



## Tracing Research Frontiers in Digital Finance and Supply Chain Finance: a Large-Scale Bibliometric Analysis

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### ABSTRACT

This study aims to trace and map the research frontier in the domains of digital finance and supply chain finance through a large-scale bibliometric approach. Research data were obtained from the Dimensions database with a total of 3,936 documents for the period 2021–2025. The method used is a network-based bibliometric analysis that integrates performance analysis and science mapping through co-citation, co-occurrence, and co-authorship analyses. The results of the study show a very significant and exponential growth in publications, especially in the 2024–2025 period, indicating a phase of rapid growth and early consolidation of this field. The social structure shows a collaboration pattern that is still fragmented, but there is strong dominance from China both geographically and institutionally as a center of knowledge production. From a conceptual perspective, the literature is dominated by main themes such as finance, integration, and analysis, while the theme of growth emerges as the latest frontier, indicating a shift in focus toward analyzing economic impact. Overall, the research frontier of digital supply chain finance moves from exploring technology integration to evaluating systemic impacts on economic growth and stability. This study provides theoretical, methodological, and practical contributions in understanding the direction of development as well as research opportunities in the future.

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## **INTRODUCTION**

The development of digital technology in the last two decades has fundamentally transformed the landscape of the global financial system, giving rise to an ecosystem known as digital finance. Conceptually, digital finance refers to the provision and use of financial products and services through digital technology and network-based channels, including online banking, electronic payments, digital cards, as well as application-based and internet-connected device financial instruments (Argade & Purohit, 2021). This transformation is not only operational but also structural, as it shifts the way financial intermediation is carried out by traditional institutions as well as technology-based entities. Recent literature positions digital finance as an integral part of modern finance, no longer as a peripheral innovation (Li & Xu, 2021). Its scope extends to include fintech, embedded finance, open banking, decentralized finance (DeFi), as well as central bank digital currencies (CBDCs), which collectively form the contemporary digital financial architecture (Kurniasari et al., 2023)). This transformation has direct implications for accelerating transactions, increasing transparency, expanding access, and cost efficiency in the money and credit markets (Tulika, 2025). Thus, digital finance has evolved into a multidimensional domain that simultaneously connects technological innovation, market structures, and financial regulation..

In the context of the supply chain, digital finance gains strategic relevance through its integration with supply chain finance (SCF), which is a financing mechanism that optimizes cash flow between actors in the production and distribution network. The digitalization of SCF strengthens settlement efficiency, accelerates payment cycles, and enhances transaction transparency across business players. The modernization of payment and transaction settlement systems becomes one of the main determinants of digital finance adoption, particularly in supporting instant and cashless payment systems (N. & B., 2025). Empirical evidence shows that digital payment systems and cashless policies contribute positively to long-term economic growth as well as financial market performance. (Baba & Tatemoto, 2024; Toriola et al., 2022) Within this framework, digital supply chain finance emerges as a conceptual intersection between digital financial transformation and production network efficiency. Although the literature extensively discusses digital finance in general, its integration within the context of supply chains has not been systematically mapped on a global horizon. Therefore, a large-scale quantitative approach is needed to identify the research frontier in this domain.

Previous literature shows that the adoption of digital finance is influenced by macro and meso determinants, including service efficiency, financial inclusion goals, payment modernization, and the sustainable development agenda (K. Gupta, 2021). Digital finance is seen as an instrument for expanding access for underserved groups through reduced transaction costs and decreased geographical barriers (Agarwal et al., 2006; Mitra & Agarwal, 2024). However, this adoption is also highly influenced by digital literacy, user capacity, and infrastructure readiness (N. & B., 2025). In the context of the supply chain, these factors become crucial because the interconnectedness between actors requires

system interoperability and technology-based trust. Studies in various countries highlight the existence of a digital divide and cyber security risks that can hinder the diffusion of financial innovations (Pranajaya et al., 2024; Thottoli et al., 2023). Thus, digital supply chain finance is not only a technological issue, but also an institutional and structural one. This complexity demands scientific mapping that is capable of capturing conceptual and collaborative dynamics simultaneously.

