research and Development*, vol. 40, no. 05, pp. 72–76+94, 2021.
- [14] J. F. Han, “Current situation and influencing factors of resident participation in rural community governance—based on the investigation of some rural communities in henan province,” *Journal of Hubei Institute of Economics*, vol. 17, no. 06, pp. 68–76+128, 2019.
- [15] Y. D. Deng and D. S. Ge, “Community participation from the perspective of social psychology,” *Gansu Social Sciences*, no. 03, pp. 108–114, 2020.
- [16] W. Q. Lv, “Research on residents’ sustainable heritage tourism participation behavior—based on the perspective of planning behavior theory,” *Social Scientists*, no. 12, pp. 89–100, 2019.
- [17] P. Zhang, Z. J. Wu, and Z. Q. Li, “A study on the participation patterns and guiding strategies of residents’ self-government in urban communities,” *Journal of Liaoning University (Philosophy and Social Science Edition)*, vol. 46, no. 04, pp. 14–21, 2018.
- [18] Y. X. Li, “The content differentiation and organizational optimization of urban residents’ community participation—based on the case comparison analysis of B community and Q community in L city,” *Urban Issues*, no. 07, pp. 84–90, 2020.
- [19] F. C. Yuan, “Energizing residents: the subjective logic and action path of community participation,” *Administrative Forum*, no. 01, pp. 80–85, 2019.
- [20] Z. F. Wang and Q. S. Xiang, “Research on the participation of community residents in wuling mountainous areas in tourism poverty alleviation based on MOA model,” *Journal of Minzu University of China (Philosophy and Social Sciences Edition)*, vol. 44, no. 06, pp. 94–102, 2017.
- [21] J. L. Zhang, B. Wen, D. J. Zhu, and Y. Zhao, “Research on the influencing factors of community residents’ participation in the renovation of old community: based on the empirical observation of old community reform in taocheng district, hengshui city,” *Urban Development Research*, vol. 28, no. 10, pp. 29–33, 2021.
- [22] Y. Z. Huang, “Participation and influencing factors of rural residents’ green lifestyle,” *Resources and Environment in Arid Areas*, no. 03, pp. 49–55, 2020.
- [23] L. Y. Zhao, “Community participation: awareness and action—based on the survey of G street residents in shanghai,” *Journal of Youth*, no. 01, pp. 67–72, 2015.
- [24] S. H. Shi, “Analysis of the influence of social capital and tourism participation awareness on residents’ participation in tourism: taking beijing shichahai community as an example,” *Regional Research and Development*, no. 03, pp. 101–106, 2015.
- [25] M. Avi, “Factors Affecting the Participation of Community Residents in Tourism,” *Lessons from Sunamgonj, District, Sylhet, Bangladesh*.
- [26] D. Y. Chen and X. Q. Min, “The neighborhood effect of online community participation: an empirical analysis based on community WeChat groups,” *Social Development Research*, vol. 8, no. 03, pp. 88–244, 2021.
- [27] B. Yang and J. Li, “Community social organization, neighborhood interaction and public affairs participation: an empirical analysis based on CGSS2012,” *Learning Forum*, no. 04, pp. 76–82, 2019.

- [28] Y. Q. Liu, Y. Liu, and Z. G. Li, "Mechanism analysis of residents' sense of belonging, neighborhood communication and community participation\*—taking the reconstruction of urban villages in guangzhou as an example," *Urban Planning*, vol. 41, no. 09, pp. 38–47, 2017.
- [29] R. L. Mauldin, F. Kayo, and W. Carin, "Social networks in an assisted living community: correlates of acquaintance and companionship ties among residents[]," *The Journals of Gerontology: Serie Bibliographique*, vol. 2021, no. 7, 7 pages, 2017.
- [30] T. Gumede and A. T. Nzama, *Approaches toward Community Participation Enhancement in Ecotourism*, Chapters, 2022.
- [31] S. Xu and Y. Hu, "How do residents respond to negative environmental impacts from tourism? The role of community participation in empowering residents' environmentally responsible behavior," *International Journal of Tourism Research*, vol. 23, no. 6, pp. 1099–1111, 2021.
- [32] A. N. Bakar, A. Ali, and R. Jangga, *Community Participation in Gunung Ledang Protected Area: Supporting the Sustainable Development Goal*, SDG, 2022.
- [33] S. Lee and S. Fayzullina, *Ecotourism and Community Development: A Case Study of Yangiabad in Uzbekistan//Hospitality, Tourism and Sports Management*, 2019.
- [34] Q. Cai, "Research on the micro-process of community public participation in sustainable development," *Seeking*, no. 10, pp. 98–100, 2005.
- [35] S. Abhayawansa, C. A. Adams, and C. Neesham, "Accountability and governance in pursuit of Sustainable Development Goals: conceptualising how governments create value," *Accounting, Auditing & Accountability Journal*, vol. 34, no. 4, pp. 923–945, 2021.
- [36] D. Naku, J. Kihila, and E. A. Mwangeni, "Towards programs sustainability: an exploration of socio-economic determinants for effective Community Participation in Development Programs in Tanzania," *Science Publishing Group*, vol. 7, no. 3, 2021.
- [37] M. S. Martins, P. Fundo, R. M. Locatelli Kalil, and F. D. Rosa, "Community participation in the identification of neighbourhood sustainability indicators in Brazil," *Habitat International*, vol. 113, no. 1, Article ID 102370, 2021.
- [38] M. A. Hir, M. Zaheri, and H. Karimzadeh, *Analysis of Sustainable Development Level Based on Information and Communication Technology in Rural Areas (Case Study: Jiroft County)*, 2021.
- [39] B. Xia, "The background, connotation and significance of green community development," *Guangdong Agricultural Science*, vol. 40, no. 20, pp. 211–214+230, 2013.
- [40] N. Moayerian, N. G. Mcgehee, and M. O. Stephenson, "Community cultural development: Exploring the connections between collective art making, capacity building and sustainable community-based tourism," *Annals of Tourism Research*, vol. 93, 2022.