
| RESEARCH ARTICLE

A Dynamic Analysis of the Research on Community Public Space and Facilities Based on the Perspective of Bibliometrics

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| ABSTRACT

The outbreak of COVID-19, a major public health event at the end of 2019, made the healthy living environment a hot topic again. Community public space is the main carrier of residents' activities, while community facilities are the daily life and space of residents basic tools for interaction. Their good operation is an important line of defense for residents to live a healthy life, which gives new research directions for community construction. By using CiteSpace software and CNKI visual analysis platform, this paper conducts text mining and visual analysis of the existing literature in the international web of science and China's CNKI academic database and plots the number of published papers and the distribution of subjects in the study of "community public space and facilities". A knowledge map of frequently cited documents and research hotspots time, research topics, and research trends. To sort out the current research on community public space and facilities, and hope to provide theoretical support for further research such as the improvement of community public space and facilities, and the frontier dynamics of academic research.

| KEYWORDS

Community public space, Facilities, Bibliometrics, CiteSpace, Visual Analysis

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1. Introduction

The concept of public space originated in the city square of ancient Greece, and it appeared as a specific term in the 1950s. It was first seen in the article "Private and Public Space", published by British scholar Charles March in 1950 and the political philosopher. In Hannah Arendt's book "The Human Condition", the community is also an "imported word". In 1887, F. Tunnis published his famous book *Community and Society*, which became a benchmark for the beginning of community theoretical research. The interpretation and comparison of the distinction between community and society and the characteristics of the two kinds of communities marked the official birth of community theory.

Therefore, the research on community public space and facilities started very early internationally. The community public space is an important form of public space and an important part of the community where residents live. Its academic research is based on the community and public space to form the corresponding theoretical support. At the same time, the research on community public space is highly comprehensive and covers a wide range of disciplines, involving natural sciences, social sciences, etc., which can be further subdivided into architectural design, architectural engineering, design, geographical environment, planning, psychology, politics, etc. It is difficult to grasp its research hotspots, research trends, and mutual co-citation relationships. Therefore, this study uses Citespace as the analysis tool and the corresponding research literature on community public spaces and facilities as the object of analysis and calculation. Visualization and computational analysis of documents in the Science database.

2. Data source and analysis condition settings

In order to increase the credibility of the bibliometric research analysis, the authoritative foreign literature database "Web of Science™ Core Collection", namely the Web of Science Core Collection (1975-present), was selected as the data source, and the index type was SCI -EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI, CCR-EXPANDED, IC. The search topics are "community public space" and "facilities", namely "TS=(community public space)" AND "TS=(facility)"; the filter article types are "Document type=Article" and "Document type=Proceedings Papers"; The longest span of time is selected; the source database is selected as default; the search deadline is December 31, 2021; A study of community public spaces and facilities was conducted in 1991. The version of software computing is CiteSpace.5.8.R3 (64-bit) (the previous version, CiteSpace.5.8.R3, lasted until December 31, 2021, and can no longer be used).

3. Analysis results and Discussion

Judging from the year and time period of literature publication, the annual publication volume of community public space and facility research papers generally increases year by year. There was a decrease in individual years, but the decrease was not much different from the previous year. The current year with the largest number of publications is 2021, with 112 publications, accounting for 14.195%. Followed by 2021, 106 papers will be published, accounting for 13.435%. The period from 2018 to 2021 is the peak of the number of publications. Therefore, the research on community public spaces and facilities has shown a good development trend as a whole, indicating that its topics are also attracting the attention of the academic circle (Figure 1). Among them, UNIVERSITY OF CALIFORNIA SYSTEM, NATIONAL AERONAUTICS SPACE ADMINISTRATION NASA, CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS, CALIFORNIA INSTITUTE OF TECHNOLOGY, UNIVERSITY OF LONDON are mostly concentrated in academic institutions in European and American countries.

