



A Study of the Multidimensional Effects of Digital Financial Inclusion: A CiteSpace-Based Literature Review

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ABSTRACT

This study comprehensively analyzes the current state and focal points in the research domain of digital financial inclusion impacts using CiteSpace software, examining 482 key documents from Web of Science (WoS) and Scopus from 2018 to 2024 as samples. The findings reveal that the research focal points of digital financial inclusion are closely linked to national policy development, with key topics examining the diverse effects of digital financial inclusion on economic development, technological innovation, rural revitalization, and green finance. An academic network has begun establishing a framework centered on key scholars and institutions. However, the overall cooperation density remains low, and there is a notable deficiency in international collaboration. Simultaneously, the research exhibits specific limitations. Most research on digital financial inclusion focuses on macro-level effects, lacking personalized micro-level studies. Furthermore, most investigations concentrate on short-term outcomes, while evaluations of long-term impacts and potential risks remain inadequate. Future research may investigate the mechanisms via which digital financial inclusion affects several dimensions, encompassing its influence at the micro-level, risk management, and regional application disparities, to foster reciprocal advancement of theory and practice.

Keywords: Digital Financial Inclusion, Multidimensional Effects, CiteSpace.

JEL Classifications: G20, O30

1. INTRODUCTION

As digital technology advances, digital financial inclusion, a critical component of the digital economy, has rapidly garnered international attention since the establishment of the G20 High-Level Principles for digital financial inclusion in 2016. It has increasingly emerged as a focal point of research in both academic and practical spheres, particularly regarding exploring and implementing its effects.

Current research indicates that digital financial inclusion transcends the constraints of conventional financial and physical outlets via digital technology, broadening the range and depth of financial service accessibility, lowering service costs while enhancing accuracy, and can partially address the deficiencies of inclusive finance, exhibiting

significant multidimensional effects. Initially, in the economic sphere, digital financial inclusion significantly has a crucial role in fostering high-quality economic growth (Ahmad et al., 2021; Ding et al., 2022; Amaliah et al., 2024; Chen et al., 2024b). Secondly, in the social sphere, digital financial inclusion markedly diminishes the income gap between urban and rural areas and promotes social fairness (Li et al., 2023; Liu et al., 2023; Gao et al., 2024). Furthermore, in the environmental context, digital financial inclusion offers a novel avenue for attaining sustainable development goals by facilitating green finance and advancing the low-carbon economy (Wang & Guo, 2022; Wang et al., 2022; Zhang et al., 2023; Bakhsh et al., 2023). Ultimately, in the technological realm, digital financial inclusion fosters innovation and improves the operational efficiency of enterprises (Chen et al., 2024a; Ma, 2023; Wang et al., 2024).

Nonetheless, despite substantial advancements in the research on digital financial inclusion, there are several deficiencies in the current literature. The research field is notably fragmented, with effect studies predominantly concentrating on economic impacts. At the same time, investigations into other aspects are scarce, and complete studies on multidimensional effects are even more lacking. Consequently, it is essential to carefully categorize and analyze the multifaceted impact studies on digital financial inclusion, elucidate the primary accomplishments and deficiencies of existing research, and offer guidance for future researchers' investigations.

This study employs the CiteSpace tool to do a visual systematic evaluation of essential literature in the relevant fields, utilizing bibliometric and knowledge mapping analysis approaches to gain a thorough understanding of the multidimensional implications of digital financial inclusion. This study systematically examines research hotspots and cutting-edge dynamics by analyzing time distribution, author and research structure, keyword co-occurrence, keyword clustering, and keyword timeline and emergence within the literature. It summarizes the multidimensional impacts of digital financial inclusion across economic, social, environmental, and technological dimensions, elucidating key themes, knowledge structures, and developmental trends in the field while identifying current research deficiencies and future directions. It elucidates the principal issues, knowledge framework, and developmental trajectories within the study domain, highlights the deficiencies of existing studies and prospective avenues, and furnishes a foundation for scholars to enhance their inquiries, as well as practical guidance for policymakers.

2. METHODOLOGY

In this study, Web of Science (WoS) and Scopus are used as the source databases, and subject terms are selected for searching. To guarantee the precision and authority of the analysis outcomes, conferences, reviews, monographs, and other types of literature are excluded, and the selected literature are all journal studies. Specifically, the WoS core ensemble database and Scopus database were searched with ALL = ("Digital Finance" OR "Digital Financial Inclusion" OR "Digital financial inclusion") AND ("Impact" OR "Effect") AND ("Economic Growth" OR "Financial Performance" OR "Social Equity" OR "Poverty Alleviation" OR "SME Innovation" OR "Regional Development") OR "Green Finance" OR "Technological Innovation" OR "Corporate Productivity" OR "Household Consumption" OR "Regional Disparities" OR "Green Development" OR "Financial Stability" OR "Green Development" OR "Green Development" OR "Green Development" OR "Financial Stability Development" OR "Financial Stability") as search terms retrieved a total of 516 documents and 621 articles respectively. To ensure the relevance of the literature, combined with the database relevance ranking, all the retrieved literature was manually screened article by article. Preliminary screening was performed to remove irrelevant literature based on the title, abstract, and keywords. The two retrieval methods were taken into concatenation and de-emphasis, and 482 high-quality English-language literature were finally obtained to constitute the research samples for the period of 2018-2024 for the knowledge mapping analysis.

