

Visualization and Bibliometric Analysis: Research on Third Front Construction in China (2003-2023)

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Abstract: China's Third Front Construction was initiated in the mid-1960s, as a significant decision made by the Central Committee of the Communist Party of China (CPC) and Chairman Mao Zedong. In this paper, Citespace visualization software was employed to analyze 356 relevant literature sources retrieved from the China Knowledge Network (CNKI) database, in order to visualize and analyze the research on China's Third Front Construction from 2003 to 2023. The paper systematically analyzes five aspects of research on China's Third Front Construction: publications, authors, issuing institutions, highly cited papers, and keywords. Based on this analysis, a knowledge graph of the Third Front Construction research is drawn. The results show that: 1. The development of Third Front Construction research from 2003 to 2023 can be divided into three phases: the development period (2003-2017), the outbreak period (2017-2021), and the sustained period (2021-2023). 2. At present, the research on China's Third Front Construction has formed a large number of cooperative teams, but the relationship between the cooperative teams generally shows a "large decentralized, small centralized" pattern, and most of the authors are in an independent mode. 3. The high-yield areas of research on China's Third Front Construction are mainly concentrated in East China, North China, and Southwest China. 4. The highly cited papers on China's Third Front Construction are mainly completed in the form of cooperation, and in general, the citation frequency of the co-authored papers is higher than that of the sole-authored papers. 5. The research hotspots of China's Third Front Construction mainly focus on the "Third Front Construction", "Third Front enterprises", "industrial structure", "industrialization" and "oral history", etc. The aim of this paper is to explore the cutting-edge topics and future trends in this field in China, as well as to provide suggestions for further research on China's Third Front Construction.

Keywords: Third Front Construction, Citespace, research hotspots, visualization and analysis.

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I. Introduction

China's Third Front Construction is an important part of the history of the new China. The escalating threat posed by the United States in 1964-1965 served as the impetus for the initiation of the Third Front Construction program in China (Naughton 1988), and the escalating threat from the Soviet Union in 1965-1971 accelerated the process of Third Front Construction (Liu 2009). Chairman Mao proposed the concept of "the Third Front Construction" for the sake of preparing for war. The Third Front Construction played a significant strategic role in improving China's productivity layout, enhancing economic and national defense capabilities, driving social progress in ethnic minority areas (Li and Jiang 2005). Since the 1980s, the Third Front Construction has gradually garnered widespread attention from domestic and international academia. Foreign scholars have offered various interpretations of the fundamental concept of the Third Front Construction, as well as its relationships with China's national defense, military industry, and economic development (Qin and Liu 2020).

In China, the Third Front Construction has experienced the process of expanding the research field, diversifying the research subjects and deepening the research contents (Xu and Zhou 2018). The diversification of research subjects in Third Front Construction is evidenced by the involvement of scholars from diverse disciplinary backgrounds and the active participation of young scholars, leading to a significant increase in the number of research outcomes (Zhang et al. 2021). This interdisciplinary research model not only broadens research horizons, but also promotes exchanges and cooperation between different disciplines (Xu et al. 2022). The depth of the study on Third Front Construction is revealed through a comprehensive and detailed examination of various aspects. The study delves into the reasons, background, and implementation process of Third Front Construction, as well as the industrial layout, urbanization development, historical events, impacts, and social life related to Third Front Construction. By exploring these different facets, a more thorough understanding of Third

Front Construction is achieved (Zhang 2020). In addition, there are still obvious weaknesses in domestic research in terms of macro breakthrough, meso broadening and micro depth (Lu and Li 2022). At the macro level, academics have mainly explored the reasons and background, implementation process, adjustment and transformation, evaluation and impact of the Third Front Construction from a national and holistic perspective (Zhang and Huang 2019), which indicates that at the macro level, research on the Third Front Construction has made remarkable progress and breakthroughs. At the meso-level, the research focuses on the issues of Third Front Construction and industrial layout, urbanization development and small Third Front Construction from a regional perspective, and this level of research reveals how the Third Front Construction has affected China's industrial production and urbanization process, especially in changing the layout of industrial production and industrial structure in the east and west (Xu and Chen 2015). These studies indicate that research on the Third Front Construction has started to expand its research scope at the meso-level by exploring intricate issues concerning industrial layout, urbanization development, and other related aspects. At the micro level, the focus of research has shifted towards examining historical events and their impacts, as well as studying social life and the individuals involved in the Third Front Construction (Xu et al. 2020). These studies have explored the impact of Third Front Construction on the lives of local residents, patterns of community organization, and building types and styles (Xu et al. 2021). For instance, the historical analysis of the adjustments and transformations of the Third Front Construction reveals that the lingering issues from the Third Front Construction are becoming increasingly out of sync with changes in the domestic and international landscapes. Consequently, the government has initiated the adjustment and transformation of the Third Front Construction. Key measures include adjustments in meso- and micro-layouts, restructuring of product portfolios, and fostering collaboration between the First Front and the Third Front, among others (Li 2002). These studies have not only deepened the understanding of the impact of the Third Front Construction, but also enriched the understanding of the living conditions and social changes of the Third Front people.

In contrast, foreign studies on the Third Front Construction seem to be less directly mentioned. Foreign studies on the Third Front Construction appear to have less direct mention. Some studies have conducted in-depth analyses by comparing the wartime economic mobilization in the western United States and China's Third Front Construction with regards to the foundation of economic construction, sources of investment, and industrial structure. These studies highlight the disparities between the two in terms of foundation, the main body of investment, and industrial focus. They underscore that the primary driving force for economic development in relatively underdeveloped regions of a country should originate from the government (Wang and Liu 2011). Foreign studies have also delved into the historical significance of the Third Front Construction and its impact on China's current western development strategy and sustainable development strategy. These studies aim to examine and analyze the "Third Front" construction in a specific historical environment, and explore its lessons learned and its role in the current situation (Zhou 2003). While there is limited research on third-line construction in foreign countries, the existing findings offer valuable references and insights to enhance our understanding and assessment of the status and role of Third Front Construction in China's history and economic development. Future research can focus on data collection and utilization, expanding and deepening research content, as well as enhancing research theories and methods.

