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Global Value Chain Innovation: A Research Review and Trend Outlook—Based on Citespace Knowledge Mapping Analysis

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Abstract: *In the context of economic globalization, innovation has emerged as a focal point within current global value chains. Companies urgently need to enhance their added value and elevate their position in the global value chain through innovation. As one of the significant theories in global value chain research, the theory and practice of innovation within global value chains have garnered widespread attention from scholars both domestically and internationally. This paper conducts a systematic review of the formation and development of the global value chain concept and identifies a lack of comprehensive synthesis and organization in the current state, research hotspots, and frontiers of global value chain innovation, which hinders the innovation practices of entities within the chain and the subsequent development of this field. Building upon this, the paper employs Citespace visualization analysis software to map the knowledge structure based on 432 foreign-language papers from 1997 to 2020. It multi-dimensionally and multi-angularly presents research hotspots and evolving trends in the field of innovation within global value chains. Then, combined with recent applications of global value chain innovation in practice, the paper analyzes and synthesizes the current state and frontiers of research.*

Keywords: *Global Value Chain Innovation; Innovation; Citespace; Knowledge Mapping; Research Review*

1. Formation and Development of Global Vaslue Chain Theory

Tracing the trajectory of global value chains (GVCs), pivotal concepts were illuminated by Michael Porter, who introduced a company-centric value creation and system perspective in "Competitive Advantage" (1985), and Kogut, who extended value chain implications to global and regional scales. Subsequent scholarship, notably by Dewatripont and Krugman, implicitly integrated GVC concepts, while explicit framework and analyses emerged with Gary Gereffi's theory of global commodity chains and a landmark 2001 "IDS Bulletin" special issue on GVCs. UNIDO's 2002-2003 report further delineated GVCs' extensive scope across global production and consumption processes. This paper, employing CiteSpace for bibliometric analysis, succinctly reviews the evolution, current state, and prospective avenues in GVC innovation research, aiming to bridge existing analytical gaps and inform future theoretical and practical endeavors in the field.

2. Research Methodology and Data

2.1 Research Methodology

This study employs the Citespace 5.8.R3 data visualization tool to construct a knowledge map. Citespace, developed by Dr. Chaomei Chen from Drexel University, USA, is a software designed to identify and visualize emerging trends and frontiers in scientific literature. Utilizing this tool allows for the uncovering of latent patterns and norms within the realm of value chain innovation under investigation. It aids in minimizing unavoidable personal biases in the literature review, presenting both the historical dynamics and future directions of the research domain. It also highlights key papers that have shaped the course of development in this field. This study aims to portray multi-dimensional and

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multi-faceted research on global value chain innovation, thereby providing insights into its research progression and scientifically identifying frontier directions and domains. Hence, this analytical tool is well-suited for this research.

2.2 Data Sources and Processing

The data pool in this study is comprised of English databases, with the Web Of Science (abbreviated as WOS) core database serving as the primary source of retrieval. The retrieval rules and the bibliographic data utilized post-retrieval are illustrated in Table 1. The retrieved literature was exported and processed, where the original English data consisted of 432 articles. After deduplication processing via Citespace software, the count remained at 432 articles.

Table 1: Literature Search Criteria

Database category	Search Formula (Word)	More settings	Database name	quantity
Web of Science Core Collection	TS=(global value chain) AND TS=(innovation)	Index=SCI-EXPANDED, SSCI Time Span=1997-2020	MANAGEMENT OR BUSINESS OR ECONOMICS	432

3. Analysis of Global Value Chain Innovation Research Domestically and Internationally

3.1 Analysis of Literature Volume

Based on the retrieved papers, a distribution map of domestic and international literature on Global Value Chain (GVC) innovation studies is delineated, as shown in Figure 1. It can be observed that the overall publication trend in the WOS concerning GVC innovation research is on the rise. In 1997, Web of Science witnessed the debut of a paper themed on Global Value Chain innovation. Chinese scholar Wang Jici's[1] research on our country's manufacturing clusters marked the first domestic literature touching upon GVC innovation. In 2007, following the 2003 study by B. Bowonder[2] on DRL Company's value chain elevation through innovation, and AP Williamson's[3] 2004 study on transnational corporate innovation forming innovation chains among others, the publication count, after experiencing a slight fluctuation, started to exhibit a continuous growth trend from 2016 onwards. In recent years, due to the relevant policies implemented by the state, the field of GVC innovation has garnered attention from numerous scholars both domestically and internationally. Overall, the academic focus on the domain of Global Value Chain innovation is bound to escalate further.