In addition to opportunities, the literature also emphasizes various risks and challenges associated with the expansion of digital finance, including cybersecurity, data protection, fraud, money laundering, as well as systemic stability risks (Fachrudin & Latifah, 2022). The growth of DeFi and crypto assets, for example, is seen as potentially expanding inclusion while also posing risks of instability if not adequately regulated (Li & Xu, 2021). Similarly, the development of CBDCs has implications for the transmission of monetary policy and banking liquidity. In the supply chain ecosystem, security disruptions or failures in digital payment systems can have systemic impacts on the smooth functioning of production and distribution. Therefore, governance and regulatory coordination become central components in ensuring the stability and sustainability of digital finance (Dong & Zang, 2023). The complexity of these risks underscores the urgency of bibliometric analysis to understand the direction of research development and the concentration of emerging themes.

Geographically, the development of digital finance shows significant variation across countries and regions. The United States presents a large fintech ecosystem but still faces challenges in inclusion and regulation (Howlader & Halder, 2025; Mansyur, 2025). Central European countries such as Czechia emphasize the benefits of instant payments for SMEs while highlighting issues of digital literacy and security (Yadav & Banerji, 2023). In Indonesia, the growth of fintech in the payment and peer-to-peer lending sectors shows a wide diversification of digital finance subsectors (Dong & Zang, 2023; Liu & Zhang, 2025). Meanwhile, crisis contexts like in Ukraine demonstrate how financial digitalization can maintain operational continuity amid extreme disruptions (Yang et al., 2023). These regional variations indicate that digital supply chain finance develops within different institutional contexts, so global research patterns are likely to reflect this heterogeneity. Large-scale bibliometric mapping is needed to identify centers of productivity, cross-country collaboration patterns, and the distribution of dominant themes.

From a methodological perspective, bibliometrics is understood as a quantitative approach to analyzing scientific literature through indicators of productivity, citations, and relational networks in order to reveal the knowledge structure of a field (Yang et al., 2023). In the practice of science mapping, three main structures are often analyzed, namely the intellectual structure through co-citation, the conceptual structure through keyword co-occurrence, and the social structure through co-authorship (Judijanto & Setiyawan, 2025). This approach allows the identification of intellectual foundations, theme clusters, and scientific collaboration networks on a large scale. Several studies have shown the effectiveness of using VOSviewer and Biblioshiny on datasets of more than a

thousand documents to map trends, theme evolution, and research hotspots (Yusup & Jasuni, 2024). Thus, a large-scale bibliometric approach is relevant for systematically and replicably tracing the research frontier of digital finance in the context of the supply chain. The use of thresholds and network parameters is reported as a prerequisite for methodological transparency so that results can be replicated (Huang, 2019). This ensures the validity and reliability of the interpretation of the scientific structures produced.

Although the digital finance literature is rapidly developing and covers a wide range of topics such as fintech, digital payments, DeFi, and CBDCs, there are still few studies that explicitly map the research frontier at the intersection of digital finance and supply chain finance in the current horizon. Most previous research focused on national contexts, specific subsectors, or conceptual analyses without comprehensive global network mapping (V. Gupta & Kumar, 2021). Furthermore, existing bibliometric studies often discuss technology themes in general without highlighting supply chain dynamics as an inter-organizational ecosystem. With the increasing volume of publications post-2020 and the acceleration of digitalization due to the global crisis, a large-scale bibliometric analysis capable of capturing collaboration patterns, thematic clusters, and the evolution of recent research is needed. The main research gap lies in the absence of an integrated mapping that simultaneously identifies the intellectual, conceptual, and social structures of digital supply chain finance. Therefore, this study offers novelty in the form of a large-scale bibliometric analysis of 3,936 documents from the 2021–2025 period to empirically trace research frontiers. This approach enables the identification of hotspots, emerging themes, as well as global collaboration centers in the digital finance domain related to supply chains..

