Systematic Literature Review of Smart Community Governance in China: Status, Challenges, and Opportunities

Muhang Wu

School of Law and Public Administration, China Three Gorges University, Yichang, China

798813581@qq.com

Abstract. A lot of attention has been paid to smart communities, which are the final mile of smart cities in China, and pertinent research on smart community governance has been emerging. This paper examines the current situation, challenges, and development opportunities faced by smart communities based on systematic literature review (SLR), PEST model, and stakeholder approach in order to further highlight the direction of smart community governance in China and clarify the findings of previous studies. The current question, problems, and governance routes of smart community governance are presented in 77 important research publications that have been found after extensive searching, filtering, statistical analysis, and identification of all elements linked to smart community governance. Finally, based on the SLR framework, all of the influencing aspects of smart community governance are recognized, along with their internal relationships and interactions. The study also examines the problem of its growth from the perspectives of politics, economics, society, and technology (P, E, S, and T) (technology). The findings indicate that there are considerable inequities in the design of smart communities across nations and regions, that research on smart communities is still mostly focused on a single element and lacks quantitative analysis, and that overall smart community resilience is still low. To further advance smart development and resilient governance in China, academics must thoroughly analyze the elements impacting the creation of smart communities, incorporate them into future research, and improve the cooperation of numerous stakeholders.

Keywords: Smart Community; China; Governance.

1. Introduction

The modernization of a country's governance system and ability to govern is largely reflected in the efforts made at the grassroots level. As the nerve end of the national governance system, the community has become an important fulcrum for pivoting national and social governance. However, it goes without saying that with the deepening complexity, sensitivity and diversity of society as a result of social differentiation and the gradual accentuation of the plurality and multi-layered nature of the interests of community residents, the traditional community governance model is no longer able to grasp the development trend based on the frontier of the times. Therefore, under the new development requirements of social governance and the new round of technology and industrial revolution, smart communities will become an important way to innovate community governance, enhance community services and meet people's needs for a better life.

Mahizhnan has introduced the concept of smart cities with the development goal of improving the quality of life of urban residents.[1] While the booming development of smart cities provides opportunities for communities, the development goals of smart cities also need to be implemented at the community level, and the development of smart communities is not only the result of continuous maturation, development, innovation and change in communities, but also an extension of wisdom in the field of social governance . In recent years, the Chinese government has made great efforts to promote smart governance in cities and communities through a series of policies and measures. In May 2002, the Central Committee of the Communist Party of China and the State Council issued the Opinions on Further Promoting the Construction of Smart Communities (hereinafter referred to as the Opinions), which clearly proposed to intensively build smart community platforms, expand smart community governance scenarios, construct a new picture of community digital life The Opinions clearly set out the eight basic tasks of intensively building smart community platforms, expanding

smart community governance scenarios, building a new picture of community digital life, promoting the application of big data in communities, streamlining and consolidating community data entry, and strengthening the construction and renovation of smart community infrastructure. At the same time, many countries around the world have introduced a series of policies and programs and explored innovative technological approaches to promote the long-term development of smart communities or smart cities. For example, Smart community can be traced back to 2008, when IBM proposed and launched the world's first smart community project in the United States. Subsequently, technology companies such as Microsoft and Cisco became important forces to promote the construction of "smart community". Since then, the smart community gradually from the concept to the landing; the Australian Smart Communities Association (ASCA) works with citizens, businesses and stakeholders at its core to support the creation of livable, sustainable and viable smart communities. In China, Beijing took the lead in putting forward the Implementation Opinions on Promoting the Construction of Smart Communities in the whole City in 2012.