Scientific knowledge graph is a kind of graphic showing the development process and structural relationship of scientific knowledge, it is the object of measurement research on scientific knowledge, which belongs to the category of Scientometrics (Chen et al. 2008). With the advancement of the information society, a scientific knowledge graph has emerged as an interdisciplinary research field. It serves to depict the intricate relationships among network structures and knowledge units or groups, as well as their interactions and evolution, presenting a clear and intuitive visualization of serialization.

Domestic scholar Lu Ting utilized the Citespace visualization tool, selecting literature data from CNKI Core Journals and the CSSCI database, to analyze literature related to the Third Front Construction published between 1992 and 2022. The study explored the current state, hotspots, and future trends of research on the Third Front Construction. The research included macro-level discussions on the historical background, achievements, and historical evaluation of the Third Front Construction, while also focusing on meso and micro levels, such as industrial heritage and regional development. The article also emphasized the importance of interdisciplinary integration. This paper similarly uses the CitespaceIII visualization tool to analyze literature related to the Third Front Construction, exploring the current state, hotspots, and future trends of research on the Third Front Construction. However, unlike Lu Ting's paper, this paper uses CNKI as the data platform and relies on authoritative academic journals such as SCI, Peking University Core, and CSSCI, covering the period from 2003 to 2023, ensuring the timeliness and academic nature of the data. Starting from the multidimensionality of research perspectives, this paper not only focuses on the historical development and policy background of the Third Front Construction but also delves into multiple angles, such as "Third Front enterprises," "industrial structure," "industrialization," "oral history," etc., enriching the research content of the Third Front Construction. In terms of research depth and expansion of horizons, this paper not only reviews the history and current state of the Third

Front Construction but also pays attention to its impact on urbanization, industrial structure, and the process of industrialization, as well as the subsequent development of the Third Front Construction, demonstrating an in-depth and broad research perspective on the Third Front Construction. The paper also points out that the impact of the Third Front Construction and its subsequent development remain key points of research on the Third Front Construction and proposes future research directions, including deepening research objects, promoting the depth and diversity of research content, and strengthening international cooperation.

This paper selects Third Front Construction, which holds a significant position in China, as the research focus and conducts a visual analysis to unveil the current development, trends, and dynamic changes in this field in China. By utilizing the CitespaceIII visualization tool, the paper examines the research trajectory of Third Front Construction in China over the past 20 years (2003-2023), offering insights for future research in this area.

II. Research Methods and Data Sources

Research methods

Citespace is an visualization software developed by applying Java language, which is mainly based on the theory of co-citation analysis and path finder network algorithm, etc., to measure the literature (collection) of the pending field, in order to explore the critical paths of the fireworks of the disciplinary field and its knowledge inflection points, and through a series of visual graph to form an analysis of the potential dynamic mechanism of disciplinary evolution and the detection of the frontiers of disciplinary development. Analysis of the potential dynamic mechanism of disciplinary evolution and detection of the development frontiers of disciplines (Chen et al. 2015). This paper uses Citespace V 6.2.R6 graph visualization tool to analyze the hotspots and cutting-edge trends of the Third Front Construction. The time slice was set to 1 year, covering the time span from 2003 to 2023. The graphs were generated for keywords, authors, and the number of published literature, and the resulting data was organized using Microsoft Office Excel software.

Data sources

The China Knowledge Network (CNKI) served as the data platform for this study, with academic journals from SCI, Peking University Core, and CSSCI forming the basis of the Chinese general database. The keyword "Third Front Construction" was used in the advanced search of the CNKI database. A total of 356 relevant literature samples published between January 1, 2003, and December 4, 2023, were selected as the data source for this study.

III. Visual Analysis

Publications

The research level and development trend of 'Third Front Construction' can be ascertained through statistical analysis of the number of published documents in this field. A total of 356 articles were subjected to statistical analysis using Citespace, and the data was organized using Excel to generate a trend chart depicting the number of research documents on China's Third Front Construction (see Figure 1). From Figure 1, it can be seen that the number of papers issued in the study of Third Front Construction has shown a wave-like upward trend since 2003 to 2023, and according to the development of the study of Third Front Construction from 2003 to 2023, it can be divided into three phases: the development period (2003-2017), the outbreak period (2017-2021), and the sustained period (2021-2023). During the development period, the number of published papers was small and the growth rate was slow, with a total of 171 published papers over 14 years, averaging about 12 papers per year. In contrast, the outbreak period saw a significant increase in the number of published papers, reaching a peak in 2021 with a total of 122 published papers in four years, averaging about 31 papers annually. The sustained period exhibited a trend of steady progress, with 104 papers published each year on average, totaling around 35 papers annually. This demonstrates a consistent effort to make advancements while maintaining stability.