What's more, this study mainly adopts the bibliometric analysis method, choosing CiteSpace 6.3 R1 as the analysis tool. It specifically explores the multidimensional effects of digital financial inclusion through the analysis of the issuance of articles, authors, research structure, keyword co-occurrence analysis, keyword clustering analysis, as well as keyword timeline, and emergence analysis to reveal the core theme. Other than that, it identifies the important literature and knowledge base of the research field, captures the research hotspots and cutting-edge dynamics, and provides a scientific basis for structured sorting of the research field.

3. BIBLIOMETRIC ANALYSIS

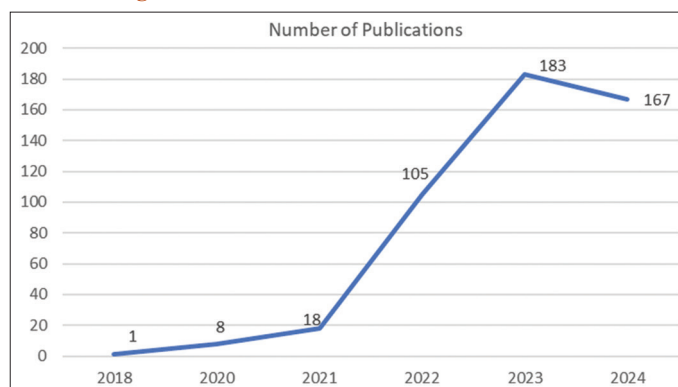
3.1. Publication Volume Analysis

The trend chart of annual publications in the domain of digital financial inclusion (Figure 1) indicates substantial development since 2018. In 2016, the concept of "digital financial inclusion" was introduced at the G20 Summit in Hangzhou. Between 2018 and 2024, research on the impacts of digital financial inclusion has progressed swiftly, with the volume of publications rising at an average yearly increase of 45%.

Figure 1 illustrates that the number of articles in this domain was merely 1 in 2018, which was in the budding stage of research. Since 2020, the number of articles has gradually risen to reach 18 in 2021. The growth in this stage is mainly due to the policy, technology, and business environment that foster an enhanced development landscape for digital financial inclusion. The total amount articles jumped to 105 in 2022, indicating a significant increase in research heat and a gradual diversification of research topics. The number of articles peaked at 183 in 2023, reflecting that indicating that studies on the implications of digital financial inclusion have become a hotspot of attention in academia. However, the number of articles in 2024 dropped slightly to 167, which may be related to the gradual maturity of some research themes or the dispersion of hotspots.

Overall, related research on digital financial inclusion has shown rapid growth in the number of articles issued, driven by policies, technologies, and social needs, and peaked in 2023, indicating the research heat and development potential of the field. Meanwhile, further attention to the segmentation and crossover of different

Figure 1: Number of Articles from 2018 to 2024



research directions may be needed in the future to continuously perpetually advance the field's progress.

3.2. Authors Analysis

Using CiteSpace software, we can identify the authors' cooperation network of cited literature, i.e., the authors' co-citation analysis of cited literature. According to the centrality and frequency of the co-citation analysis, we can discover the high-influence authors (authors with the highest citation weight) and their corresponding articles in the research field. It can also show the authors' co-citation relationship, as well as which authors' research topics are similar and closely related. This is to understand the field's academic network structure, core characters, and research hotspots of the field, revealing the direction and potential of the development of the field, and providing researchers with a comprehensive perspective and research support. In this study, we analyzed the co-citation of authors of cited documents in 482 English documents and came up with a map, as shown in Figure 2.

Concurrently, the data were aggregated to enumerate the top 10 writers based on citations (Table 1), and the scholar with the highest number of citations from the data analysis was GUO F (221 times, centrality 0.13), whose research occupies a central position in the knowledge network. Other highly cited scholars include LI J (214 citations) and LIU Y (142 citations), indicating their important contributions to the field. In addition, scholars with high centrality, such as GOMBER P (0.11) and BECK T (0.09),

serve as a bridge connecting different research directions, further highlighting their key position in the academic network.

The temporal distribution of research hotspots shows that the studies of GUO F and LI J became highly cited in 2020, which may be closely related to the academic hotspots or policy environment at that time. The newer research hotspots are concentrated in 2022, such as WANG X and WANG Y, indicating that the field has remained active in recent years and has a tendency for continuous development. Overall, the academic network in this field has gradually matured and formed a solid structure dominated by core scholars, especially the close co-citation relationship among highly cited authors. At the same time, research in this field presents a good combination of international and local features. Cited scholars include both Chinese scholars (e.g., GUO F, LI J, and LIU Y) and international scholars (e.g., BECK T and GOMBER P), which shows that research in the field of digital financial inclusion has struck a balance between localization and internationalization, and at the same time, has a strong potential for transnational collaboration.