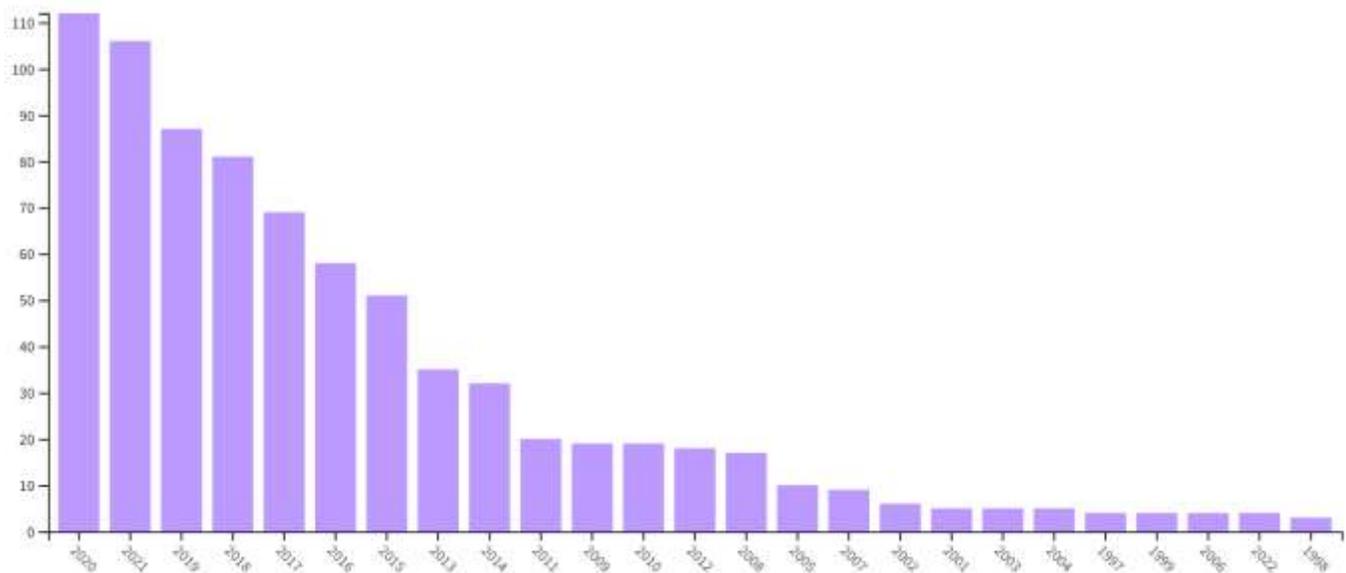


Figure1 Statistics of publication years of foreign community public space and facilities research literature
Image source: Intercepted from Web of Science database platform analysis

Firstly, the data obtained from Web of Science will be checked for duplicates, tested, converted into formats, and imported into CiteSpace. A beating cluster map was obtained using the Log-likelihood rate (LLR algorithm). At the same time, check the clusters obtained by the operation, open the statistical view of Summary of Clusters, and check the Silhouette column, that is, the S value, which represents the calculated average contour value of the clusters. It is generally considered that $S > 0.5$ clusters are reasonable. $S > 0.7$ means that the clustering is convincing (Li Jie, Chen Chaomei, 2014). After inspection, it is found that the S values of this operation analysis are all over 0.7, and most of them are above 0.9; that is, the operation results are valid (Figure 2).

Summary of Clusters -

Save/Show as HTML: cluster_summary.html Save Label Terms as a Whitelist

Select	Cluster ID	Size	Silhouette	mean(Year)	Top Terms (LSI)	Top Terms (log-likelihood ratio)	Terms (mutual information)
<input type="checkbox"/>	0	163	0.796	2012	physical activity, case study, q	physical activity (510.31, 1.0E-	householder (2.33), space fatal
<input type="checkbox"/>	1	106	0.701	2016	case study, rural communities,	tobacco use cessation service	householder (1.37), space fatal
<input type="checkbox"/>	2	94	0.918	2016	first data release, lofar two-me	first data release (336.15, 1.0E-	ash optical depth (1.31), eyjafa
<input type="checkbox"/>	3	60	0.927	2007	pilot study, controlled trial, staff	staff education (106.41, 1.0E-4	co-operative inquiry (1.64), pu
<input type="checkbox"/>	4	51	0.616	2010	public space, long-term manag	public space (187.05, 1.0E-4)	historic district (0.73), vernacu
<input type="checkbox"/>	5	38	0.955	1999	multipurpose residential home,	multipurpose residential home	physical activity (0.01), sustain
<input type="checkbox"/>	6	29	0.878	2015	solar photovoltaic electricity, p.	solar photovoltaic electricity (1.	ethic (0.15), solidarity (0.15), d
<input type="checkbox"/>	8	25	0.674	1992	confined space fatalities in virg	space fatalities (19.45, 1.0E-4)	physical activity (0.02), case st
<input type="checkbox"/>	10	22	1	1999	african american women's exp	daily live (18.41, 1.0E-4), africa	physical activity (0.02), case st
<input type="checkbox"/>	11	18	0.999	2001	the context, management and	heroin overdose (16.82, 1.0E-4	physical activity (0.02), case st
<input type="checkbox"/>	13	17	0.963	2012	15th century, ten mixed-use fa	15th century (71.47, 1.0E-4) t	physical activity (0.02), case st
<input type="checkbox"/>	14	16	0.995	2006	inspired design, international p.	international partner (29.63, 1.0	physical activity (0.02), case st
<input type="checkbox"/>	15	16	0.986	2007	historic health care institution,	community skateboard park (4.	physical activity (0.02), case st
<input type="checkbox"/>	18	13	0.916	2012	rural south africa, adult mortali	rural south africa (57.37, 1.0E-	physical activity (0.02), case st
<input type="checkbox"/>	20	12	0.999	2004	determining the drivers for hou	householder (18.41, 1.0E-4), d.	physical activity (0.02), case st
<input type="checkbox"/>	22	10	0.995	2003	the application of ultraviolet ger	transmission (16.82, 1.0E-4), g	physical activity (0.02), case st

Figure 2 Perform a Silhouette test on the clusters resulting from the operation (Image source: The author intercepted according to Citespace)