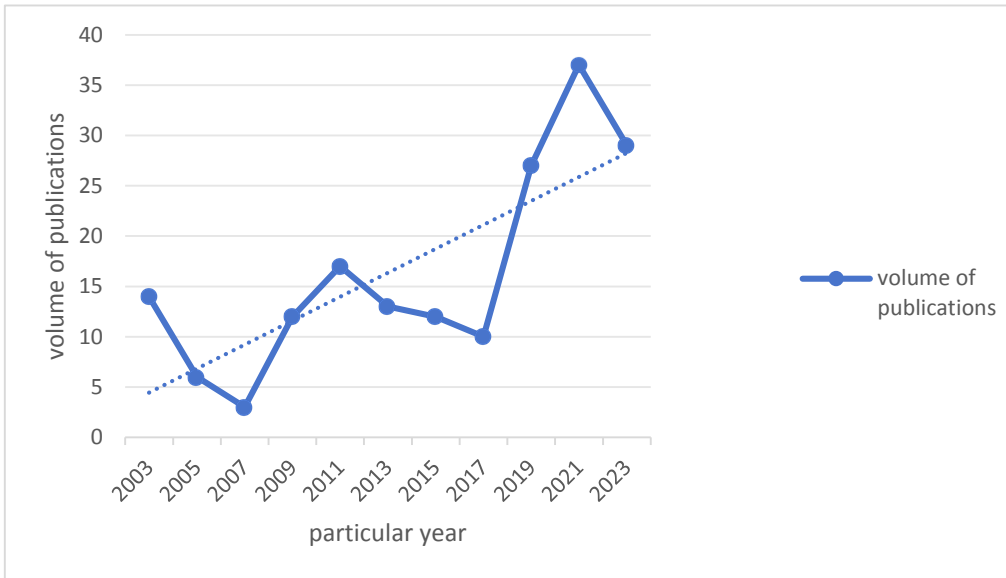


Figure 1. Volume of literatures published on the Third Front Construction research.

Authors

The author cooperation graph of the Third Front Construction study was generated by Citespace (see Figure 2), Figure 2 shows N=223, E=86, Density=0.0035. N is the node, representing the author. In the figure, the diameter of the circle and the size of the font are positively correlated with the frequency of the number. The larger the diameter of the circle or the size of the font, the more the author has published. E is Links, and the link between nodes represents the cooperative relationship between authors. It is evident from the figure that the field of the Third Front Construction has seen the emergence of prominent researchers such as Xu Youwei, Cui Yanan, Zhang Yong, and Zhang Sheng. Xu Youwei has made significant contributions with a total of 18 articles published between 2003 and 2023. Subsequently, Cui Yanan, Zhang Yong, and Zhou Xiaohong have also made strides in the Third Front Construction research, leading to the expansion of the research team and a flourishing research environment.

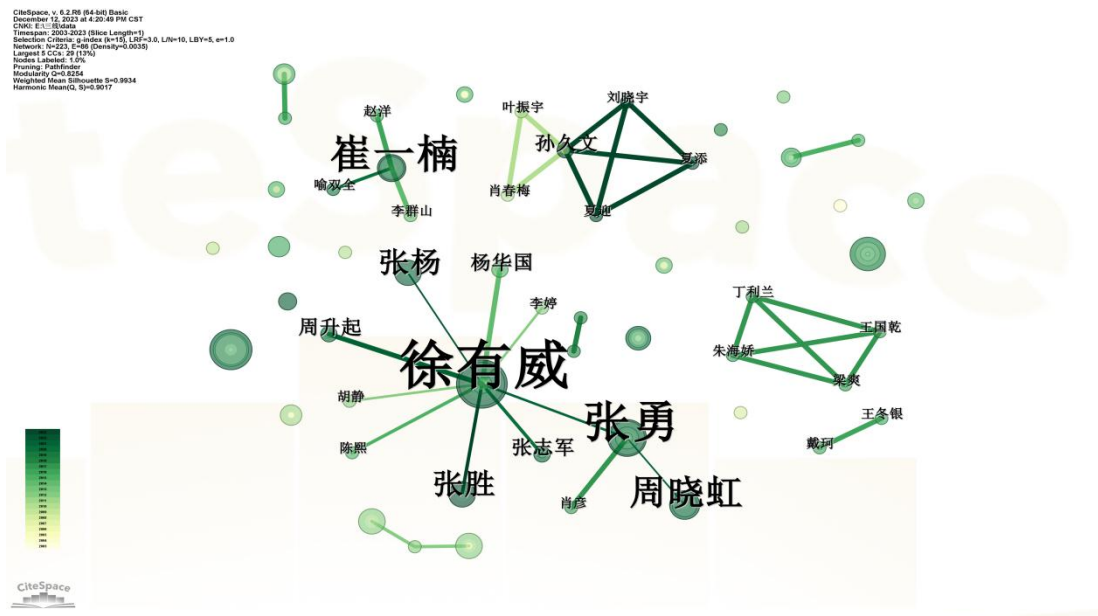


Figure 2. Knowledge map of collaboration among scholars in Third Front Construction research.

Issuing institutions

The Citespace visualization software was used to analyze and generate a graph of Third Front Construction issuing institutions (see Figure 3).