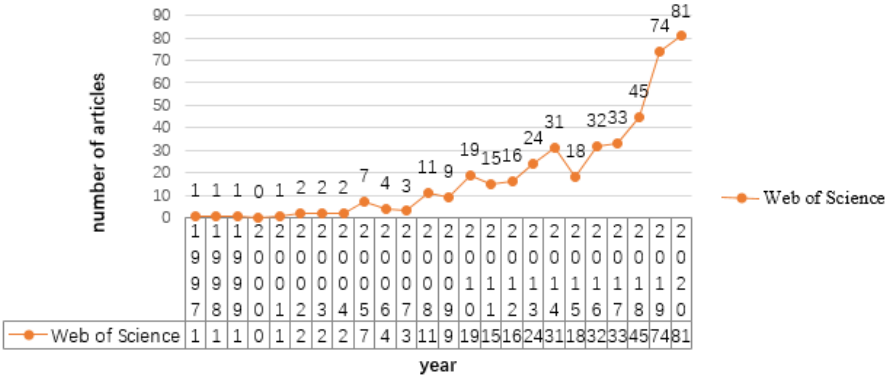


Figure 1: Annual Distribution of Research Literature on Global Value Chain Innovation from International Sources

3.2 Analysis of Research Institutions and Highly Productive Authors

Selecting "Institution" as the key analysis node, with Year Per Slice set to 1, and Selection Criteria Top N set to 50, while keeping other selections at default values, a network map of Global Value Chain (GVC) innovation research institutional collaboration is generated (see Figure 2). The circles in the figure correspond to the publishing institutions, and the lines between circles represent collaborative relationships between institutions; the thicker the line, the closer the degree of collaboration. From the

ISSN 2616-7433 Vol. 5, Issue 16: 116-122, DOI: 10.25236/FSST.2023.051619

figure, it can be deduced that Temple University, Copenhagen Business School, University of Sussex, and Lund University are high-yield institutions in terms of English literature publication. Secondly, the overall connectivity of the overseas research institution collaboration network is strong, indicating a closer collaborative relationship among foreign institutions compared to domestic ones. Lastly, most high-yield foreign institutions are distributed among universities and other academic entities.

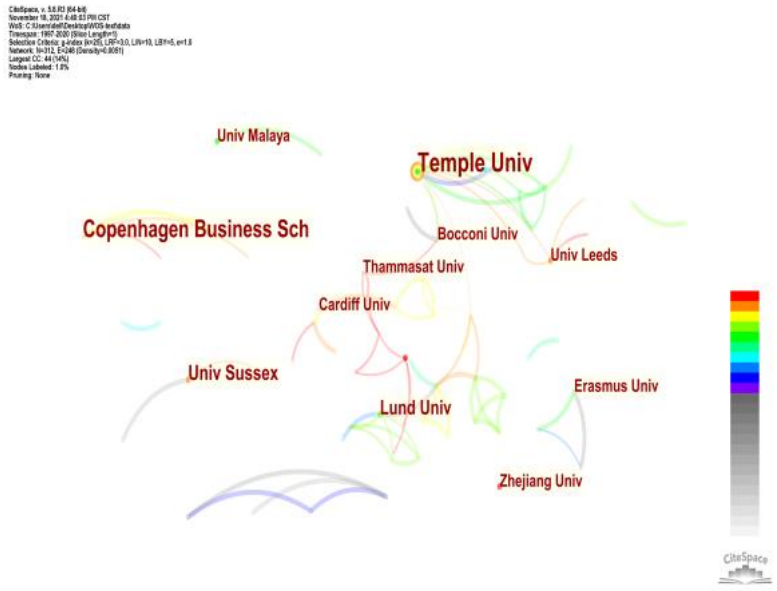


Figure 2: International Collaboration Network Map of Research Institutions in Global Value Chain Innovation