3.3. Institutional Cooperation Analysis

To investigate the collaboration among research institutions in digital financial inclusion research, the co-occurrence analysis of the sample literature signed by institutions is conducted to obtain the institutional cooperation network mapping (Figure 3). It reveals the cooperation relationship and academic influence within the domain of digital financial inclusion research. The connecting line and thickness represent the inter-institutional cooperation relationship and the frequency of cooperation. Figure 3 illustrates that there are 162 network nodes, 174 connecting lines, and a network density of 0.0133, indicating a moderately dispersed cooperative relationship among research institutes and a constrained total intensity of collaboration. In terms of distribution, Chinese universities dominate digital financial inclusion research. However, the core institution represented by the Renmin University of China is at the centre of the network. Its larger nodes and dense connectivity reflect its academic influence in the field of digital financial inclusion. Institutions such as Wuhan

Table 1: The top 10 most-cited authors

Number	Count	Centrality	Year	Cited authors
1	221	0.13	2020	GUO F
2	214	0.07	2020	LI J
3	142	0.09	2021	LIU Y
4	118	0.07	2020	OZILI PK
5	115	0.04	2021	ZHANG X
6	109	0.02	2022	WANG X
7	102	0.11	2018	GOMBER P
8	94	0.09	2018	BECK T
9	78	0.01	2022	WANG Y
10	73	0.01	2022	LEE CC

Figure 2: Co-citation analysis of cited authors

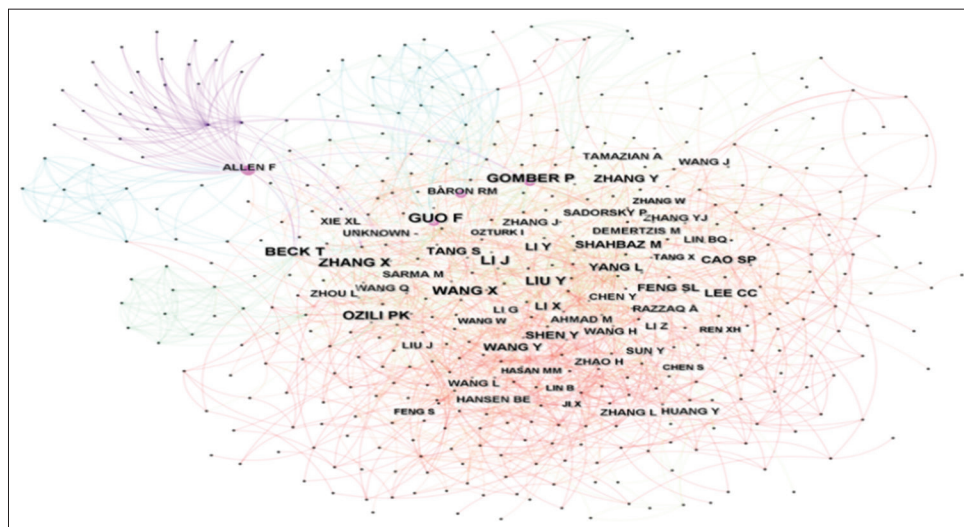


Figure 3: The collaborative network map of research institutions

University, Nanjing Normal University, and Central University of Finance and Economics also show a high frequency of cooperation. However, their influence and scope of cooperation are relatively small.

However, the mapping also shows some problems. First, the research teams are relatively independent, and some institutions have a high number of publications but a low frequency of cooperation. For example, the School of Economics and Management of the Southwestern University of Finance and Economics is the institution with the highest count of publications. Nonetheless, its cooperation with other institutions is low, reflecting the dispersed nature of research resources. Second, regional academic exchanges still need to be further strengthened, especially the partnership between universities in eastern China (e.g., Nanjing Normal University and China Agricultural University) and those in central and western China (e.g., Southwestern University of Finance and Economics), which has not yet been fully reflected. Thirdly, international cooperation is diminished, and the future internationalization of research in this domain might be enhanced by fortifying connections with foreign universities and research institutions.