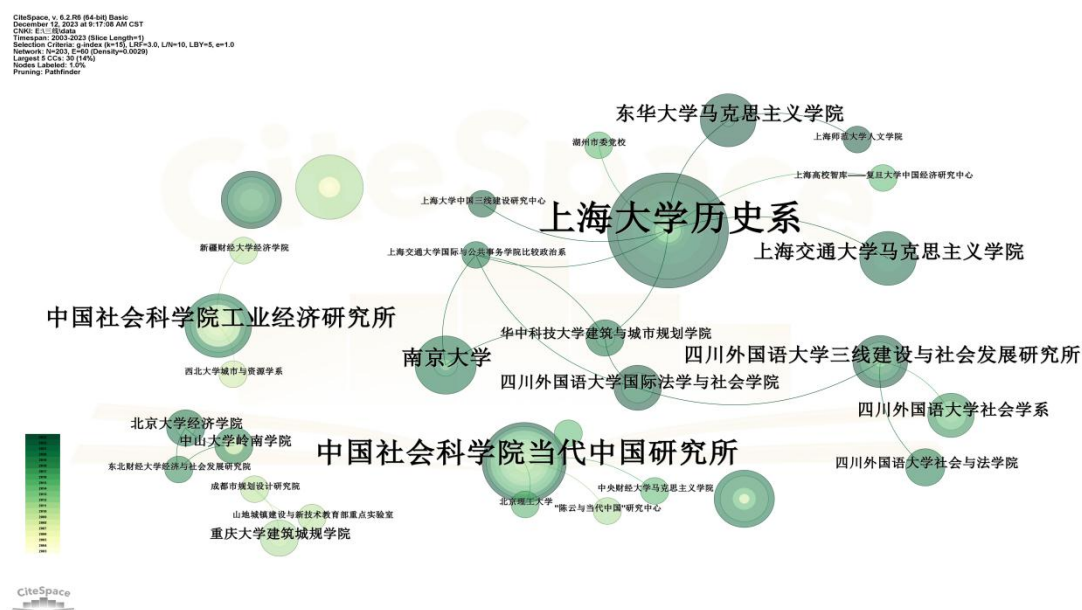


Figure 3. Knowledge graph of Third Front Construction research organizations.

As can be seen from the figure, $N=203$, $E=60$, $Density=0.0029$, N is the Nodes, which represents the issuing institutions, and the connecting line between the nodes represents the cooperative relationship between the institutions, and there is a picture that can be visualized that there are a total of 203 institutions in China that conduct research on the third line of construction. The Department of History at Shanghai University has published the highest number of papers on the research of Third Front Construction, and has the largest number of collaborative institutions surrounding it. Following closely behind are the Institute of Contemporary China and the Institute of Industrial Economics at the Chinese Academy of Social Sciences. According to Figure 3, the top 10 institutions with the most significant nodes in the knowledge graph and their relevant information have been organized. Based on the data obtained from Table 1, the analysis of the issuing institutions is carried out in terms of the nature of the research institutions, the geographical distribution, as well as the year of the starting year of issuing and the volume of issuing papers:

Table 1 Top 10 Third Front Construction Issuing Agencies.

Rankings	Institutions	Area	Volume of publications	Year of issuance
1	Department of History, Shanghai University	Eastern China	20	2012
2	Institute of Contemporary China, Chinese Academy of Social Sciences	Northern China	10	2010
3	College of Political Science and Law, Northeast Normal University	Northeast China	6	2005
4	Institute of Industrial Economics, Chinese Academy of Social Sciences	Northern China	6	2009
5	Institute of Economic Research, Chinese Academy of Social Sciences	Northern China	5	2009
6	Nanjing University, NJU	Eastern China	5	2016
7	School of Marxism, Sichuan International Studies University	Southwest China	5	2017

Rankings	Institutions	Area	Volume of publications	Year of issuance
8	School of History and Culture, Sichuan University	Southwest China	5	2020
9	Shanghai Jiao Tong University School of Marxism	Eastern China	4	2021
10	School of Marxism, Donghua University	Eastern China	4	2022

Nature of the research organization

The key institutions in China that have made significant contributions to the study of the Third Front Construction are the Academy of History, the Chinese Academy of Social Sciences, and the Academy of Marxism. Within these institutions, the Academy of History specifically includes the Department of History at Shanghai University and the Department of History and Culture at Sichuan University. Similarly, the Academy of Marxism encompasses the Academy of Marxism at Sichuan University, Shanghai Jiaotong University, and Donghua University. Professor Xu Youwei, from the Department of History at Shanghai University and deputy director of the Shanghai University Research Center for China's Third Front Construction, has conducted extensive research in collating and excavating historical materials related to the Third Front Construction, consequently filling numerous gaps in historical research. The Department of History at Shanghai University can be considered the leading force in the investigation of the Third Front Construction. Following closely are the Chinese Academy of Social Sciences, Northeast Normal University, Nanjing University, Sichuan University of Foreign Studies, and Sichuan University. The School of Marxism at Shanghai Jiaotong University and Donghua University have also achieved noteworthy progress in studying the Third Front Construction.

Geographical distribution of research organizations

Research on the Third Front Construction primarily focuses on East China, North China, and Southwest China. In these regions, East China is centered around Shanghai, North China around Beijing, and Southwest China around Sichuan, extending in various directions. The reason why research on the Third Front Construction thrives in these three central regions is closely tied to the concentration of local talent and the advantageous geographical locations. As the capital of China, Beijing's geographic location and strategic position make it one of the important cities in the Third Front Construction. Beijing played an important role in planning and managing the Third Front Construction, especially in spatial planning and the construction of the railroad network (Huang et al. 2018). Shanghai played an important role in the Third Front Construction, especially in the small Third Front Construction. Shanghai, not only participated in the big Third Front Construction tasks assigned by the state, but also carried out the construction of small Third Front in Jiangxi and Anhui, etc. (Xie 2012). And Sichuan is the main area of the Third Front Construction in southwest China, the study of the Third Front Construction is imperative.

Starting year of publication and volume of collaboration of research institutions

During the period 2003-2023, the School of Political Science and Law at Northeast Normal University took the lead in research on Third Front Construction. Its publication output exceeded that of other institutions in the field. Following this, both the Institute of Industrial Economics and the Institute of Economics at the Chinese Academy of Social Sciences also demonstrated significant achievements, establishing themselves as the top publishing institutions in this area. Subsequently, the Department of History at Shanghai University, Nanjing University, the School of Marxism at Sichuan University of Foreign Languages, and the School of History and Culture at Sichuan University have all initiated research on Third Front Construction. As a result, the heat of research on the Third Front Construction has gradually increased.