Based on this background, the purpose of this study is to explore and map the research frontier in digital finance and supply chain finance through large-scale network bibliometric analysis. This study aims to identify annual publication trends, patterns of author and country collaboration, conceptual structures based on keyword co-occurrence, as well as citation distribution and thematic clusters. Thus, this study not only presents a quantitative overview of the literature's development but also interprets the intellectual and social dynamics shaping the field. The theoretical contribution lies in providing a comprehensive knowledge structure map based on empirical data, while the methodological contribution lies in the application of a replicable large-scale network bibliometric design. Practically, the findings of this study are expected to provide guidance for researchers, policymakers, and industry practitioners in understanding the direction of digital supply chain finance development.

Thus, the research problem in this study is: How are the intellectual, conceptual, and social structures as well as the research frontier formed in the literature of digital finance and supply chain finance for the period 2021–2025 based on large-scale bibliometric analysis?

## LITERATURE REVIEW

The rapid evolution of digital technology has significantly reshaped the global financial ecosystem, giving rise to what is now widely conceptualized as digital finance. Digital finance encompasses the delivery of financial services through digital platforms, including mobile banking, electronic payments, fintech applications, and decentralized financial systems. According to Argade and Purohit (2021), digital finance represents a structural transformation in financial behavior and decision-making, particularly in the post-pandemic era. This transformation is further reinforced by the integration of financial technology (FinTech), which has become a central driver of innovation and efficiency within modern financial systems (Li & Xu, 2021).

Recent studies emphasize that digital finance is no longer a peripheral innovation but a core component of financial intermediation. The expansion of fintech ecosystems—including digital wallets, peer-to-peer lending, and blockchain-based systems—has enhanced financial accessibility and reduced transaction costs (Kurniasari et al., 2023). Moreover, digital financial services contribute to financial inclusion by lowering barriers related to geography and infrastructure, particularly in developing economies (Agarwal et al., 2006; Mitra & Agarwal, 2024). However, the effectiveness of digital finance adoption is highly contingent upon factors such as financial literacy, technological readiness, and institutional support (N. & B., 2025).

Within the broader financial ecosystem, supply chain finance (SCF) has emerged as a critical domain where digital finance plays a transformative role. SCF refers to financial solutions that optimize cash flow within supply chains by facilitating efficient transactions among suppliers, manufacturers, and distributors. The integration of digital technologies into SCF enhances transparency, accelerates payment cycles, and improves liquidity management across supply chain networks (Toriola et al., 2022). Empirical evidence suggests that digital payment systems and financial innovations positively influence economic growth and market efficiency (Baba & Tatemoto, 2024).

Despite these advantages, the literature also highlights several challenges associated with digital finance expansion. Cybersecurity risks, data privacy concerns, and financial fraud remain significant barriers to widespread adoption (Fachrudin & Latifah, 2022). Additionally, the rise of decentralized finance (DeFi) and crypto-assets introduces new forms of systemic risk that require robust regulatory frameworks (Li & Xu, 2021). In this context, governance and policy coordination are essential to ensure financial stability and sustainable innovation (Dong & Zang, 2023).

Another important strand of literature focuses on the socio-economic implications of digital finance. Studies indicate that digital financial inclusion can stimulate economic growth by improving access to credit and enhancing consumption patterns (Liu & Zhang, 2025; Mansyur, 2025). However, disparities in digital literacy and infrastructure create a “digital divide,” particularly between developed and developing regions (Pranajaya et al., 2024). This divide can hinder the equitable distribution of digital finance benefits and limit its potential impact on inclusive development (Thottoli et al., 2023).

From a methodological perspective, bibliometric analysis has gained prominence as a tool for mapping the intellectual structure and evolution of digital finance research. Bibliometric studies enable the identification of research trends, thematic clusters, and collaboration networks through quantitative analysis of scientific publications (Hong et al., 2021; Yang et al., 2023). Previous bibliometric research has explored fintech development (Bajwa et al., 2022), digital financial literacy (Yadav & Banerji, 2023), and financial inclusion (Judijanto & Supriadi, 2025), highlighting the growing complexity and interdisciplinarity of the field.