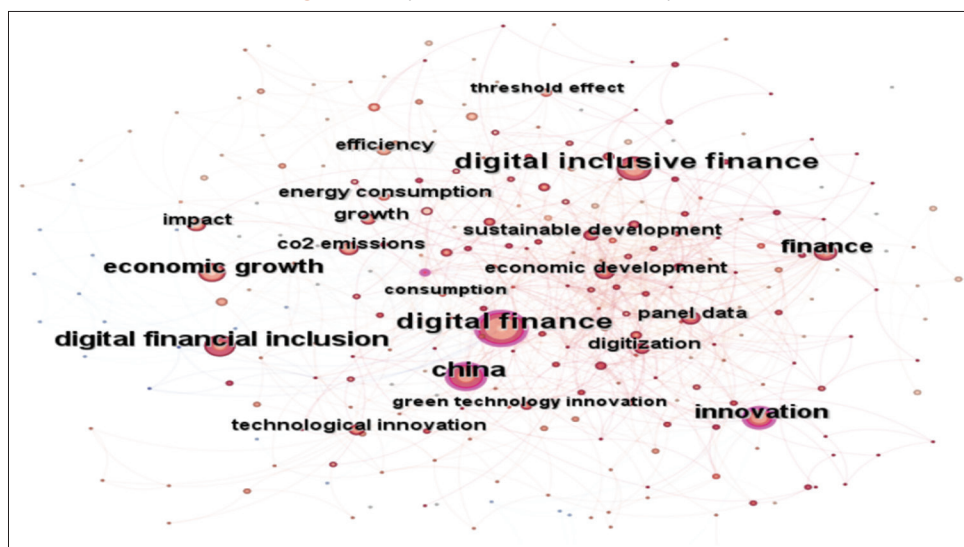
3.4. Keyword Co-occurrence Analysis

Keywords are a high degree of summary and overview of the research content and research direction in the literature, and analyzing keywords facilitates a better understanding of prominent topics in the research domain. This study generates a keyword co-occurrence network diagram for the years 2018-2024 by setting the g-index ($k = 25$), the length of the time slice to 1 year, and adopting the method of pruning networks (Pathfinder and Pruning sliced networks) (Figure 4). The keywords are displayed in the form of a yearly wheel, with the size of the wheel indicating the frequency of keyword occurrence. The graph contains 293 nodes and 1129 connecting lines, with a network density of 0.0264. This reflects the degree of keyword association and the overall structure of keywords in the research field.

To elucidate the status and interrelation of the keywords, Table 2 presents the frequency and centrality of the keywords, selecting those that rank in the top 10 for frequency comprehensively. The frequency of keywords shows that there are more research themes, among which digital finance is the highest (169 times), which is the core theme of the field, followed by digital financial inclusion (127 times), reflecting significant attention to this specific area. China (112 times) ranks fourth, indicating that the research on digital financial inclusion has a strong regional characteristic, especially in the context of China, where the research heat is higher. From the centrality degree, it can be seen that the more closely connected is digital finance, with a centrality degree as high as 0.11, indicating that it has a strong connecting role in the research network and is the pivotal keyword for other research directions the centrality degree of digital financial inclusion is 0.03, which is a lower centrality degree. Still, it has a higher frequency, showing the focus of the research. Innovation stands out with a centrality of 0.13 as a bridge between technological innovation and other themes of digital financial inclusion. At the same time, China has a centrality of 0.12, reflecting the importance of regional research.

As can be seen from the co-occurrence network diagram, “digital finance” and “digital financial inclusion” are the core keywords of the network, with a high degree of node centrality and dense connectivity, indicating that they have received widespread attention as core topics in the research field. As the core themes of the research field, they have received extensive attention. Moreover, the keywords “economic growth”, “innovation”, and “technological innovation” also have high node centrality and dense connectivity, indicating that they have received extensive attention as core topics in the research field. “Technological Innovation” also has high co-occurrence frequencies, reflecting the close connection between digital financial inclusion research and economic growth and technological progress.

The dense connectivity between keywords indicates that the research theme of digital financial inclusion is more focused.

Figure 4: Keywords co-occurrence analysis**Table 2: The frequency and centrality of keywords**

No.	Keywords	Frequency	Centrality
1	digital finance	169	0.11
2	digital inclusive finance	127	0.03
3	China	112	0.12
4	digital financial inclusion	94	0.08
5	economic growth	88	0.01
6	innovation	68	0.13
7	finance	55	0.06
8	impact	46	0.01
9	panel data	38	0.05
10	growth	37	0.02

For example, the strong connection between “digital financial inclusion”, and “economic development” and “sustainable development” suggests that the research on digital finance is gradually focusing on its combined impact on the environment and social development. In addition, the emergence of keywords such as “CO₂ emissions” and “energy consumption” suggests that the topics of green finance and sustainable development have also become hot topics in recent research. However, there are also isolated nodes in the network diagram, suggesting that some of the research themes are not yet closely linked to the core themes. For example, although “panel data” has a certain application value, its centrality is low, indicating potential for enhancing the research approach. Other than that, some low-frequency keywords such as “financial inclusion” and “economic disparity”, although important, have low weights in the overall network, indicating that research in these directions still needs to be strengthened. This indicates that the research in these directions in the field still needs to be strengthened.

3.5. Keyword Clustering Analysis

To better examine the knowledge framework of the research hotspots related to digital financial inclusion and explore the combined classification of keywords, the high-frequency keywords were clustered using the Log-Likelihood Ratio (LLR), and the clearer keyword clustering spectra were achieved by adjusting the queue values several times (Figure 5). Typically, a module value Q

> 0.3 indicates a considerable clustering structure, while an average profile value $S > 0.7$ signifies that the clustering is both efficient and compelling. Overall, the module value $Q = 0.5005$ indicates that the clustering results are highly significant. In contrast, the average contour value $S = 0.7938$ demonstrates that the clusters have good internal consistency and that the classification results are reliable. In conclusion, the mapping is valid.

A total of 10 clusters were obtained from the mapping (Table 3). They are: #0 Rural Income Gap, #1 Green Development, #2 Rural Poverty Alleviation, #3 Digital Financial Inclusion, #4 Panel Data Analysis, #5 Economic Growth, #6 Chinese Experience, #7 Environmental Regulation, #8 Green Technological Innovation, #9 Moderating Effect.