The cooperation among the institutions of the Third Front Construction research needs to be further strengthened. As depicted in Figure 3, out of the 203 research institutions focusing on the Third Front Construction, there are 60 connections indicating collaborative relationships between these institutions. Similar to other fields, in order to achieve comprehensive development in domestic research on the Third Front Construction, it is imperative for the academic community to enhance cooperation among institutions. This serves as a crucial pathway to expanding the impact of research on the Third Front Construction and enriching the scope and depth of studies in this area.

Highly cited papers

Citation analysis, as a bibliometric method, utilizes mathematical and statistical approaches to examine the citations and references found in journals, theses, and works by various authors. Its purpose is to uncover the quantitative characteristics and underlying patterns within these sources (Liang and Feng 2013). Highly cited papers refer to the papers with the highest number of citations in a certain research field within a certain statistical time period, which to a certain extent represents the research progress of the discipline and has important research significance (Zhu and Leng 2014). Citespace visualization software was used to analyze the highly cited papers, and the data were imported into Microsoft Office Excel, and the information of the top 10 most frequently cited literature is shown in Table 2:

Table 2 Top 10 Highly Cited Papers.

Rankings	Title of document	Authors	Published Journals	Year of publication	Number of citations
1	<i>Development strategies, urbanization and the urban-rural income gap in China</i>	Chen Bin kai; Lin Yifu	Social Sciences in China	2013	1437
2	<i>Composition and Characteristics of Chongqing's Industrial Heritage</i>	Zhao Wanmin; Li Heping; Zhang Yi	Architectural Journal	2010	106
3	<i>Impact of the Third Front Construction on China's Industrial Economy and Urbanization</i>	Xu Youwei; Chen Xi	Studies in Contemporary Chinese History	2015	73
4	<i>A preliminary study on the value assessment system and methodology of Chongqing industrial heritage during the Third Front Construction period</i>	Liu Fengling; Chu Dongzhu	industrial building	2011	72
5	<i>Oral History and the Social Construction of Collective Memory</i>	Zhou Xiaohong	Tianjin Social Sciences	2020	66
6	<i>A Review of Research on the Third Front Construction and Its Related Issues in the Past 20 Years</i>	Duan Juan	Studies in Contemporary Chinese History	2012	64
7	<i>Review of research on the Third Front of construction in the past five years</i>	Xu Youwei; Zhou Shenqi	Open Age	2018	56
8	<i>Analysis of the spatial and temporal characteristics and drivers of Tianshui's urban expansion</i>	Zhang Xiufang; Niu Shuwen; Feng Xiao; Wang Wendie	Geographical studies	2013	55
9	<i>Study on industrial agglomeration, environmental pollution and coordinated regional development</i>	Li Weina	Modern Management Science	2010	53
10	<i>Historical experience and lessons learned from the construction of China's Great Third Front</i>	Li Caihua; Jiang Dayun	Northeast Normal University Journal	2005	52

Table 2 illustrates that the highly cited papers on the Third Front Construction encompass both micro and macro studies, delving into areas such as architecture, history, geography, and more. In order to gain a comprehensive understanding of the depth of the Third Front Construction, it is imperative to broaden the scope of knowledge on this subject across various research dimensions. Among these papers, China Social Sciences' publication on Development Strategy, Urbanization, and China's Rural-Urban Income Gap stands out with the highest number of citations, totaling 1,437. This paper has significantly contributed to the academic theoretical framework in the realm of China's Third Front Construction research. Notably, the highly cited papers are

predominantly the result of collaborative efforts, with co-authored papers generally receiving higher citation frequencies compared to solely-authored papers.

Keywords

Keyword co-occurrence

Keywords play a crucial role in any article, as they can reflect the core essence of the research, with frequently occurring keywords indicating the key focal points in the field. By utilizing the Citespace visualization software, an analysis was conducted on the keywords found in the literature related to the domestic Third Front Construction, resulting in the creation of a knowledge map (see Figure 4). In Figure 4, N=253, E=295, Density=0.0093. Each circle (Nodes) in the figure represents a keyword. The larger the diameter of the circle means that the frequency of the keyword is higher, then its research heat in the field is also higher. As can be seen from the figure 4, in the field of Third Front Construction, the keyword "Third Front Construction" has the highest frequency, followed by "Third Front enterprises" and "industrial structure", "industrialization", "oral history" and "western development". This is in line with China's policy pace, and is a policy-oriented research hotspots. In the 21st century, China's economy has taken off. China's accession to the World Trade Organization, the implementation of the Tenth Five-Year Plan, and the announcement of a major strategic initiative for the development of the western region in 2000 have directly or indirectly contributed to the restructuring of industries and the process of industrialization in China.