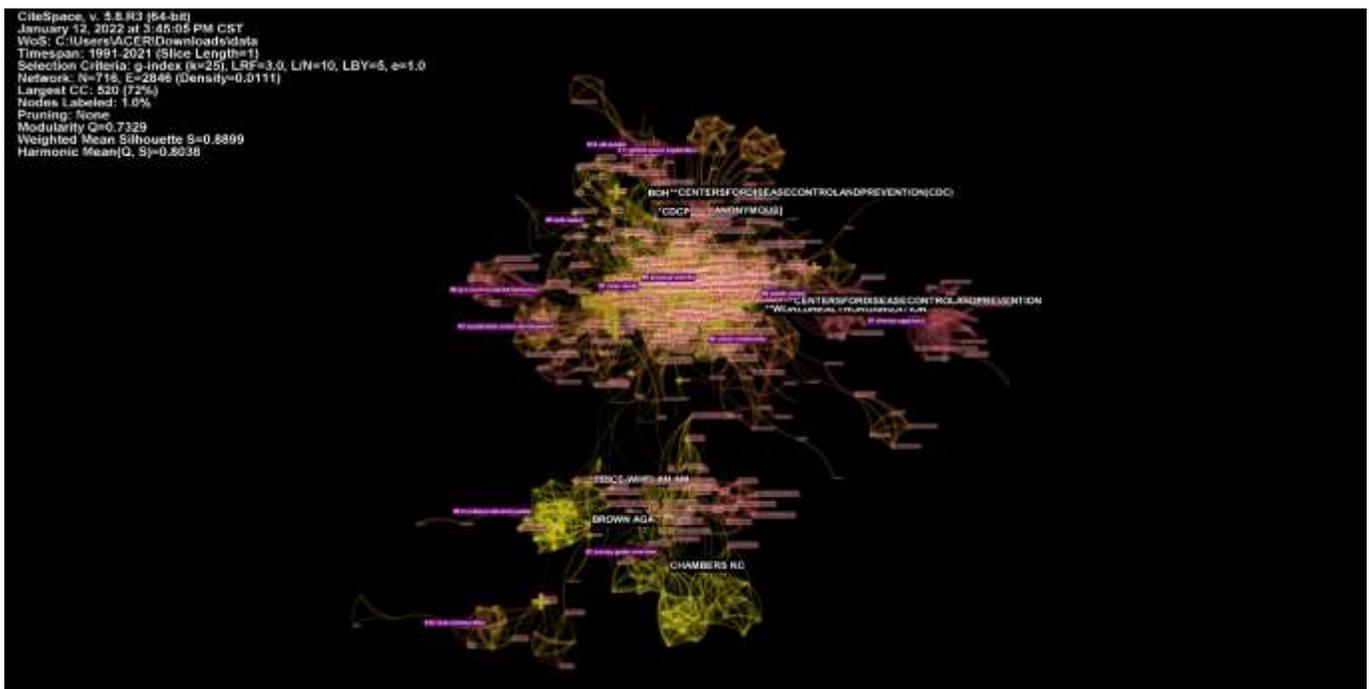


Figure 3 Cluster labels derived from the operation (Image source: The author exported according to Citespace)

Through operation analysis, 14 groups of cluster labels are formed (Figure 3). The operation result shows Network: N=716, E=2846 (density=0.0111), N represents the number of network nodes, E is the current number of connections, and Density is the network's density. It is presented in the form of a space-time diagram (Figure 4), which are: physical activity, Case study, Community, survey goals overview, close, sustainable urban development, urban community, irradiated ultrahot jupiter, ranet, public policy, diversity approach, pro-environmental behaviour, safe space, viral communities, global space exploration, ultraviolet.

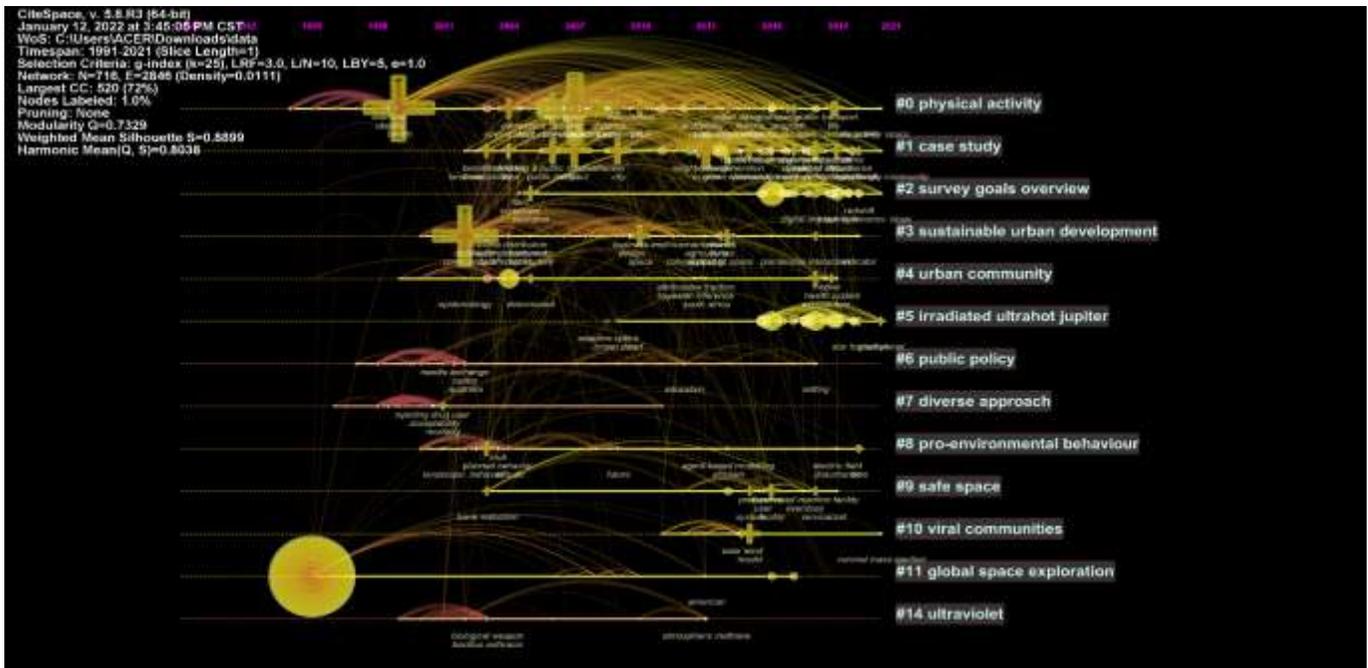


Figure 4 The spatiotemporal graph of the cluster labels obtained by the operation (Image source: The author exported according to Citespace)