The practice of exploring smart cities and even smart communities in various countries responds to the issues and directions of the times, which has led to a surge of research by many scholars. For example, according to Holland , "one of the key elements highlighted in the literature on smart (intelligent) cities is the use of networked infrastructure to improve economic and political efficiency and to promote social, cultural and urban development".[2] And Caragliu, Bo and Nijkamp argue that "investment in human and social capital and traditional (transport) and modern (ICT) communication infrastructure for sustainable economic growth and high quality of life, and the wise management of natural resources, through participatory governance"[3] It is the smart city that is the smart city; but it is worth noting that "each city can reach a different level of intelligence within a certain range, rather than "falling into a black and white classification of smart or unintelligent" (jill - garcia, Zhang and Puron-Cid).[4] In 2013, toward the end of the first decade of the 20th century, the University of California, in the United States of America, has been working on the development of a new model of intelligence. In 2013, Townsend's book Big Data, Civic Hacking and the Quest for a New Utopia explored the consequences of two global trends today: rapid urbanization and the spread of ubiquitous computing. He places great emphasis on the importance of open source information and how it can inspire grassroots movements and empower citizens to produce the desired community-led approach that current smart city initiatives have failed to achieve; the implementation of smart cities is localized bottom-up intervention policy implementation that places new demands on collaborative, participatory, democratic and self-organized forms of social governance to promote higher levels of citizen participation in addressing complex environmental sustainability issues at the local level and creating social value for the community as a whole. The growth of intangible capital, rather than tangible capital, is therefore a necessary component of promoting 'smart' cities (Angelidou) [5] has also suggested that smart communities are communities that apply new information technologies such as the Internet of Things, cloud computing and big data to digitize and coordinate the daily lives of community residents (Ding et al, Ianuale, Li et al) [6].

Up to now, although many scholars have reviewed the content of smart communities, they have only focused on the policy, technology and client side of smart communities in a one-sided analysis, lacking a systematic overview of the current situation, challenges and opportunities of smart communities as a whole. Therefore, this paper will study this issue in order to comprehensively and systematically sort out the factors of smart community construction and provide insights for multiple actors to collaboratively promote intelligent community governance.

2. Methodology

To ensure comprehensive of the methodology, a two stage systematic literature review was adopted. First, we conducted a systematic literature search and screening (Tranfield et al., 2003) to retrieve and select literature relevant to our research questions. Second, we used qualitative content analysis to analyze the selected literature (Mayring, 2015; Seuring and Müller, 2008). This research

design ensured that we retrieved a systematic sample and we were able to develop a framework by identifying and summarizing the most important themes in the literature, as illustrated in Figure 1.