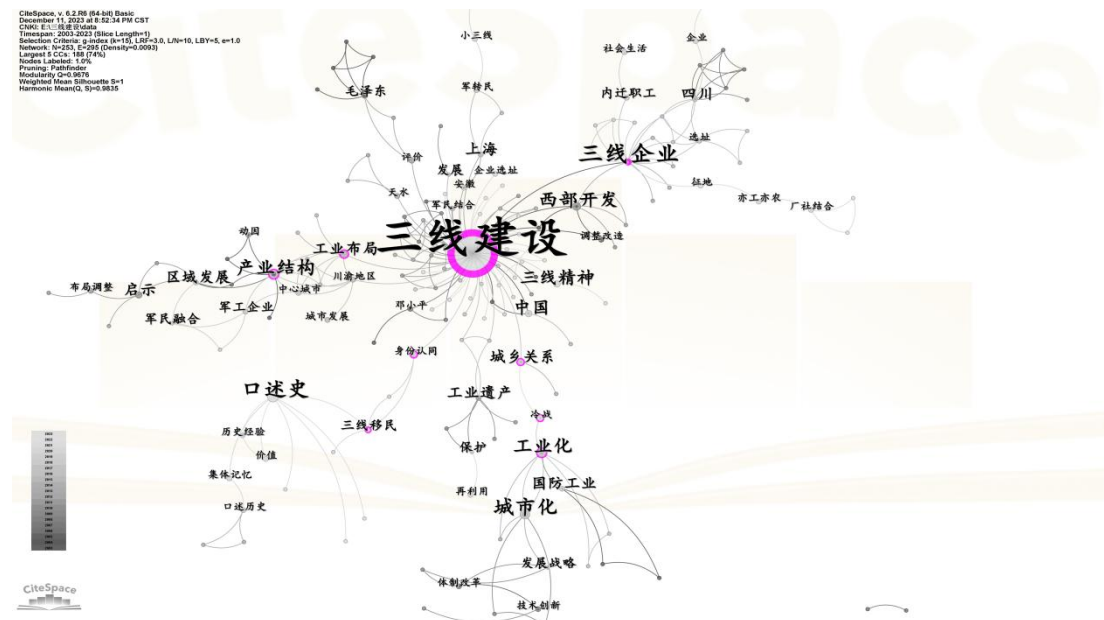


Figure 4. Co-occurrence graph of keywords for Third Front Construction research.

Except for the term "Third Front Construction", the node degree centrality of the other network nodes in the graph varies greatly, but in general they can be categorized into the following 4 knowledge clusters.

The first knowledge cluster is Third Front enterprises Studies. In a specific historical context, Third Front enterprises were established mainly in response to the need for defense preparedness within the international Cold War pattern (Zhang 2021a). In the new era, Third Front enterprises began to explore new development paths. Some enterprises seek a sustainable development path through technological progress and innovation (He 2009). For example, relying on the resource advantages of the "Third Front", developing local township enterprises, and promoting the economic union and collaboration between military industrial enterprises and localities (Wang and Chen 1994). Third Front enterprises have played a significant role in the development of numerous new cities and injected fresh vitality into established towns with an industrial background. The restructuring of Third Front enterprises has not only spurred the local economies but also contributed to a better understanding of the evolution of businesses in post-1949 China. Studying Third Front enterprises helps elucidate the history of enterprises in New China and provides insights into the main trajectory of their development.

The second knowledge cluster is Industrial Structure Studies. The construction of the Third Front has played a significant role in enhancing China's national economic structure and industrial layout. It has spurred economic and social development, as well as scientific, technological, and cultural advancement in western China. Furthermore, it has established a robust foundation for the urbanization of western China. Additionally, the Third

Front construction has driven technological progress and innovation, offering technical support for the optimization of industrial structure (Xiong 1998). Understanding the industrial structure of Third Front Construction can provide insights into the core of China's economic development, enabling us to grasp how China can ensure the sustainable and stable growth of its economy in the long term. Exploring the industrial structure of Third Front Construction not only helps us gain a profound understanding of China's economic development in historical context and its strategic importance, but also offers valuable lessons and inspiration for promoting regional coordinated development and optimizing and upgrading the industrial structure, both now and in the future (Deng and Duan 2023).

The third knowledge cluster is Industrialization Studies. the Third Front Construction has strengthened China's national defense and improved China's industrial layout (Wang 2014). The adjustment in layout not only boosted the industrial production capacity of the central and western regions but also established a solid industrial foundation for the modernization of cities in the interior of China. The Third Front Construction has exerted a profound influence on China's industrialization, reshaping the industrial layout and structure, promoting regional economic development, and significantly impacting the urbanization process (Zhou 2014). Therefore, the study of industrialization of the Third Front Construction can provide guidance and reference for China's subsequent industrialization process as well as urbanization process.

The fourth knowledge cluster is Oral History Research. Oral history synthesizes the concepts of “oral” and “history”. Oral history research unveils the spiritual outlook and social life of the Third Front builders. By delving into the oral narratives of common people, we can effectively portray the transformations of that monumental era and establish a cultural and spiritual realm imbued with profound significance (Xie 2017). The example of the Third Front Construction in Panzhihua shows that the Third Front builders have demonstrated the spiritual qualities of hard work, selfless dedication, unity and cooperation, and the courage to innovate (Dai et al. 2022). In other words, oral history can enhance the national macro-history by presenting individual micro-narratives. While the oral history of the Third Front Construction may have a subjective element, the authentic oral accounts enable us to comprehend the life histories of the interviewees and the social context of that era. Furthermore, oral history research aids in bridging the gaps in documentary archives and furnishes a wealth of social history resources for interdisciplinary studies (Xie 2018).

Keyword timeline graph

A timeline graph of keywords can represent the relationship between clusters and also show the time span of literature in a particular cluster. In other words, the timeline graph can effectively and visually represent the rise and fall of research objects and their current hotspots.

According to the keyword co-occurrence graph, Citespace visualization software was used to analyze the keyword timeline chart in the field of Third Front Construction and get the knowledge graph (see Figure 5). As can be seen from the figure 5, $Q=0.8254$, $S=0.9944$, indicating that the clustering is reasonable and has research significance. There are a total of 10 clusters in the figure 5, which represent the 10 main directions of research in the field of Third Front Construction: #0 Third Front Construction, #1 Third Front enterprises, #2 Industrial structure, #3 Industrialization, #4 Oral history, #5 Industrial heritage, #6 Mao Zedong, #7 Military-to-civilian conversion, #8 Western development, #9 Innovation system, and #10 Innovative talents.