Selecting "Author" as the key analysis node, with Year Per Slice set to 1, and Selection Criteria Top N set to 50, while keeping other selections at default values, a network map of international author collaborations in Global Value Chain (GVC) innovation research is generated (see Figure 3). This illustrates the contribution and collaborative relationships of authors in the field of GVC innovation research, with node information detailed in Table 2. It can be observed that, in English literature, researchers in the field of GVC innovation have also formed some cluster-like structures, albeit on a smaller scale, such as the collaborative network led by Ram Mudambi and Kenneth L Kraemer. Moreover, a majority of authors still primarily work independently, with mature research teams yet to be formed, as seen with Giulio Buciuni, Carlo Pietrobelli, and others.

Figure 3: Collaboration Network Map of Authors in Global Value Chain Innovation Research - International

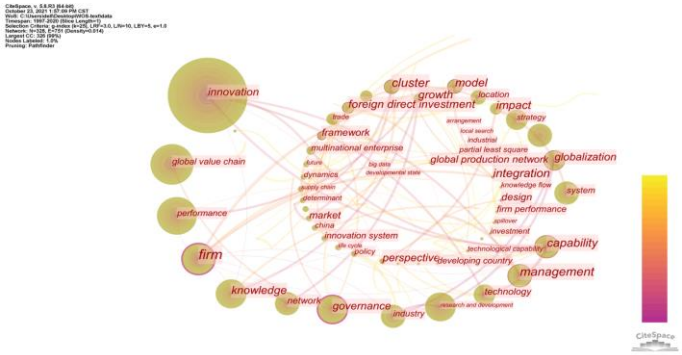
ISSN 2616-7433 Vol. 5, Issue 16: 116-122, DOI: 10.25236/FSST.2023.051619

Table 2: Top 10 High-Producing Authors in Global Value Chain Innovation Research - International

Serial No.	Foreign Authors	Number of Publications
1	Ram Mudambi	12
2	Kenneth L Kraemer	5
3	Jason Dedrick	4
4	Andrea Szalavetz	4
5	Lei Wang	4
6	Carlo Pietrobelli	4
7	VALENTINA MELICIANI	3
8	Elisa Giuliani	3
9	Giulio Buciuni	3
10	Cecilia Rikap	3

3.3 Analysis of Research Hotspots

Keywords succinctly indicate the central theme of an article, serving as a high-level summary of the research findings. Keyword co-occurrence maps can clearly display the hotspots and development trends in a particular research field. After processing the data, it is imported into the Citespace software for analysis. Selecting "Keyword" as the key node, with Year Per Slice set to 1, and Selection Criteria Top N set to 50, while keeping other selections at default values, an analysis is conducted on the keyword co-occurrence in Global Value Chain (GVC) innovation research, resulting in a keyword co-occurrence map of GVC innovation, as shown in Figure 4. The keywords with higher co-occurrence frequencies in the Web of Science are presented in Table 3.



Note: Larger node circles indicate higher publication frequency, while thicker connecting lines signify stronger co-occurrence intensity in the network visualization.

Figure 4: Keyword Co-occurrence Map of Global Value Chain Innovation - Based on WOS Database

Table 3: Frequency of Keywords in Global Value Chain Innovation Research - Domestic and International

Keywords(Web of Science)	Earliest Year of Appearance	Frequency
innovation	2002	191
global value chain	2008	81
performance	2002	72
firm	1999	66
knowledge	2002	52
network	2002	48
governance	2009	45
industry	1999	44
reseasrch and development	1999	43
technology	2004	40

Through Table 3, it is evident that "innovation" is a common focal point in international research, with a frequency of 191 occurrences, ranking first. The international sphere exhibits a greater emphasis on the study of Global Value Chain theories, focusing on micro-level aspects such as technology, networks, and knowledge, with a higher regard for the impact of Global Value Chain innovation on companies and industries. As per the high-frequency international keywords and Figure 5, the characteristics of foreign research are as follows: firstly, there is an emphasis on accumulation, forming

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global research teams and networks; secondly, the primary backdrop is economic globalization, utilizing value chains as analytical tools, with a central focus on development, continuously innovating the research content.