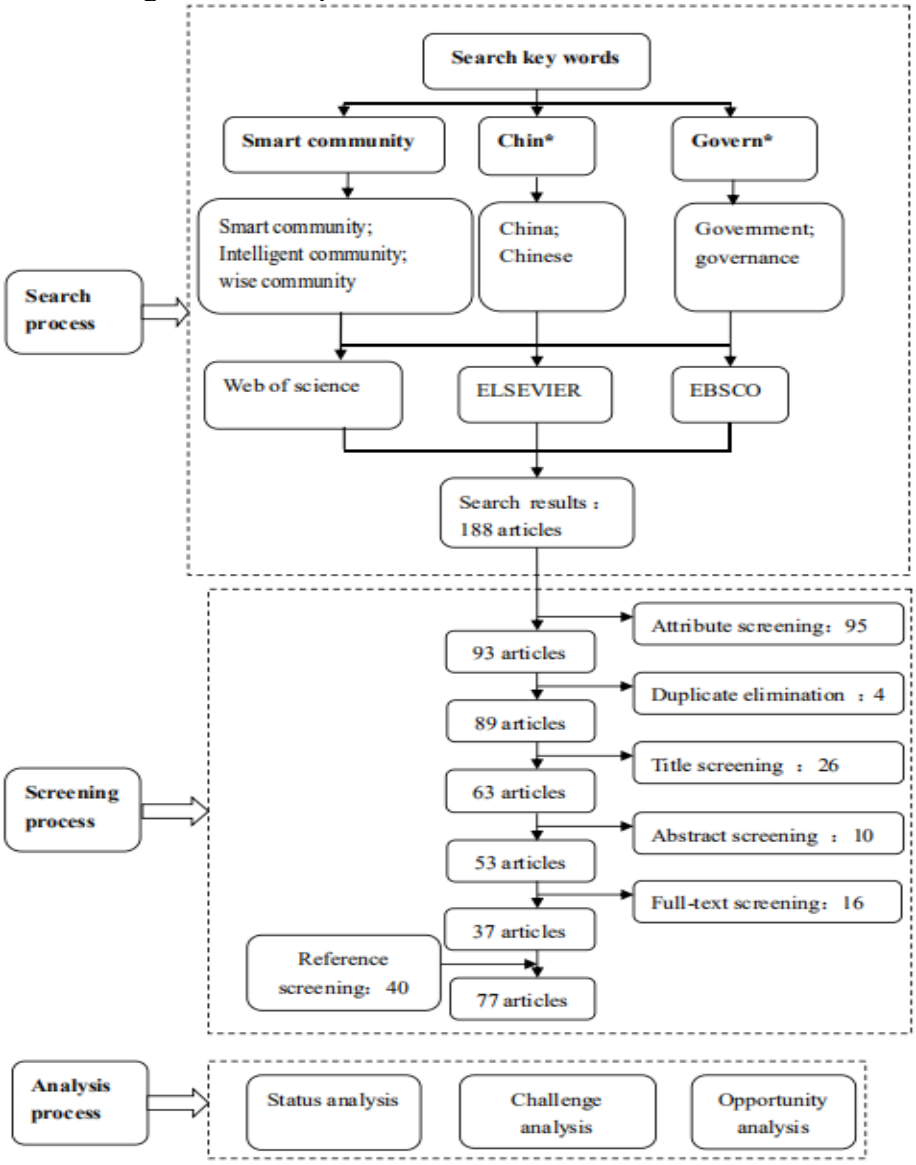


Figure 1. Flow chart of literature search and screening

2.1 Search Protocol

To obtain a complete and accurate literature, it is necessary to select appropriate electronic databases and set search terms. Three major electronic databases were selected as literature sources for this study:

(a) The Web of Scientific Core Collection (WOBCC), which provides access to all high-quality articles indexed by SSCI, SCI and A&HCI;

(b) ELSEVIER, one of the world's largest publishers, whose online database offers more than 2,000 journals related to technology and medicine;

(c) EBSCO, which is also one of the largest databases and includes several sub-databases.

Based on the objectives of this study, three sets of search terms were identified which were used when conducting searches within subject categories, including titles, abstracts and keywords.

"smart community" which contains all variations of smart community, intelligent community and wise community.

(a) "China" which includes China and Chinese;

(b) "Governance" which includes governance and government.

Articles are limited to English language and published from 2011 - 2022 . Articles that do not meet these restrictions will not appear in the search results.

2.2 Screening Protocol

The results obtained from the search process did not all focus on smart communities and Chinese governance. Therefore, we filtered these irrelevant articles in the following six steps:

(a) Duplicate elimination

An article may belong to more than one database. For example, an article published by ELSEVIER may be indexed by WOBCC. Therefore, a duplicate elimination process is required to ensure that there are no duplicate copies in the results.

(b) Attributes screening

For the purposes of this study, conference articles were not considered as the studies may be immature or incomplete. Review articles were also not considered, as they usually summarise previous research. However, conference articles and review articles are not separated from research articles in the search results. Therefore, this step requires the removal of all conference articles and review articles.

(c) Title screening

Title filtering entails reading through the headlines to filter these articles that are clearly not concerned with the surrounding context.

(d)Abstract screening

In order to check whether the detailed objectives and conclusions of the study are relevant to our SLR, the next step is to obtain information about the study from the abstract. Articles that do not mention " Smart Communities" and "Governance" in the objectives and conclusions must be removed.

(e) Full-text screening

To ensure the availability of articles that meet the above filtering steps, downloading and reading the full article is a necessary step to filter out articles that do not provide detailed elements of smart community governance

(f)Reference screening

The references to the remaining articles and review articles identified in step (b) of the attribution screening are a good complement to address any missing eligible articles. Therefore, in this step, all references are collected and screened again from the first step of the screening protocol.

The screening process was as follows: 4 duplicate papers were screened. A total of 95 conference papers or review papers were removed in the attribute screening process. 26 papers were removed in the title screening process. 26 papers were removed in the abstract screening process. In the full-text screening process 16 documents that did not mention 'smart communities' or 'community governance' were eliminated. In the full-text screening process 40 relevant documents were added.

2.3 Literature Analysis

After the SLR analysis, 77 articles were retained from . From the 77 retained articles, we will now explore the current situation, challenges and pathways of smart community governance and systematically analyze them.

3. Results

According to the nation distribution dimension, the chosen references are grouped as illustrated in Figure 2.

China makes up the greatest share of the research items (countries) in the references, which emphasizes the growth spurt and strong drive-in intelligent governance of developing countries with China as a typical example. Other nations or areas are also accelerating their study into and examination of smart governance, demonstrating that it is an essential component of modern social government and that its growth is unabated.