Fig. 5 Keyword timeline graph

From the temporal graph presented in Figure 5, cluster #0 Third Front Construction lasts from 2003 to 2023, which is the one with the highest level of attention and the most crossed lines in the study. The main research hotspots are the spirit of the Third Front, enterprise location, national construction, regional division of labor, and regional collaboration. Cluster #1 Third Front enterprises start slightly before cluster #0 Third Front Construction, and continue until about 2021, the main research concerns are industrial structure, industrial layout, Sichuan and Chongqing regions, etc. Cluster #2 Industrial structure started in 2003 and continues until around 2019, its focus on military enterprises, military-civilian integration, and industrial layout. Cluster #3 Industrialization research from 2005 to about 2019, the research focuses on urbanization, urban-rural relationship, and defense industry in the early period, and the research focus is not prominent in the later period. Cluster #4 Oral history started later, from 2011 to around 2021, with research focusing on Third Front migration, identity, and collective memory. Cluster #5 Industrial Heritage, which started in 2009 and lasts until about 2019, the main focus of research is in reuse, value assessment, and the hotspot of attention is reduced in recent years. Cluster #6 Mao Zedong, the cluster started earlier, but the clustering is not significant enough, and the research attention hotspot is less. Cluster #7 Military to civilian, the start time is late, has continued until 2020, the early research focus on Shanghai, Anhui, the late main research on the small three lines, three new factories. Cluster #8 Western development, from about 2004 until 2011, focusing on adjustment reform and industrial transfer. Cluster #9 Institutional innovation research is the latest to start and continues until about 2021. The main hotspots of its research attention are factory-for-society, factory-society integration, and land acquisition.

IV. Results and Discussion

After utilizing the Citespace visualization software, the author discuss the following results pertaining to the analysis of the Third Front Construction from six different aspects.

Firstly, China has a wave-like upward trend in the volume of papers published on Third Front Construction research from 2003 to 2023. According to the development of Third Front Construction research from 2003 to 2023, it can be divided into three phases, the development period (2003-2017), the outbreak period (2017-2021), and the sustained period (2021-2023). It is expected that with the increasing focus of the country on the western region, the number of papers on Third Front Construction will also rise. From a document trend perspective, the amount of documents issued on Third Front Construction is closely linked to the development of China's new west.

Secondly, most of the prolific authors in the field of Third Front Construction in China tend to develop in a single-core mode. Among them, Xu Youwei stands out as a key figure in domestic Third Front Construction research, making significant contributions to the field. However, the single-core development model often leads to excessive reliance on the core individual, resulting in a lack of solid cooperation network. Such a pattern not only hinders the progress and development of Third Front Construction research, but also risks leading to research stagnation. Therefore, the field of Third Front Construction research should be committed to the creation of a dual-core development model or a multi-core development model. The cooperation relationship of authors in the field of Third Front Construction research generally shows a pattern of "big dispersion, small concentration", with most authors in an independent mode, and a small number of authors have established cooperative relationships. For example, Xu Youwei's team, Cui Yinan's team and Sun Jiowen's team. Among them, Xu Youwei's team is the largest, with Zhang Yong, Zhou Xiaohong, Zhang Sheng, Zhang Yang and Yang Huaguo as its main members. The mode of cooperation between authors can be mainly categorized into two types, "academic relationship" and "geographical relationship". The former refers to the cooperation among colleagues, classmates, or teachers, while the latter refers to cooperation between schools or regions. Upon analysis, it can be concluded that the cooperation among authors in the research on the Third Front Construction is primarily based on academic relationships, with less emphasis on cross-regional collaboration. The general direction of the research on the Third Front Construction is different for different cooperative teams, such as: Hu Yuehan, based on the archive materials of the Third Front enterprise 4504 Factory in Xiangyang, Hubei, combined with the interviews with the employees of the factory, carefully examined the preparatory process for the construction of the factory, and explored the management mode of the Third Front enterprise (Hu 2017). Xu Youwei and Li Yun take the case of Xinguang Metal Factory of Shanghai's small Third Front Construction as a comprehensive discussion of the dilemmas faced by Xinguang Metal Factory during the period of restructuring and reintegration into the historical process of Shanghai (Xu and Li 2014). Taking three factories in Peng County, Sichuan as examples, Zhang Yong examines the site environment and site selection changes of Third Front enterprises, the game process and action strategy of changing the site, and the relationship and role of the central-local-enterprise. And Zhang tries to combine the micro perspective with the macro view for a comprehensive study (Zhang and Xiao 2017).

Thirdly, the attention of major colleges and departments to the third-line construction shows an increasing trend, but the cooperation between institutions needs to be enhanced. Therefore, in order to achieve comprehensive development in the research of third-line construction, academia must strengthen cooperation among various institutions, consolidate and enhance interdisciplinary communication and interaction, as well as

promote further collaboration between domestic and foreign scholars (Xu and Zhang 2020). This is the necessary path to expand the influence and enhance the breadth and depth of research on third-line construction.

Fourthly, the highly cited papers on China's Third Front Construction are both micro and macro studies, involving architecture, history, geography and so on. Therefore, in-depth understanding of the Third Front Construction requires expanding knowledge of it from various perspectives. Currently, the impact of the Third Front Construction on urbanization and research on its later development remain key focal points in this field.

Fifthly, the hotspots of China's Third Front Construction research include the study of Third Front enterprises, industrial structure, industrialization, and oral history. In the process of promoting in-depth research on Third Front Construction, the importance of interdisciplinary research has become increasingly prominent. Firstly, interdisciplinary research can help break down the barriers between disciplines and promote the communication and cooperation between different disciplines; secondly, interdisciplinary research can not only enrich the research content of the Third Front Construction, but also expand the research horizons and provide theoretical support for the research on the Third Front Construction (Zhang 2014); Finally, interdisciplinary research can provide new ideas and methods for solving complex real-world problems (Zhao 2007). These research hotspots integrate the knowledge of history, economics and political science, indicating that the Third Front Construction is closely connected with many disciplines, which is precisely where the vitality of the research on the Third Front Construction can maintain its vigorous development lies.