3.4 Analysis of Citation of Foreign Literature

In order to better explore the development and evolutionary dynamics in the field of global value chain innovation in international research, this paper employs the co-citation clustering function of Citespace to analyze foreign research literature data. The generated co-citation bibliographic mapping is illustrated in Figure 5. In the figure, 13 explosive nodes are generated, with the node information outlined in Table 4.

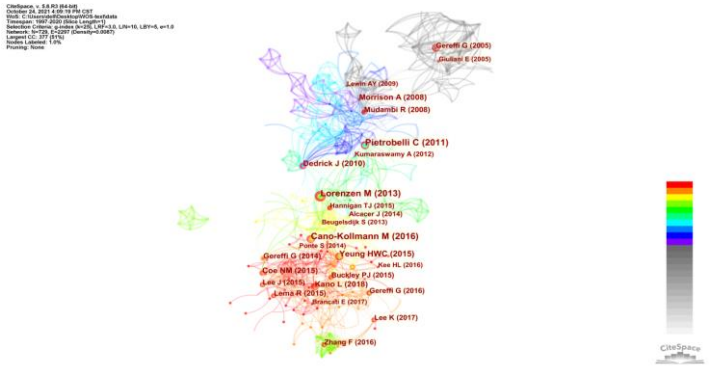

Figure 5: Co-citation Map of Literature - Based on WOS Database

Table 4: Burst Nodes of Co-cited Literature - Based on WOS Database

Serial Number	Emerging Literature Title	Author	Intensity	Start Time	End Time
1	The governance of global value chains	Gereffi G	5.35	2008	2010
2	Upgrading in Global Value Chains: Lessons from Latin American Clusters	Giuliani E	4.36	2009	2010
3	Global Value Chains and Technological Capabilities: A Framework to Study Learning and Innovation in Developing Countries	Morrison A	6.49	2010	2013
4	Location, control and innovation in knowledge-intensive industries	Mudambi R	5.39	2010	2013
5	Why are companies offshoring innovation? The emerging global race for talent	Lewin AY	3.3	2010	2014
6	Who profits from innovation in global value chains?: a study of the iPod and notebook PCs	Dedrik J	5.68	2012	2015
7	Global Commodity Chains. Genealogy and Review	Bair J	3.28	2012	2014
8	Global Value Chains Meet Innovation Systems: Are There Learning Opportunities for Developing Countries?	Pietrobelli C	8.42	2013	2016
9	Catch-up strategies in the Indian auto components industry: Domestic firms' responses to market liberalization	Kumaraswamy A	3.34	2013	2017
10	Clusters, Connectivity and Catch-up: Bollywood and Bangalore in the Global Economy	Lorenzen M	7.24	2016	2018
11	Thriving innovation amidst manufacturing decline: the Detroit auto cluster and the resilience of local knowledge production	Hannigan TJ	3.85	2016	2018
12	Knowledge connectivity: An agenda for innovation research in international business	Gano-kollmann M	4.38	2017	2020
13	Global value chains in a post-Washington Consensus world	Gereffi G	4.03	2017	2020

According to Table 4, between the years 2008-2010, the first two pieces of literature were cited most frequently, primarily focusing on the analysis of actual cases. Gereffi G[4] and others, through case studies in four industries, highlighted the dynamism and overlapping nature of global value chain governance. Giuliani E[5] and others, through analyzing clusters in Latin America, deduced that clusters help local enterprises in industrial zones overcome growth restrictions and compete in remote markets of developed