At the same time, burst detection is also carried out through the CiteSpace operation. The algorithm principle is to count the frequency of words in the titles and abstracts of papers in related fields, and then according to the growth rate of these words, to determine the current research frontier hot words, emerging words year etc. The evolution of community public spaces and facilities in foreign literature research reflects the progress of urban development and the development of theoretical systems. Run the Burst test to get the calculation results of the top 20 frontier hotspots. The red mark is the time node distribution of the burst. They are adult, health, association, resource, neighborhood, space, open space, physical activity, perception, women, service, digital sky survey policy, people, life, health care, spectrum, facility, older adult, accessibility (Figure 5). Since 2008, the research hotspots have constantly been changing and showing diversification. The highest intensity calculated is the perception of strength=4.42, which also shows that in the community's public space, the relationship between people's feelings, experiences, behaviours, and space is constantly becoming an Academic focus of community public space and facility research.

In the international literature, the general trend of community public space and facilities research reflects that the development has been relatively slow since 1991 and has developed rapidly since 2008. With the development of the city, the deepening of cognition and the deepening of research, new concerns continue to emerge and become diversified over time. Pay attention to the resources, natural environment, facilities and services of community public space and facilities, as well as people's experience and healthy activities in the community.

As for the related research in China, mainly through the Chinese CNKI platform retrieval, the total number of documents obtained is 545; retrieval conditions: (subject%='community public space facilities' or title%='community public space facilities' or title=xl('Community public space facilities') or v_subject=xl('Community public space facilities')); the search scope is set to the general library, and other conditions remain the default settings. According to the publication year, the overall publication volume is on the rise (Figure 6). The data for 2022 is the forecast value of the CNKI visualization platform. Currently, according to the growth index, the forecast value for 2022 is 130.