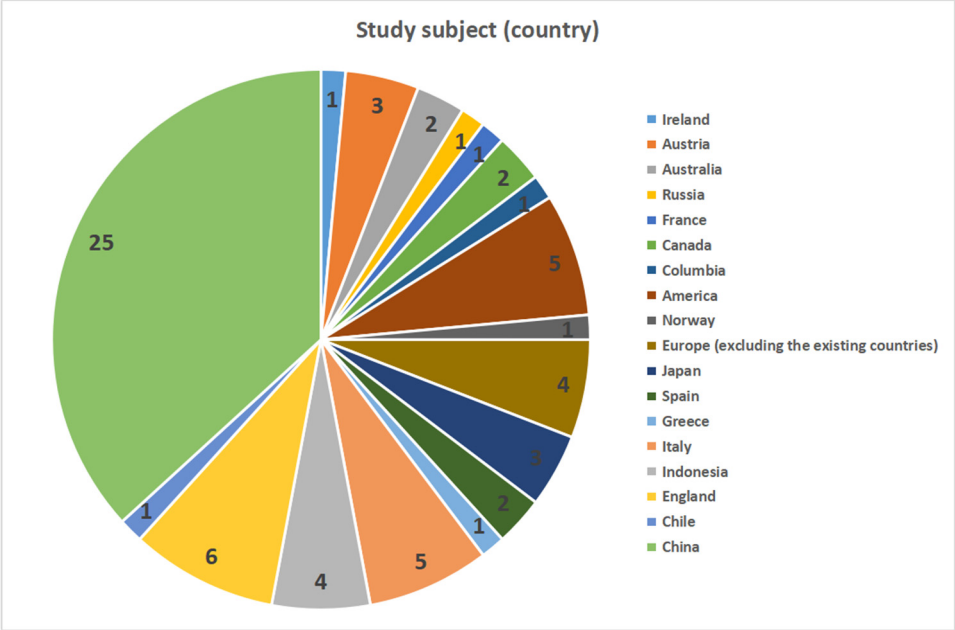


Figure 2. Regional distribution of the literature

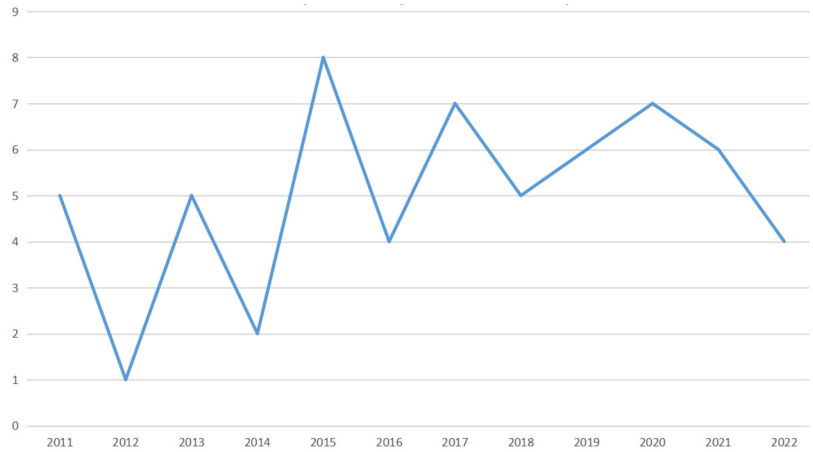


Figure 3. Statistics on the year of publication and number of papers published

According to Figure 3, there is an overall upward trend of scholars' research on smart governance in the past 10 years, and smart governance may attract more scholars to conduct more in-depth research and thinking on this issue in the future.