Finally, China's research on the Third Front Construction has gone through the process of expanding the field of research, diversifying the subjects of research and deepening the content of research in the past 20 years (Xu and Zhou 2018). The expansion of the research field of Third Front Construction is evident in the diversification of research perspectives and the abundance of research topics. In their review of the research on the Third Front Construction, Li Qunshan and Cui Yinan suggest that the early research on the Third Front Construction mainly focused on the historical background, decision-making formation, and implementation process of the Third Front Construction (Li and Cui 2015). With the passage of time, the research field of Third Front Construction began to expand to a wider range of areas, including the exploration of new issues such as Third Front Construction and rural revitalization, education, health care issues, and the study of music history (Xu and Zhang 2021), and the study of the types and spatial characteristics of the surviving buildings of Third Front Construction (Yuan et al. 2020). The diversification of the main body of research on Third Front Construction is reflected in the participation of scholars from different disciplinary backgrounds in the study of Third Front Construction, especially the addition of young researchers, which has led to a surge in the number of research results (Zhang 2021a). The depth of the research content of the Third Front Construction is reflected in the comprehensive examination of the impact of the Third Front Construction and the in-depth excavation of its spiritual connotation. For example, scholars such as Xu Youwei, Zhou Shengqi, and Zhang Yong analyzed the historical evaluation and impact of the Third Front Construction (Xu and Zhou 2018; Zhang 2020), Wang Xiaoyun, Zhang Yang and Other Scholars Focus on the Reality of the Third Front Construction on Contemporary Chinese Social Development (Wang 2021; Zhang 2021b), and scholars such as Li Qunshan and Cui Yinan focus on the protection and development of the cultural heritage of the Third Front Construction (Li and Cui 2015). The field of research on Third Front Construction is expanding, with research subjects becoming more diverse and research content deepening. This process involves mutual promotion and mutual penetration. By continuously broadening research horizons, enhancing interdisciplinary cooperation, and deepening research content, the study of Third Front Construction will offer a richer and more profound perspective on understanding China's historical development and social changes.

V. Conclusion

The Third Front Construction is an important part of the history of New China, and it is of great significance to China. In this study, we used Citespace visualization software to systematically analyze the publications, authors, issuing institutions, highly cited papers, and keywords of the research on the Third Front Construction based on 356 papers searched with the keyword of "Third Front Construction" obtained from CNKI, and came up with the following conclusions, 1. The development of Third Front Construction research from 2003 to 2023 can be divided into three phases, the development period (2003-2017), the outbreak period (2017-2021), and the sustained period (2021-2023).2. The partnership of authors in the field of Third Front Construction generally shows a pattern of "big dispersion, small concentration".3. Research hotspots in the field of Third Front Construction mainly focus on "Third Front enterprises", "industrial structure", "industrialization", and "oral history". "Oral history".4. The highly cited papers are mainly in the form of cooperation, and the citation frequency of the co-authored papers is higher than that of the sole-authored papers.5. In the field of Third Front Construction, the keyword "Third Front Construction" has the highest number of occurrences, followed closely by "Third Front enterprise", "industrial structure", "industrialization", "oral history", and "western development", and so on.

The Third Front Construction not only plays a role in preparing for war, but also holds significant importance in promoting the industrialization process in southern China. Therefore, the following recommendations are proposed for the study of the subsequent Third Front Construction:

1. The object of research on Third Front Construction should be deepened continuously, and the diversification of research subjects as well as the depth of research content should be constantly promoted. Attention should be paid not only to the social and cultural characteristics and impact of Third Front Construction, but also to its social structure and civil rights issues in a particular historical context, while also focusing on the combination of theory and practice, with a view to obtaining more in-depth and comprehensive research results.

2. Scholars in the field of Third Front Construction should enhance exchanges and cooperation among institutions to establish a broad academic consensus. By engaging in mutual learning of theories and methods from a multidisciplinary perspective, researchers can enhance problem awareness and research literacy, thereby fostering innovation through cross-integration (Zhang 2021a). At the same time, it is also necessary to focus on the collection and utilization of relevant information, the broadening and deepening of the content of the study, and the objective evaluation of the process and results of the Third Front Construction (Sun 2010), so as to promote the in-depth development of the study of the Third Front Construction.

3. The construction of the Third Front has positively influenced the lives of millions of people. Utilizing oral history can enhance the national macro history by incorporating individual micro narratives. Therefore, scholars examining the Third Front construction should emphasize the significance of oral history, as it aids in capturing the life trajectories of interviewees and provides insights into the social context of the time period. The study of oral history of the Third Front Construction reveals the historical revelation and practical significance of the Third Front Construction on the development of China's western region (Fu 2002), so through the study of oral history, we can also understand the historical significance and practical impact of the Third Front Construction more comprehensively.

Due to the lack of data retrieval ability, this study may have certain omissions in the collection of literature, or the analysis of literature is not sufficient, and the authors need to strengthen the ability to extract literature. The follow-up will look at more foreign literature related to the Third Front Construction, and there are relatively few foreign studies on the Third Front Construction, which indicates that future research can further strengthen international cooperation, draw on foreign research results, continue to deepen the understanding of the Third Front Construction, broaden the research horizons, and enrich the content and methodology of the study, so as to promote the further deepening of the research on the Third Front Construction.

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