Top 20 Keywords with the Strongest Citation Bursts

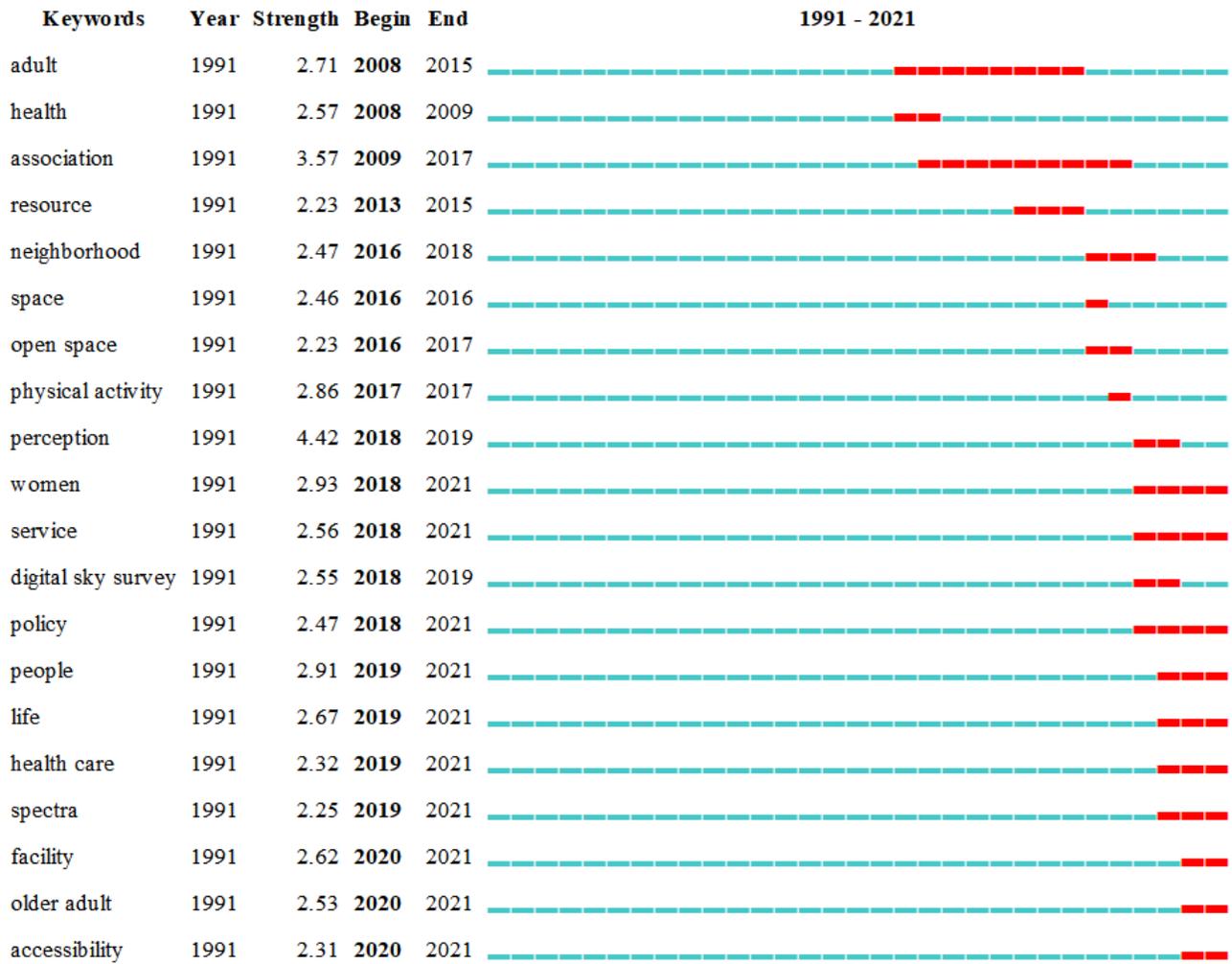


Figure 5 Distribution map obtained by Burst detection operation (Image source: The author derived from Citespace)

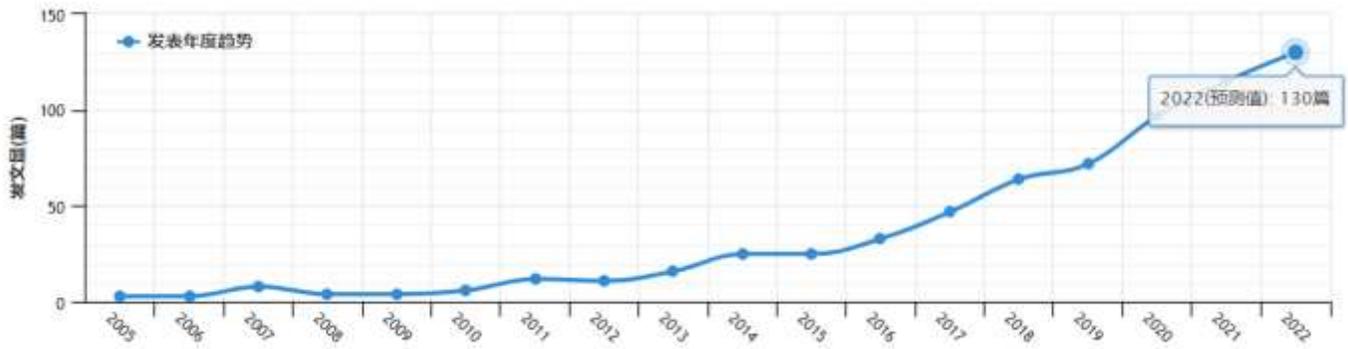


Figure 6 Analysis of the overall number trend in the publication year (Image source: The author derives from CNKI visualization)

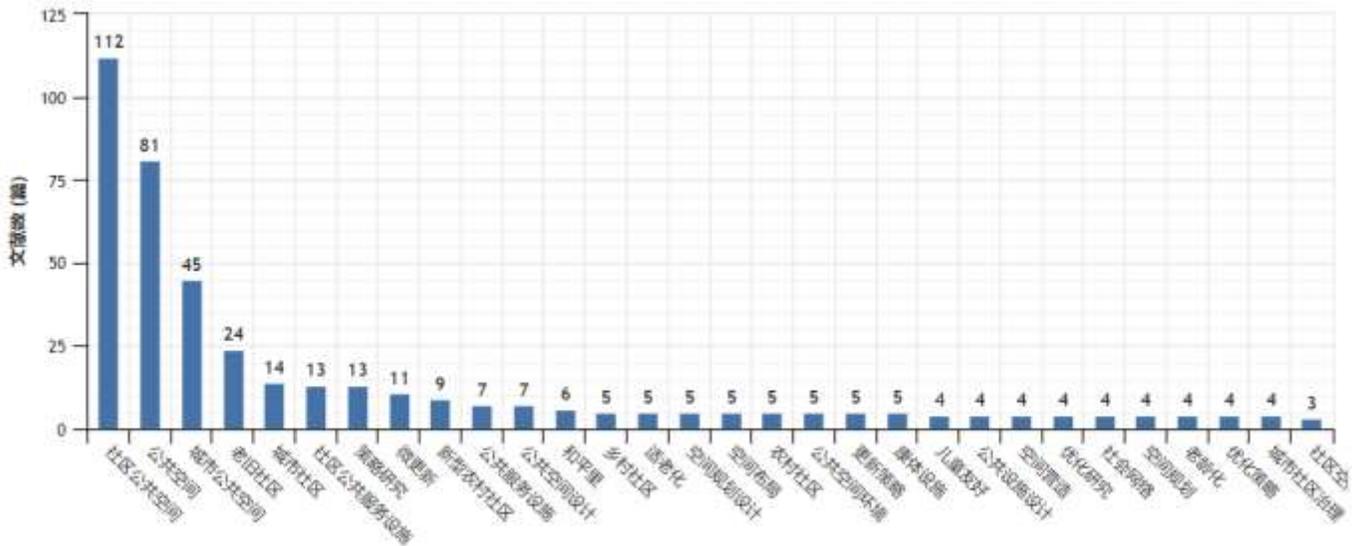


Figure 7 The overall trend analysis of the publication year (distribution of main topics) (Image source: The author derives from CNKI visualization)