3.1 An Overview of the Current State of Smart Community Governance

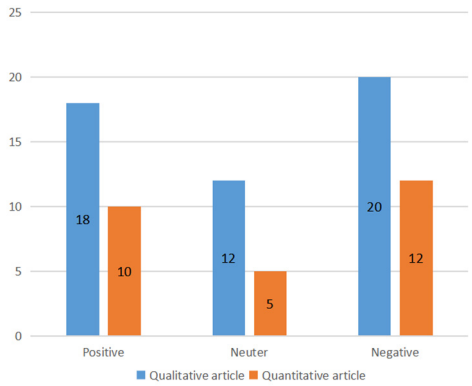


Figure 4. Article Research Methodology and Sentiment Classification Chart

As shown in Figure 4, 77 of the selected papers were predominantly qualitative, accounting for 50 articles, while quantitative literature accounted for 27 articles. For the qualitative papers, they mostly used research methods such as interviews, macro descriptions, policy analysis, some used case study methods, and a few scholars used behavioral research methods, such as Jenni Viitanen, Paul Connell & Martine Tommis, who conducted a behavioral study on smart governance in two low-carbon communities in Sheffield and Leeds, UK. For the quantitative For quantitative papers, the main focus is on the assessment of governance performance, mostly using fuzzy integrated evaluation, TOPSIS, DEA and other methods. Some scholars use system dynamics, game theory and other methods. A few scholars used the stakeholder approach to conduct research. For example, Zainab Nurrohmaha, Suhirmana constructed a stakeholder analysis matrix to assess the current state of governance in a smart theme park in Bandung, Indonesia. For the qualitative studies, the results of the evaluation of the smart governance of communities or societies can be divided into three categories: positive, neutral and negative. However, not many papers maintained a positive evaluation attitude, with only 18 papers, mostly for countries or regions with a high level of socio-economic development and a clear foundation for smart governance, such as the USA, the UK and Japan. The majority of papers, 32 were neutral and negative, revealing that the hardware and software facilities for smart governance are still inadequate globally, especially in developing countries, and that there is still a long way to go to change the governance model and improve its effectiveness.

There aren't many quantitative studies on smart communities, and the majority of them evaluate smart community or society governance negatively. This suggests that, on the one hand, there aren't enough software resources for smart communities around the world, particularly in developing nations, like academic research and policy support. On the other hand, hardware infrastructure in smart communities is also weak.

3.2 An Overview of the Challenges of Smart Community Governance

Table 1. Statistics on the combination of challenge categories

Serial number	P	E	S	T	Number
1	√				0
2		√			0
3			√		2
4				√	5
5	√	√			1
6	√		√		1
7	√			√	8
8		√	√		3
9		√		√	1
10			√	√	14
11	√	√	√		3
12	√	√		√	1
13	√		√	√	15
14		√	√	√	14
15	√	√	√	√	9
Number	33	32	61	67	...

The PEST model is a widely used model for macro-environmental analysis. In general, it refers to an analysis that addresses four main categories of external influences: political (P), economic (E), social (S) and technological (T). This study uses the PEST model to broadly categorize and summarize the challenges of smart community governance. With regard to the political environment, the main challenges include the policy system, political institutions and collaboration mechanisms; with regard to the economic environment, the main challenges include the industrial environment and the competitive environment, specifically the socio-economic structure, the level of economic

development, the economic system, macroeconomic policies and other general economic conditions; with regard to the social environment, the main challenges include cultural traditions, lifestyle changes, social With regard to the challenges of the social environment, these include cultural traditions, changes in lifestyles, social mobility and demographic factors; with regard to the challenges of the technological environment, these refer to the general level of technology in society and trends in change, technological breakthroughs and the manifestation of the interaction between technology and the political, economic and social environment. These factors are often inextricably linked and mutually reinforcing, and are often analyzed by scholars in an integrated manner. Therefore, this paper presents a combination of the challenges posed by these environmental factors, as shown in Table 1.

As can be seen from Table 1, the most frequent studies in the selected literature were on T, with 67 papers; studies on S, including 61 papers; and studies on P and E, with only 33 and 32 papers respectively. For studies on the interrelationship between the four environmental factors of PEST, 15 papers discuss PST together, followed by 14 papers on both ST and EST, indicating that in recent years research on smart governance has increasingly emphasized the joint development of social participation and technological progress; while only seven papers discuss P, E, S and T separately, Zhiye Huang, for instance, assesses the Chinese smart residential neighborhood from a technical standpoint.

3.3 An Overview of Smart Community Governance Pathways

The subjects/objects of smart community governance can be broadly divided into government departments, residents, social organizations, enterprises (property units) and experts. With the popularization and application of the concept of multi-center collaborative governance, more diverse and extensive governance subjects will be deeply involved in the governance of smart communities.

Based on the theoretical idea of mechanism design, the governance paths of smart communities are broadly classified into three categories: incentive-based, constraint-based and incentive-constraint co-promoted, as shown in Figure 5. Among them, 33 papers advocate the adoption of incentive-binding governance paths , 26 papers advocate the adoption of incentive-based governance paths alone , and only 18 papers propose the adoption of constraint-based governance paths alone .