However, existing literature reveals a significant research gap at the intersection of digital finance and supply chain finance. Most prior studies focus either on fintech innovation or on supply chain efficiency independently, without integrating both perspectives into a unified analytical framework (Gupta & Kumar, 2021). Furthermore, many studies are limited to specific national contexts or sectoral analyses, lacking a comprehensive global mapping of research developments.

In response to this gap, recent bibliometric approaches advocate for large-scale network analysis to capture the intellectual, conceptual, and social structures of emerging research domains (Cherian et al., 2025; Vijayagopal et al., 2025). Tools such as VOSviewer and Biblioshiny have proven effective in visualizing research trends and identifying knowledge clusters in datasets exceeding one thousand publications (Gong & Wang, 2021). These approaches allow researchers to systematically trace research frontiers and uncover emerging themes, such as sustainability, digital integration, and economic growth.

In summary, the literature indicates that digital finance has evolved into a multidimensional field that intersects with technological innovation, economic development, and institutional governance. While its integration into supply chain finance offers significant opportunities for efficiency and growth, challenges related to security, regulation, and inequality persist. The absence of comprehensive bibliometric mapping at this intersection underscores the importance of large-scale analytical approaches to better understand the evolving research frontier.

## **METHODOLOGY**

This study uses a quantitative-descriptive design based on network-based bibliometric analysis to trace the research frontier in the domains of digital finance and supply chain finance for the period 2021–2025. The bibliometric approach is chosen because it is capable of analyzing scientific literature systematically through indicators of productivity, citations, and network relationships to map the knowledge structure of a field (Hong et al., 2021; Yang et al., 2023). Operationally, this study integrates two clusters of analysis, namely performance analysis (publication and citation trends) and science mapping (mapping intellectual, conceptual, and social structures) as practiced in recent bibliometric studies. (Cherian et al., 2025; Judijanto & Supriadi, 2025; Vijayagopal et al., 2025; Wahyuni et al., 2022; Yadav & Banerji, 2023) Intellectual structure is traced through co-citation analysis, conceptual structure through co-occurrence

of keywords analysis, and social structure through co-authorship analysis (Maulana et al., 2021). Thus, this research design allows for simultaneous exploration of the knowledge base, theme clusters, and patterns of scientific collaboration on a large scale.

The research data source comes from the Dimensions database, with the publication period limited to the years 2021–2025. The search strategy used the formula TITLE-ABS-KEY ('digital finance' AND 'supply chain finance') to ensure conceptual relevance with the research focus. Document types were limited to articles and reviews in English to maintain scientific quality consistency and metadata compatibility. The search results yielded 3,936 documents that met the inclusion criteria. The data collection procedure was carried out through the stages: (1) extraction of complete metadata (title, abstract, keywords, authors, affiliations, country, year of publication, and citation count), (2) data cleaning (deduplication and harmonization of synonymous keywords), and (3) verification of document relevance based on topic match. This curation stage is important to maintain the validity of the resulting network structure (Li & Xu, 2021).

The analysis instruments used were VOSviewer for network mapping (co-authorship, co-occurrence, and citation network) and Biblioshiny (bibliometrix-R) for thematic analysis, temporal trends, and thematic evolution, as recommended in large-scale studies (>1000 documents) (Gong & Wang, 2021). At the network analysis stage, the full counting parameter was applied to calculate the occurrence of keywords and collaboration relations. To maintain the readability of the network map, a minimum threshold was used: keyword occurrences  $\geq 20$ , minimum documents per author  $\geq 5$ , and minimum documents per country  $\geq 10$ , following the practice of explicitly reporting parameters in the literature (Li & Xu, 2021; Pranajaya et al., 2024; Thottoli et al., 2023). Citation analysis was conducted by identifying the total citations (TC), the average citations per document, and the most cited articles as indicators of scientific impact (Aijaz et al., 2024; Shamim & Ahmad, 2025).