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and underdeveloped countries. Post-2010, the highly cited literature mainly pertains to resolving practical issues through the analysis of specific subjects. Mudambi R[6] and others explored the positioning, control, and innovation of knowledge-intensive industries within the global value chain backdrop. Dedrik J[7] and others, through the study of specific products, discussed who could benefit economically from innovations within the global value chain; Between 2013-2018, foreign scholars continuously expanded the research topics in the field of global value chain innovation, primarily covering developing countries and various industries. Pietrobelli C[8] and others believed that innovation systems interact with global value chains in multiple ways, and these interactions influence whether and how enterprises in developing countries learn and innovate; In recent years, the most cited literature primarily bases on the theoretical framework of global value chains, continuously innovating and deepening related theoretical research. Gano-kollmann M[9] and others proposed that under the backdrop of global value chains, the scale of global knowledge flows is expanding, and multinational enterprises must grasp global knowledge network innovation to enhance their positions within global value chains.

3.5 Keyword Emergence Analysis

Keyword emergence analysis can exhibit the persistence and evolutionary trajectory of a particular keyword in a field, which is conducive to exploring the research frontier of the domain. The emergence of certain keywords reflects a surge in attention towards them, thereby vividly showcasing the research hotspots of that phase. The generated keyword emergence maps are illustrated in Figures 6. Through analyzing the keyword emergence map in the field of Global Value Chain (GVC) innovation, information on keyword emergence has been obtained. There are two emergent keywords identified in international research, as shown in Table 5.

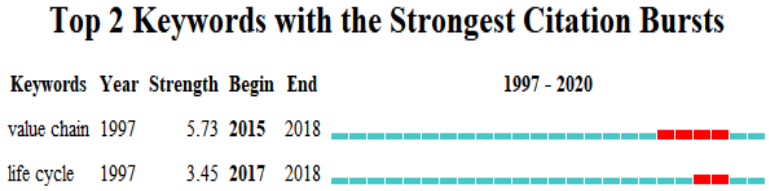

Figure 6: Emergence Map of Keywords in International Global Value Chain Innovation Research Fields

Table 5: Emerging Keywords in Global Value Chain Innovation Research - Domestic and International

Emerging Keyword	Intensity	Start Year	End Year
value chain	5.73	2015	2018
life cycle	3.45	2017	2018

Table 5 provides a clear depiction of the international research trajectory concerning Global Value Chain (GVC) innovation. Starting in 2015, international research began to prominently focus on the study of the "value chain," and from 2017, there has been an increased attention towards the issues of the "life cycle." This suggests that researchers are mainly delving into an in-depth study of the Global Value Chain itself, enriching its theoretical framework and continuously expanding it. The objective is to better guide practical applications, addressing the sustainable operations and long-term development issues of enterprises and industrial clusters.

4. Research Conclusions

Based on the summarization of the development of Global Value Chain (GVC) theories, this paper utilizes the Citespace software to generate visual knowledge maps, and analyzes aspects such as literature annual distribution, research hotspots, co-citations, and keyword emergence, with the aim of sorting through and exploring the hotspots, trends, and research frontiers in the field of GVC innovation abroad. The main conclusions drawn from this paper are as follows:

Firstly, current international scholars' research on GVC innovation mainly falls into two categories: one is focused on studying theoretical issues of Global Value Chain innovation; the other involves

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selecting practical cases for empirical research to continually refine and expand the related theoretical framework, all with the objective of better serving practical applications. In foreign research, how to analyze and utilize the dynamic changes of the Global Value Chain, and achieve the integration and upgrading of enterprises and industrial clusters in developing countries with GVC innovation, are hot topics and research directions under discussion.

Secondly, the research conclusions of this paper offer insightful implications for domestic and foreign scholars regarding the future research on GVC innovation theories, research directions, and research gaps. This is beneficial for a systematic understanding of Global Value Chain theories. However, there are certain limitations. One limitation is that although the literature data selected for this paper have a certain level of representativeness and authority, there's a possibility that some research findings may be omitted, which could adversely affect the bibliometric results. Another limitation is that this paper sorts through and explores the hotspots, trends, and research frontiers in the field of GVC innovation abroad from a macro perspective, making it challenging to elaborate on the specific research content of each aspect in detail.

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