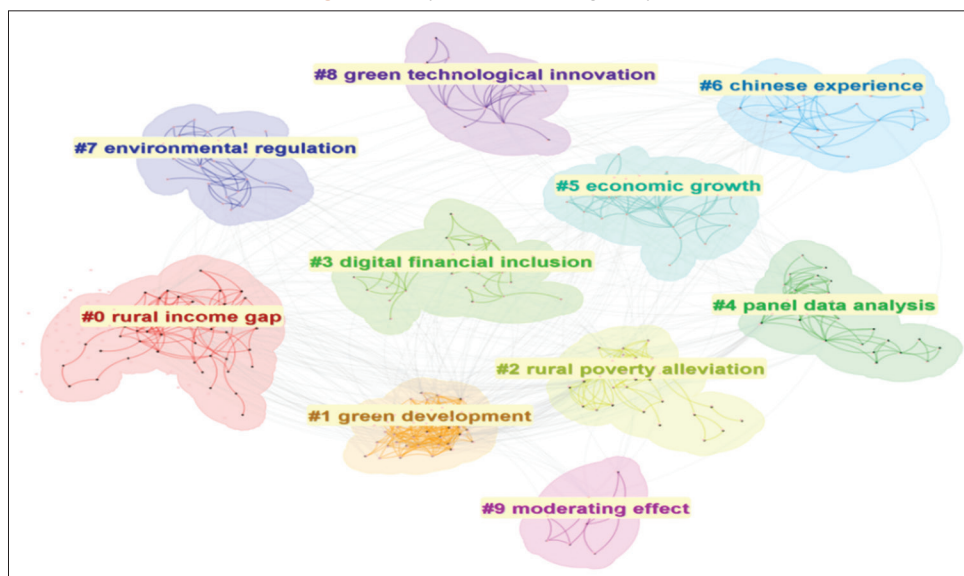
The clustering of the map, in conjunction with research hotspots and themes, reveals that contemporary scholars’ investigations on digital financial inclusion predominantly concentrate on the following aspects:

3.5.1. Digital financial inclusion and economic development

Research primarily examines the impact of digital financial inclusion on economic growth, investigating its potential to foster economic development by lowering financial service costs and enhancing the efficiency of financial resource allocation. Amaliah et al. (2024) utilize poor countries as a case study and, through empirical research, argue that digital financial inclusion favorably impacts sustainable economic growth. Sun and Tang (2022) performed an empirical investigation about the effect of digital financial inclusion on the number of loans from banking institutions, citizens’ savings, and residents’ consumption via a mediation effect model. Xi and Wang (2023) discovered that digital financial inclusion exerts a positive and incremental non-linear impact on economic growth, with the degree of marketization serving as a significant moderating factor. Furthermore, panel data analysis has been extensively employed in this domain, offering significant empirical evidence for the impact on economic growth. Zhou et al. (2024) analyzed panel data from the Beijing-Tianjin-Hebei region spanning 2011-2020 to assess the influence

Table 3: Research hotspot clustering

Cluster ID	Size	Silhouette	Year	Cluster name	Key words
0	50	0.691	2023	Rural Income Gap	Rural income gap, poverty alleviation, rural financial services, digital financial inclusion
1	41	0.764	2022	Green Development	Green development, sustainable finance, environmental sustainability
2	29	0.828	2022	Rural Poverty Alleviation	Rural poverty alleviation, financial inclusion, inclusive growth
3	27	0.702	2022	Digital Financial Inclusion	Digital financial inclusion, financial inclusion, income equality
4	26	0.899	2021	Panel Data Analysis	Panel data, empirical analysis, statistical methods
5	26	0.816	2020	Economic Growth	Economic growth, GDP, economic development
6	24	0.833	2022	Chinese Experience	Chinese experience, economic reform, development strategy
7	24	0.819	2022	Environmental Regulation	Environmental regulation, policy implementation, carbon reduction
8	16	0.907	2020	Green Technological Innovation	Green technology, technological innovation, renewable energy
9	8	0.94	2023	Moderating Effect	Moderating effect, interaction terms, impact analysis

Figure 5: Keywords clustering analysis

of digital financial inclusion on economic growth. Zhang et al. (2024) utilized panel data to analyze that the advancement of digital financial inclusion directly fosters economic growth, with the extent of coverage, depth of utilization, and level of digitization all contributing to this growth.

3.5.2. Digital financial inclusion and rural development

Research in rural development investigates the effects of digital financial inclusion on rural revitalization, poverty alleviation, and the reduction of the urban-rural income disparity. Liu et al. (2023) utilized a spatial Durbin model with dual fixed effects and mediation effects, revealing a notable positive relationship between digital financial inclusion and urban-rural income disparity. Pei et al. (2024) used panel data from 31 provinces in China to conduct an empirical analysis of the impacts of digital financial inclusion on mitigating relative rural poverty. The research indicates that digital financial inclusion can markedly diminish poverty in rural China. Related studies examine the amalgamation of rural financial services with agricultural modernization to bolster rural economic development by facilitating rural labor mobility and improving the consumption structure. Li and Ma (2021) examine the effect of digital financial inclusion on rural inhabitants' income by utilizing panel regression. Furthermore, an analysis of the industrial structure, educational attainment, and financial development reveals that digital financial inclusion substantially

enhances the earnings of rural inhabitants. However, disparities exist at the regional level and among various income quartiles.