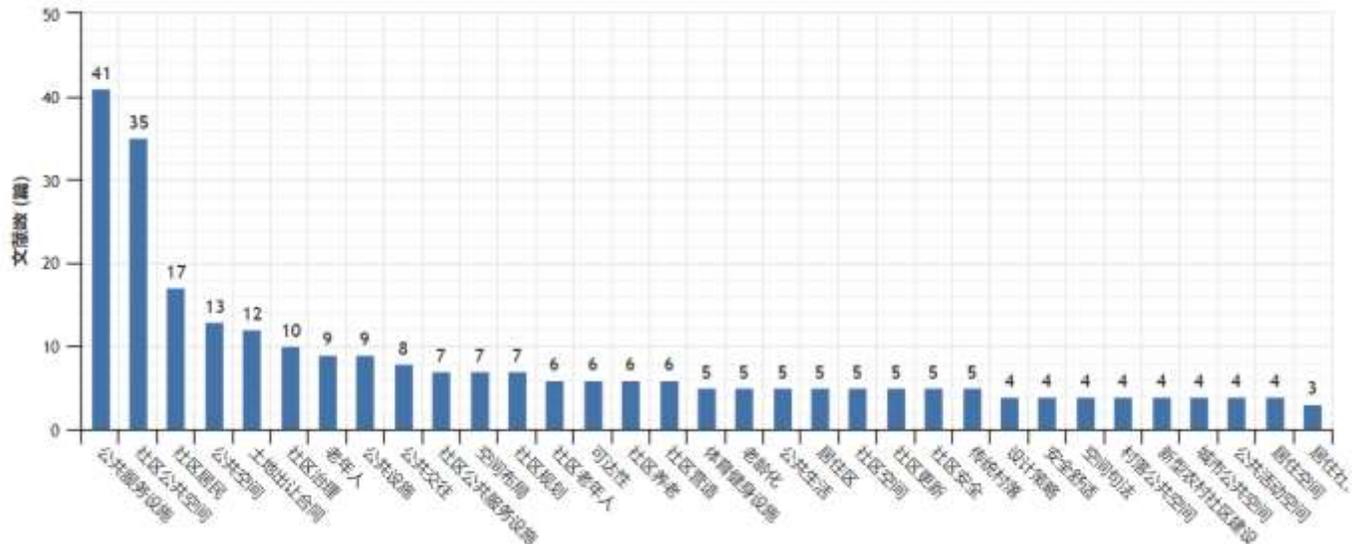


Figure 8 The overall trend analysis of the publication year (distribution of secondary topics) (Image source: The author derives from CNKI visualization)

According to the distribution of the main topics of the published articles (Figure 7), the most distributed articles are 112 articles in community public spaces, followed by 81 articles in public spaces, 45 articles in urban public spaces, 24 articles in old communities, 14 articles in urban public spaces of urban communities and 13 community public service facilities. However, in terms of the distribution of secondary topics (Figure 8), the most distributed are 41 articles on public service facilities, 35 articles on community public space, 17 articles on community residents, 13 articles on public space and 12 articles on land assignment contract. In terms of the main themes and sub-themes of the published literature, there are currently 437 articles in architectural science and engineering, 56 articles in Chinese politics and international politics, and 31 articles in sociology and statistics (Figure 9).

At present, the largest source of literature is "Urban Architecture" magazine, followed by the dissertation research of South China University of Technology, Harbin Institute of Technology, Southwest Jiaotong University, Chongqing University, Xi'an University of Architecture and Technology, etc. (Figure 10). The most Chinese scholars are Li Guangbin (Suzhou University of Science and Technology), Wang Yong (Suzhou University of Science and Technology), Wang Ling (Chongqing University), Gong Wei (Beijing Forestry University) and Zou Qingqing (Suzhou University of Science and Technology) (Figure 11). In terms of the total distribution of publishing institutions, Chongqing University and Tongji University are the top ones (Figure 12).

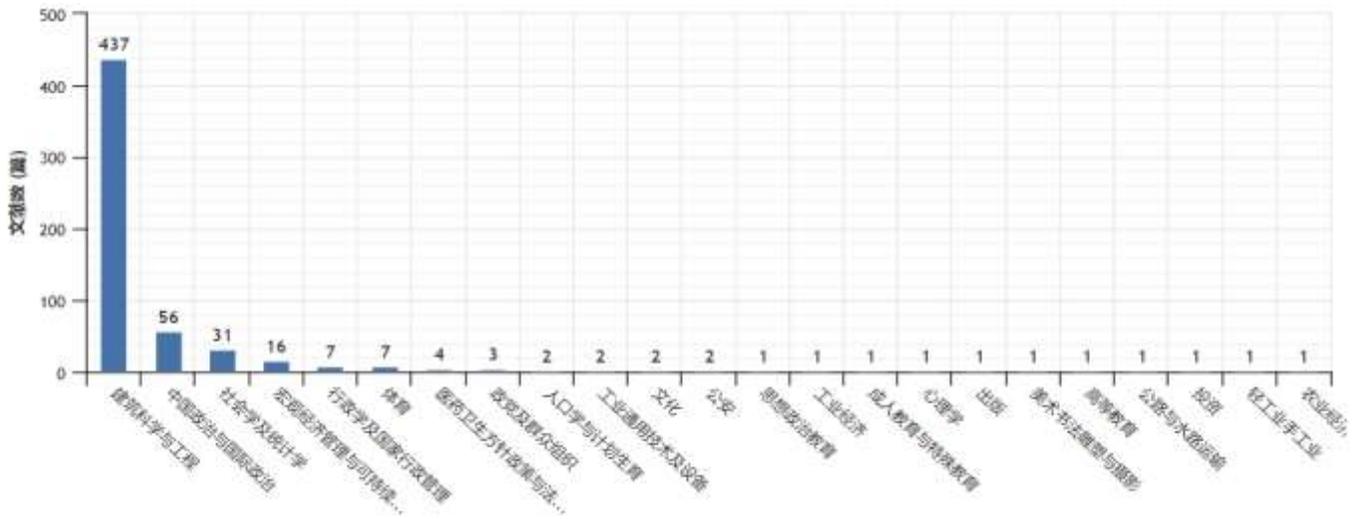


Figure 9 Discipline distribution (Image source: the author derives from CNKI visualization)