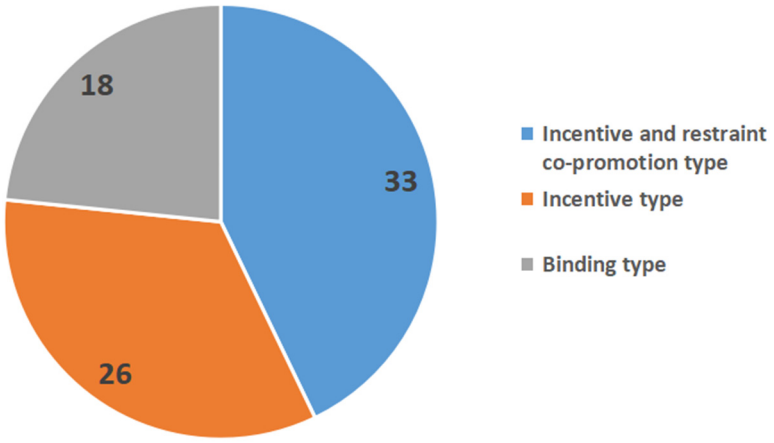


Figure 5. Statistical relationship diagram of governance path types

4. Discussions

From the analysis of the selected papers at, the research on smart communities in the past decade has mostly focused on qualitative judgments but lacked quantitative data mining, which may lead to difficulties in defining and suspending the concept of smart communities and making it difficult to implement and promote it in concrete governance practices. Therefore, the implementation of "smart communities" requires both top-down top-level design and bottom-up vivid practice. For example, to

strengthen organisational leadership and unified planning and design. In other words, the government should establish a "holistic government" (Perri 6, 1997) from the top down, build a unified database to co-ordinate a larger and deeper range of data and information, break down departmental barriers and promote data and information sharing; at the same time, a professional organisation should provide holistic solutions, from system design, data sharing, platform At the same time, professional organisations provide holistic solutions, from system design, data sharing, platform construction to operation services, etc. to carry out unified planning, construction, layout and maintenance. Data information is the key point of exploration and research for smart communities and is also the fundamental point of its characteristic practice. Only continuous reform to cross the "digital divide", break down data barriers and defeat data hegemony can promote more concrete and feasible construction of smart communities.

The analysis of the challenges facing the construction of smart communities in the selected reference papers reveals that past research on smart communities has mostly been limited to the S and T dimensions, with less exploration and analysis of the P and E dimensions; at the same time, there is a lack of research that integrates the four P, E, S and T dimensions. This may lead to a series of problems such as one-sided research and insufficient depth of analysis. Therefore, I suggest that more scholars should fully investigate the various influencing factors in the four dimensions of P, E, S and T and combine them for empirical analysis, in order to provide more valuable references for the actual construction of smart communities.

"Government intervention is necessary, not optional." (Lucy Cradduck)[7] For the construction of smart communities, the government should play a leading role and engage a wide range of actors to achieve the maximum benefits of smart community projects. Research on smart communities over the past decade has shown that many scholars still limit themselves to using pure incentives or constraints to build smart communities rather than advocating an integrated path of intervention. "Information technology has broken down the "physical" boundaries between government, market, society, the public and other governance actors, expanding the overall scope and scale of governance targets and helping to shape shared governance goals." However, if the focus is only on endless incentives, there is a risk that the imbalance between the interests of various social actors will become more and more serious, bringing about greater governance problems. Therefore, in the face of the dual nature of science and technology, as human society enters the era of artificial intelligence, it is necessary to not only explore the social benefits brought by technology but also to accurately grasp the boundaries of its development and formulate corresponding policy regulations to restrain it, so as to shape the resilience of intelligent communities. The definition of these boundaries varies from time to time and from place to place, and more research is needed to provide reference solutions for future community smart governance.

5. Conclusion

Over the past 40 years, China's cities have developed according to their own internal rules, transitioning from rural to urban areas. In the coming decades, the demand for "smart" cities, particularly smart communities, is expected to become a major factor in urban development. Using a hybrid of the SLR and PEST models, this study investigates the governance of smart communities in China. The findings indicate that quantitative research on the governance of smart communities is insufficient and faces difficulties on four fronts: political, economic, social, and technological. This calls for adaptation and optimization in light of regional and local characteristics. This paper reviews and analyzes pertinent research findings from the previous ten years in order to serve as a useful reference for future studies on smart community governance.

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