3.5.3. Digital financial inclusion and sustainable development

Green development is a notable application of digital financial inclusion, with research emphasizing its supportive function in environmental conservation and green economic advancement. Wang et al. (2022) utilized spatial econometric modeling to investigate the impacts of digital inclusion on carbon dioxide emissions. Han et al. (2023) employ the Generalized Method of Moments Model to empirically investigate the correlation between digital finance, environment regulation, and the efficiency of green development. The authors assert that digital financial inclusion alleviates the finance limitations imposed by environmental legislation, diminishes the negative impacts of such regulation on green development efficiency to a certain extent, and promotes sustainable growth.

3.5.4. Digital financial inclusion and technological innovation

Technological innovation is a fundamental aspect of research on digital financial inclusion. The research investigates how digital financial inclusion improves the efficiency of traditional financial services and promotes technological innovation in businesses through sophisticated approaches. The influence of Small and Medium-sized Enterprises' technology and green technology has

been a significant focus of contemporary research. Gu et al. (2023) performed regression analysis utilizing a fixed effects model to confirm the favorable influence of digital financial inclusion on SMEs' innovation. Li et al. (2024) examined the influence of digital financial inclusion on green technology innovation and analyzed the mediating effect of financing limitations utilizing a spatial Durbin model. This indicates that financing constraints account for over 50% of the mediating effect in the direct relationship between local digital financial inclusion and green innovation.

The aforementioned four facets of the study elucidate the multifaceted impacts of digital financial inclusion and serve as a significant reference for pertinent policymaking and theoretical inquiry. This establishes a basis for attaining high-quality economic development, social equity, and environmental sustainability.

3.6. Keyword Timeline Analysis

Keyword clustering identifies the primary focal points of the research. To enhance comprehension of the evolutionary process and developmental trajectory of this research, CiteSpace is employed to produce a keyword timeline map. It facilitates a clear observation of the research evolution and elucidates the temporal trends of research hotspots and the logical relationships among the topics. Figure 6 shows the changes and development of the keywords of this research from 2018 to 2024.

The data illustrates that the study focuses in 2018 was concentrated on subjects pertaining to “digital financial inclusion”, especially the discussion of its underlying concepts and application frameworks. In this phase, the keyword “digital finance” occupies a central position, and the research theme revolves around the impact of digitalization on the inclusion, efficiency, and innovation of financial services. This is primarily driven by digital transformation worldwide and the swift advancement of fintech, which promotes the popularity and research of digital financial inclusion popularisation and research. However, this stage of research has just started and is still in the theory construction stage.

With the deepening of research, the keywords of 2020 have been expanded to “innovation”, “efficiency”, and “credit.” The adoption

of the innovation-driven development approach indicates that scholars increasingly recognize the importance of digital financial inclusion.

In 2022, the research focuses further shifts to green finance and environmental sustainability, with keywords such as “sustainability”, “green technology”, “green economy”, and “carbon emissions” appearing in a concentrated manner, indicating that the contribution of digital finance in supporting the transition to a green economy has become a hot research topic. On the other hand, “green economy” and “carbon emissions” appear centrally, indicating that the role of digital financial inclusion in supporting green economic transformation has become a research hotspot. Moreover, the keyword “threshold effect” indicates the development of research methodology, which increasingly emphasizes the non-linear relationship between variables and its threshold effect, in addition to the original linear relationship.

The 2024 research theme expands further into complexity and segmentation, with the keywords “heterogeneity”, “sustainable development”, “digitization”, and “small and medium-sized enterprise” reflecting the emerging academic interest in the differentiated role of digital finance in heterogeneous economies as well as in SMEs. The keywords “digitization” and “SMEs” signify a burgeoning scholarly focus on the distinct function of digital finance inside diverse economies and SMEs. The terms “digitization” and “SMEs” indicate an increasing academic interest in the specific role of digital financial inclusion within various economies and SMEs. This phase of change is closely related to national policy support for SMEs' development. Hence, the research findings related to promoting digital financial inclusion for SMEs' development are more prominent.

3.7. Keyword Emergence Analysis

Keyword emergence analysis aims to reveal the rapid development of research hotspots in a specific time period and explore the stage characteristics and future trends of academic research from it. In this study, we use CiteSpace software to carry out keyword emergence analysis and the nine emergent words obtained (Figure 7).