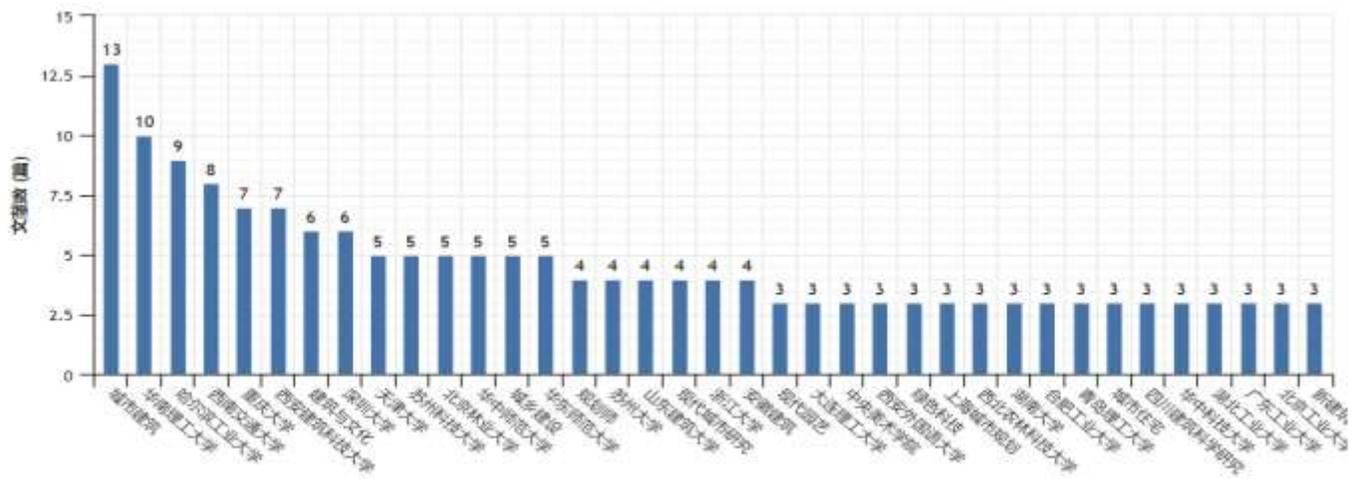


Figure 10 Distribution of literature sources (Image source: the author derives from CNKI visualization)

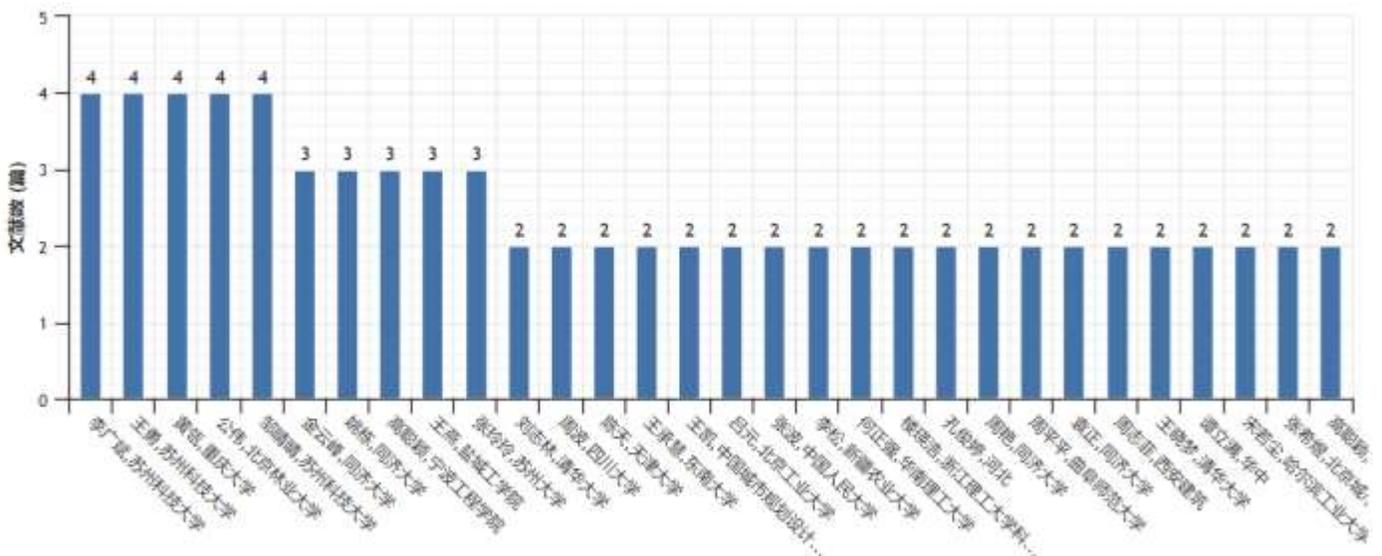


Figure 11 Distribution of Chinese scholars (Image source: the author derives from CNKI visualization)