The analysis techniques include: (1) annual publication trend analysis to identify the dynamics of research growth; (2) co-authorship network analysis to map the social structure and collaboration among authors as well as among countries; (3) keyword co-occurrence analysis to identify dominant theme clusters and research hotspots; (4) density visualization analysis to detect concentrations of major topics; and (5) thematic map and thematic evolution analysis to identify motor themes, niche themes, emerging themes, and basic themes during the observation period (Alam et al., 2021; Bajwa et al., 2022; Thottoli, 2023; Yadav & Banerji, 2023). The interpretation of network structures is carried out by considering node size, link strength, and cluster position as representations of the intensity of conceptual as well as collaborative relationships. The entire procedure is analyzed replicatively with the reporting of parameters and stages in a transparent manner to ensure the reliability and methodological validity of the research.

## RESULT

### Annual Publication Development (Annual Publication Trend)

Based on Dimensions data for the 2021–2025 period with a total of 3,936 documents, the publication trend shows a very significant increase over the past five years. The visualization of the annual publication graph shows exponential acceleration, especially since 2022. The number of publications in 2021 was recorded at around 200 articles, increasing to about 420 in 2022, then jumping to around 730 in 2023. In 2024, the number of publications reached around 930 articles, and in 2025 it sharply increased to nearly 1,500 articles. This pattern indicates that digital finance research, including in the context of the supply chain, is entering an intensive expansion phase in the post-global pandemic era. The more than sevenfold increase over five years shows the growing academic and policy attention toward digital financial transformation. The significant surge in 2024–2025 can be interpreted as an indication of topic consolidation and the expansion of research frontiers. Quantitatively, the average annual growth rate (compound growth) falls into the high category, demonstrating the dynamics of a rapidly developing field. Thus, the temporal structure of the literature reflects a rapid growth stage in the scientific development cycle.

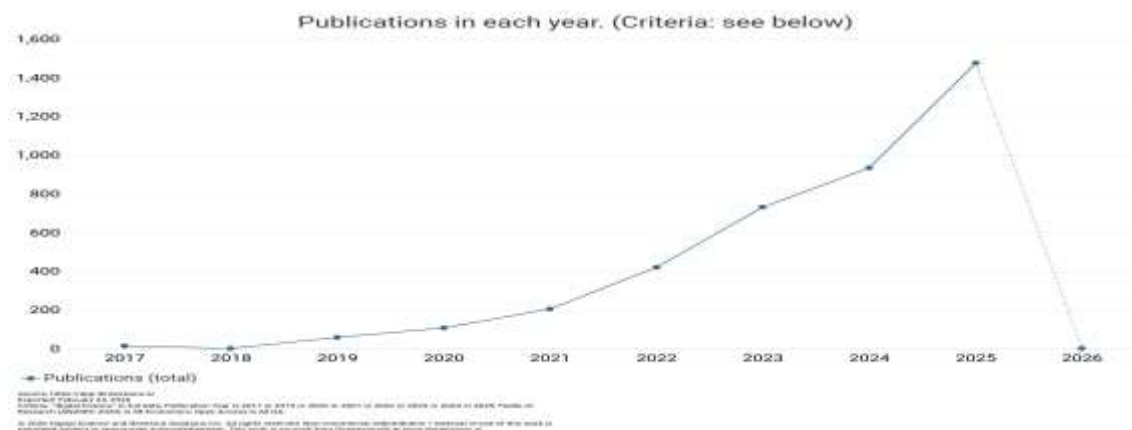


Figure 1. Publication Trend

### Social Structure: Authors' Co-Authorship Network

Co-authorship analysis resulted in several relatively fragmented collaboration clusters but connected through some central actors. The visualization shows small clusters with strong intra-cluster connections but limited inter-cluster connections. Some authors, such as Ran Qiyang, Li Weiwang Hui, and Huang Yiping, appear as nodes with relatively larger sizes compared to others, indicating higher productivity or intensity of collaboration. The network structure shows a linear and semi-separated pattern, rather than a dense core-periphery network. This indicates that research communities are still segmented based on certain groups or institutions. There is no sign of a dominant mega-cluster, but rather several research groups with their respective thematic specializations. The network density is relatively low, indicating that cross-cluster collaboration is still limited. Methodologically, this structure reflects a social structure that is not yet fully integrated globally. Thus, the research frontier is still developed by a relatively autonomous community.