Figure 6: Keywords timeline analysis

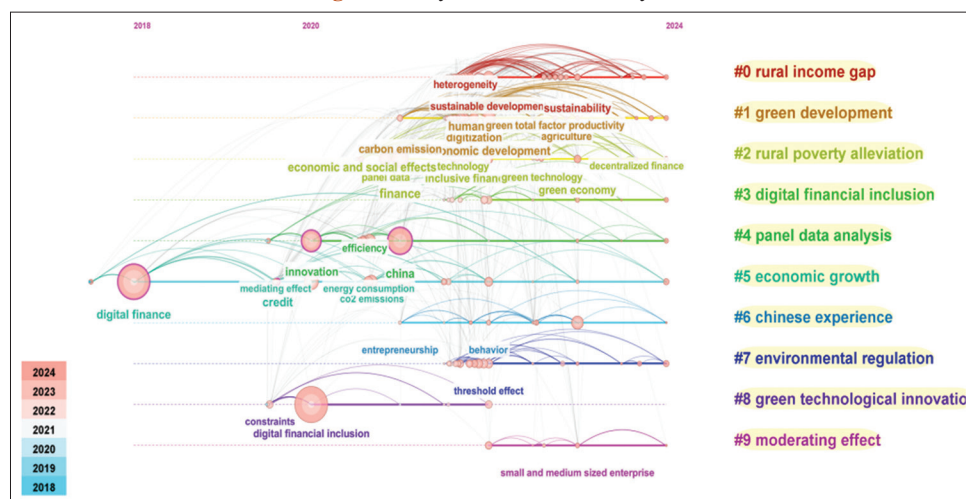


Figure 7: Keywords with the strongest citation burst

Keywords	Year	Strength	Begin	End	2018 - 2024
impact	2020	4.68	2020	2022	
growth	2021	2.33	2021	2021	
urbanization	2022	3.57	2022	2022	
mediation effect	2022	3.04	2022	2022	
rural revitalization	2022	2.6	2022	2022	
threshold effect	2022	2.17	2022	2022	
inequality	2022	2.17	2022	2022	
technological innovation	2023	2.78	2023	2024	
spatiotemporal analysis	2023	2.25	2023	2024	

As can be seen from the table, “impact” (2020-2022) is the keyword with the highest intensity of emergence, reaching 4.68, which indicates that the focus of academic research has changed in this period and is no longer limited to connotative research. It rather researches the impact and effects of digital financial inclusion, involving the urban-rural income gap, rural finance, poverty reduction effects, technological innovation, high-quality economic growth, etc. Consequently, the research on how to solve the practical problems of current development through the application of digital financial inclusion.

The “growth” appeared briefly in 2021, a research boom that may be related to economic recovery policies in the post-epidemic period, hoping to promote economic recovery and development through digital financial inclusion. In 2022, “urbanization,” “rural revitalization,” and “inequality” surfaced as keywords emblematic of Chinese characteristics, closely linked to the progress of China’s rural revitalization strategy. By the conclusion of 2020, China had eradicated absolute and regional poverty. However, this is not the culmination of anti-poverty efforts. It is imperative to further investigate the long-term governance framework for relative poverty, mitigate its prevalence, avert the risk of regression into poverty, and establish a preventive mechanism against such regression. Concurrently, ensuring a cohesive integration of poverty alleviation initiatives with rural revitalization is essential. Digital financial inclusion should facilitate the advancement of financial inclusion and the strategy aimed at achieving high-quality development within the rural economy through its extensive reach, depth of utilization, level of digitalization, and approach to superior growth. Therefore, against this background, the issue of rural revitalization in 2022, the relationship between the urbanization process and rural financial services, has received further attention. In-depth studies have been conducted to explore how to promote balanced development across urban and rural regions and achieve the objective of shared prosperity through digital financial inclusion. In addition, the “mediation effect” and “threshold effect” also appear at the same time in 2022, reflecting the attention to the mechanism study and the analysis of the threshold effect, respectively.

Meanwhile, “technological innovation” became a new keyword in 2023, mainly due to the destruction of the global industrial

chain and supply chain by the Covid-19 pandemic. The current global economic pattern is complex and uncertain, and the economies of all countries are facing the challenges of structural adjustment and transformation. Innovation, especially enterprise technological innovation, is considered to be an essential requirement and important support for achieving economic growth and transformation. Thus, scholars begin to focus on researching how digital financial inclusion affects enterprise technological innovation to promote high-quality economic development, and this hotspot continues until 2024. Another keyword appearing in 2023 is “spatiotemporal analysis”, which mainly reflects that data analysis technology and methodology is the most popular way of analyzing data and supply chain disruptions. This keyword reflects the improvement of data analysis techniques and methods. In the past, the main method applied in this field was linear regression, which could not reveal the dynamic development characteristics, especially for cross-regional analysis and comparison. Hence, applying spatiotemporal analysis shows the deepening and development of research methods.

Overall, the emergence of keywords reflects the close connection between academic research and national policies and technological progress. Changes in research hotspots reflect the trend of shifting from theoretical discussion to practical application while revealing the great potential of digital financial inclusion in driving economic growth, narrowing the urban-rural gap, and promoting sustainable development. In the future, the field will continue to expand deeply along the direction of multidisciplinary intersections to address complex socioeconomic challenges.

4. CONCLUSION AND RESEARCH TRENDS

In this study, we mainly combed 482 articles about the “digital financial inclusion effect” in WoS and Scopus databases from 2018 to 2024 through CiteSpace software. It reflected the trend of publication, research cooperation, research progress, hot frontiers, and other aspects of the related research through visual mapping. Through visual mapping, we reflect on the publication trend, research cooperation, research progress, hot frontiers, and other aspects of related research, and we come up with the following conclusions and outlook.