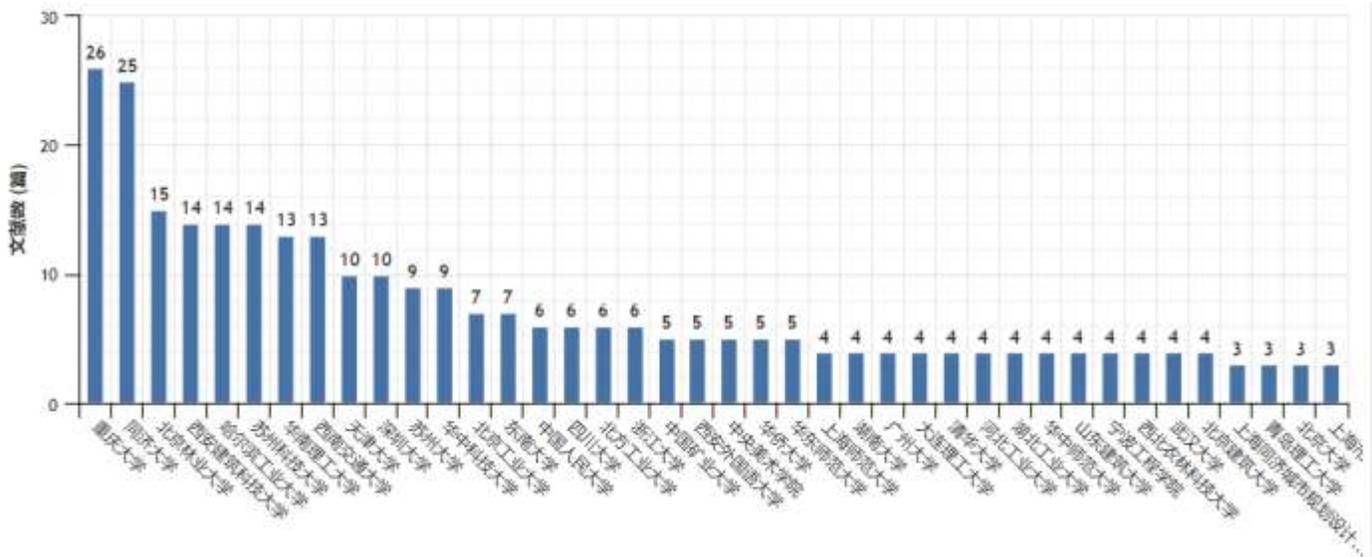


Figure 12 Institutional distribution (Image source: the author derives from CNKI visualization)

Among the 545 papers, the first five with a high frequency of citations also have different research themes. To a certain extent, the high citations reflect the importance of these five research topics in the field of community public spaces and facilities. Alanna Boland and others first used the policy framework of green community construction projects, and based on this background, they discussed the two case practices of Nanyuan and Jingkou in Guangzhou City, which are the frontiers of "green community construction", and analyzed the NGO organization "Green Hope" and other groups involved in the effectiveness of community public participation in energy conservation and environmental protection activities (Alanna Boland, 2007).

Then, Sun Daosheng took 18 communities in Qinghe Street, Beijing as a case, firstly collected GPS data of residents, obtained the temporal and spatial scope of the community life circle, and calculated the "concentration" and "sharing" in the community life circle. It also divides the community life circle and divides the configuration units of different levels of public service facilities based on the "Implementation Opinions on the Configuration Indicators of Residential Public Service Facilities in Beijing" as the theoretical guiding framework (Sun Daosheng, 2017).

He Zhengqiang put forward ten theoretical assumptions about the development trend of community social networks and the relationship between community public space and public life based on the basic theory of social network and social network analysis method. Then, with public life as an intermediary, a validity analysis framework based on the interaction of public space (space and space), public life (space and people), and social network (people and people) as the main clues is constructed. The effectiveness analysis and evaluation of three representatives remodelled communities, and their public spaces are carried out (He Zhengqiang, 2014).

In addition, from the perspective of the suitability of the community and the suitability of children, some scholars have carried out the spatial needs of different aging communities in Chongqing, Tianjin and other communities, the survey of the community's public space environment suitable for the elderly, and the construction of model indicators for the public space environment suitable for the elderly. The subjective spatial cognition of the elderly and children, and in-depth research on collecting environmental preference data (Wu Yan, 2015; Li Xinyang et al., 2015).

4. Conclusion

Community public space is a spatial arrangement for the transformation of a community of strangers into a community of acquaintances, a basic element for the transformation of a residential area into a community, and social construction that enables community collective action. How to create a high-quality community public space for people to enjoy is the starting point of our thinking. Therefore, we can use bibliometrics to obtain the latest research trends in the face of cutting-edge exploration in many directions and constantly updating and changing related literature.

The study found that the international research hotspots on community public space are diversified, and the research knowledge base and its evolution are relatively concentrated and scattered. At present, European and American countries have made the largest contribution to related research, and universities dominate the distribution of research institutions. Regarding community public space and facilities, domestic and foreign literature have gradually begun to focus on the optimization of space and facility

configuration, the interaction between human activities and space, from the early public space ontology, but in general, modern residential communities, Older communities are the research objects. Finally, the study of community public space and facilities also requires the active participation of the government, the public and other parties, and the establishment of a sound evaluation system has been explored since it is practical and can cope with various emergencies.

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