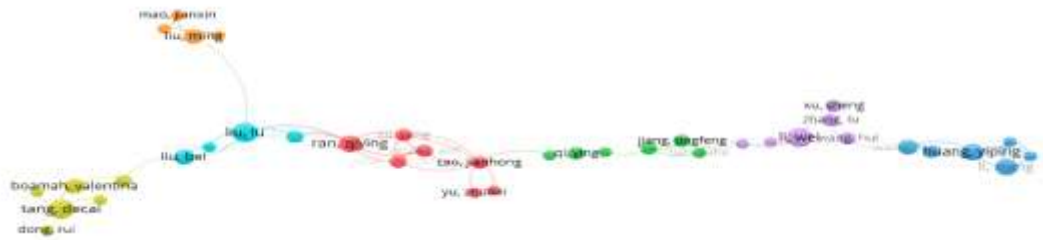


Figure 2. Co-Authorship Visualization

### Global Social Structure: Collaboration between Countries

Analysis of the country collaboration map shows that China is the dominant center in digital finance research production and collaboration. The size of China's node is much larger compared to other countries, indicating the highest publication contribution in the dataset. China has strong connectivity with the United States, United Kingdom, Indonesia, Malaysia, Saudi Arabia, and Pakistan. The United States and United Kingdom also appear as large nodes with many cross-regional connections. The network pattern shows a hub-and-spoke model with China as the main center. Southeast Asian countries such as Indonesia and Malaysia have semi-central positions, indicating an increasing role of developing regions. Western Europe (Germany, France, Switzerland) has moderate connectivity but is not dominant. Developing countries such as Pakistan and Saudi Arabia show increasing regional collaboration intensity. Overall, the structure of international collaboration shows the dominance of Asia, particularly China, in the global digital finance frontier