4.1. Conclusion

Regarding publication frequency and volume, research on digital financial inclusion from 2018 to 2024 has experienced rapid and consistent growth, with an average annual growth rate exceeding 45%. It is anticipated to reach its zenith in 2023, emerging as a prominent research focus recently, and projections indicate that the core body of research output will surpass 200 articles by 2025. This will establish a robust theoretical framework for the subsequent advancement of digital financial inclusion.

From the perspective of research authors and research institution cooperation, the research on the effects of digital financial inclusion has gradually formed a relatively mature academic network, and the research authors and institutional partnerships have taken shape. At the level of research authors, highly cited scholars such as GUO F, LI J, and LIU Y occupy a central

position in the knowledge network, and their research has an important academic influence and bridging role. Meanwhile, the good combination of international and Chinese scholars highlights the leading role of Chinese scholars in the field. Also, it shows that the research in this field has a strong potential for internationalization and transnational cooperation. At the level of research institutions, a multi-centre network pattern with the Renmin University of China as the core has been initially formed, but the cooperation relationship as a whole is still fragmented. Although the number of articles issued by some universities and research institutions is high, the frequency of cooperation is low, reflecting the dispersed nature of research resources. In addition, inter-regional cooperation is uneven, especially in academic exchanges between Eastern central and Western universities, and needs to be further strengthened. Less international cooperation is another obvious feature. In the future, the globalization of research and the enhancement of academic influence can be promoted by strengthening ties with overseas universities.

From the keyword co-occurrence, clustering, timeline, and emergence analyses mainly reveal the concentration and evolution trends of the research hotspots, providing profound insights into the research direction. Firstly, the keyword co-occurrence analysis reveals that digital financial inclusion and digital finance are the core keywords in the research network, and the research themes around economic growth, technological innovation, and sustainable development are highly concentrated and related, showing the extensive attention to economic, social and environmental effects in this field of research. Second, the keyword clustering analysis further reveals the main directions of the research, including the impact of digital financial inclusion on promoting economic growth, its application in rural development, its combination with green finance, and its assistance in technological innovation. In addition, research methods such as panel data analysis and threshold effect analysis have been widely used, providing strong support for empirical research. Further, the timeline analysis can reflect the evolution path of the research theme from conceptual construction to practical application. Early research centred on the theoretical foundations of digital finance and then gradually expanded to themes related to efficiency improvement, innovation drive, and sustainable development. Finally, the examination of emerging keywords indicates a swift evolution of research focal points. Terms such as “impact,” “growth,” and “rural revitalization” signify the scholarly focus on the influence of digital financial inclusion on economic expansion, equitable urban-rural development, and rural rejuvenation. Moreover, the advent of “technological innovation” and “spatiotemporal analysis” signifies the enhanced sophistication of technical instruments and methodologies. The advent of “technological innovation” and “spatiotemporal analysis” signifies an advanced investigation into the enhancement of technical instruments and methodologies. Especially since 2023, with the shifts in the global economic framework and the advancement of data analysis technology, research has begun to focus on how to promote technological innovation and optimize resource allocation through digital finance, as well as the use of spatiotemporal analysis to assess the regional differences and long-term impacts of policy implementation.

Overall, The research focus on digital financial inclusion has gradually shifted from basic theories to integration with practical issues, showing a transition trend from theoretical discussion to practical application. Research in this area focuses on high-quality economic development, urban-rural income balance, and green economy transformation. At the same time, new technologies and methods are constantly being introduced, reflecting the close interaction between academic research and national policies and technological progress.

4.2. Research Trends

At present, the research on the impact of digital financial inclusion has produced diverse and relatively mature results. However, there are still limitations and places where in-depth research can be carried out. Future research should build upon existing findings, integrating new issues and challenges arising from the evolution of the country’s social realities to enhance studies on digital financial inclusion from various aspects and to advance in the following three areas.

First, focus on personalized and micro-level research. Current research focuses mostly on macro-level effects but pays insufficient attention to the personalized effects at the micro level. Future research should thoroughly investigate the varied impacts of digital financial inclusion on distinct demographic groups, including people with low incomes, entrepreneurs, women, and rural inhabitants, while also examining the efficacy of personalized financial services in addressing specific needs, thereby elucidating how digital financial inclusion enhances people’s happiness at the micro level.

Second, research on long-term effects and risk assessment should be strengthened. Current research predominantly emphasizes the short-term economic impacts of digital financial inclusion. However, the assessment of its long-term effects and potential risks is still insufficient. In the future, it is necessary to systematically study the long-term effects of digital financial inclusion in terms of optimizing economic structure, balancing income distribution and social equity, especially the potential ethical issues of technology and the risk of data misuse, to provide a more comprehensive theoretical basis for policymaking and practice.

Thirdly, it focuses on cross-country comparison and internationalized experience. Current research is mostly in the context of China and lacks a systematic comparison of digital financial inclusion practices in various countries or regions. In the future, it is imperative to strengthen internationalized research and comprehensively enhance the application and practice of digital financial inclusion in the global framework.

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