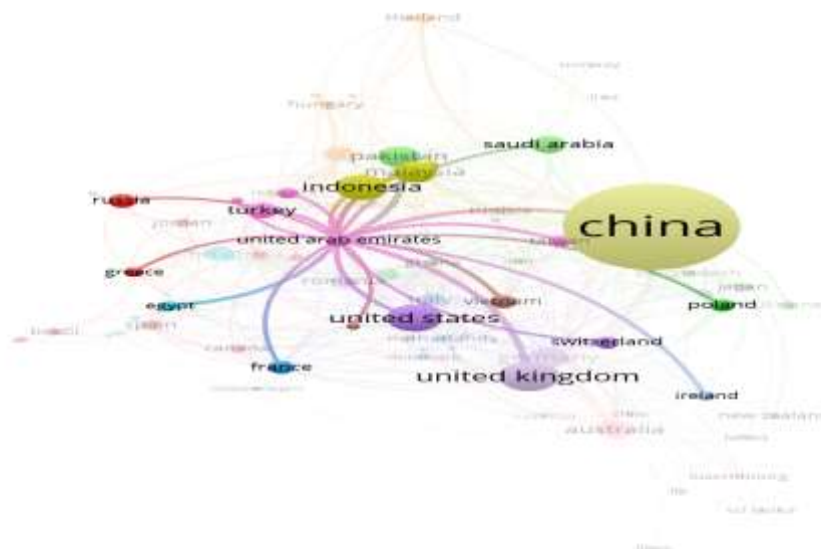


Figure 3. Visualization of Country Collaboration

### Institutional Structure: Network of Organizations

Mapping of institutions shows the dominance of Chinese-based universities. The largest nodes are seen at Southwestern University of Finance and Economics, Peking University, Zhongnan University of Economics, and Anhui University of Finance and Economics. These institutions form dense clusters with strong internal connections. Outside of China, institutions such as the University of International Business and Economics, University of Hong Kong, University of Southampton, and University of Johannesburg show significant connectivity. The network structure shows a clear geographical concentration in East Asia. Universities in Europe and Australia are present but with smaller node sizes. The high institutional concentration in China is consistent with the findings in the country analysis. This indicates that the production of digital finance knowledge is highly geographically centralized. Structurally, Chinese institutions form the core cluster in the social structure of research.

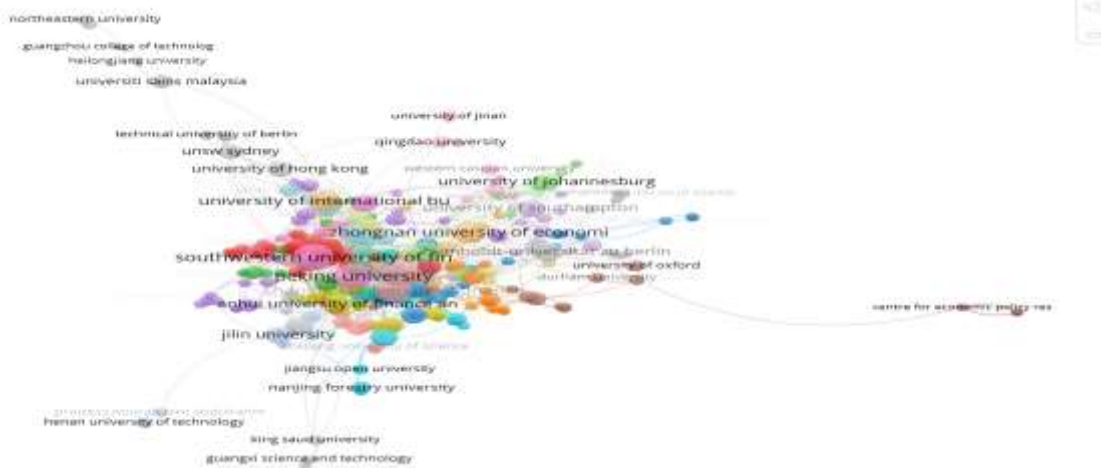


Figure 4. Visualization of the Organizational Network

### Conceptual Structure: Keyword Co-Occurrence

Co-occurrence analysis with a minimum threshold of 20 occurrences produced the main cluster consisting of the keywords: finance, integration, analysis, and case. The keyword “finance” has the largest node size, indicating the dominance of general financial topics in the literature. “Integration” appears as a central keyword connecting other themes, indicating a focus on the integration of financial and technological systems.



Figure 5. Co-Occurrence Visualization

“Analysis” and “case” indicate the dominant methodological approach in empirical studies. In addition, the keyword “growth” appears as a separate cluster with limited connections, indicating a sub-theme of macroeconomics or development. The conceptual structure appears relatively simple with one main cluster and one minor cluster. This suggests that the literature is still focused on general conceptual exploration and has not fragmented into very specific sub-themes. Epistemically, the research frontier is still centered on the integration and analysis of digital finance.

### Overlay Visualization: Temporal Evolution of Theme

The overlay visualization shows a color change from blue (2021) to yellow (2025). The keywords “finance” and “integration” tend to be yellow-green, indicating high intensity in the latest period. Meanwhile, keywords such as “case” tend to be more green-blue, showing that they appeared earlier in the observation period. The theme “growth” appears more yellow, indicating increased attention in 2024–2025. Temporally, the research focus shifts from case studies and descriptive analysis toward exploring the impact of growth and system integration. This evolution indicates a shift from early exploration toward consolidation and strengthening of economic impact. Thus, the latest frontier leads to the analysis of economic growth based on digital finance.



Figure 6. Overlay Visualization

### Density Visualization: Topic Density

Density visualization shows the brightest concentration of color on the keywords 'finance,' 'integration,' and 'analysis.' These areas form the main hotspot in the conceptual map. Meanwhile, 'growth' appears as a secondary hotspot with a lower density. The density distribution indicates that research is highly concentrated on the core theme of digital finance, while the growth subtheme is still developing. There are not many separate hotspots, which indicates that topic diversification has not yet occurred widely. This is consistent with the relatively simple co-occurrence structure. Overall, the high density in the core area shows the dominance of general digital finance discourse in the context of the supply chain.



Figure 7. Density Visualization

Tabel 1. Summary of Bibliometric Findings

Dimension of Analysis	Key Findings	Interpretation
Publication Trend	Significant surge 2021–2025	Rapid growth phase
Co-authorship	Small cluster fragmentation	Collaboration is not yet integrated
Country	China's Dominance	Asia as a research center
Institution	Concentration of Chinese universities	Core geographic cluster
Co-occurrence	Focus on finance & integration	General conceptual frontier
Overlay	Enhancement of the growth theme	Shift to economic impact
Density	Hotspot in finance	High topic concentration

### Empirical Synthesis

Overall, the results of the bibliometric analysis indicate that the digital finance literature in the context of the supply chain is experiencing exponential growth, with geographical and institutional dominance from China. The social structure is still relatively fragmented, but international collaboration is beginning to increase. The conceptual structure shows a concentration on the integration of financial systems and economic impact analysis, with an emerging focus on growth. The latest research frontier is moving towards strengthening macroeconomic analysis and cross-system integration. Thus, this domain is in a phase of conceptual consolidation with opportunities for thematic diversification in the future.

### DISCUSSION

The exponential development of digital finance publications during the 2021–2025 period indicates that this field has entered a phase of structural acceleration in the global financial landscape. The significant surge in publications, particularly in 2024–2025, suggests an intensification of academic attention to the

transformation of payment systems, digital intermediation, and the integration of technology within the financial ecosystem. These findings are consistent with the argument that digital finance is no longer a peripheral phenomenon, but rather an integral part of modern finance that continues to evolve alongside technological innovation and changes in business models (Ozili, 2022). This sharp increase also aligns with the expansion of digital financial services in the transformation of the global money and credit markets. In the context of supply chain finance, this growth reflects the increasing need for faster, more transparent, and digitally integrated financing systems. Thus, the temporal dynamics of the literature indicate that the research frontier moves from the exploration stage toward conceptual and institutional consolidation. Theoretically, this phase can be interpreted as an early maturation period (early consolidation phase) in the cycle of scientific development. This acceleration also underscores the relevance of public policy and simultaneous industrial transformation. Therefore, this quantitative growth has substantive implications for the formation of global knowledge structures.

The social structure identified through co-authorship analysis shows a relatively fragmented collaboration pattern with several small clusters that are not fully integrated. This fragmentation indicates that the digital finance scientific community is still developing within specific research groups, likely based on institutions or regions. These findings align with the characteristics of a rapidly developing field, where cross-cluster collaboration has not yet fully consolidated. Previous literature emphasizes that the social structure of science can be understood through co-authorship relations as a proxy for academic community interactions (Judijanto, 2025; Judijanto & Setiyawan, 2025; Judijanto & Supriadi, 2025). In this context, the low network density indicates opportunities for increasing international and interdisciplinary collaboration. Compared to more mature fields, the social structure of digital finance still shows limited cohesion. This can be caused by the multidisciplinary nature of the topic, which encompasses finance, information technology, public policy, and development economics. This fragmentation also reflects the heterogeneity of research focus, ranging from digital payments to DeFi and CBDCs (Alfawareh & Al-Kofahi, 2023; Li & Xu, 2021). Thus, the social structure of the literature indicates significant opportunities for collaborative expansion.

China's dominance in the country collaboration map provides important findings regarding the global digital finance knowledge production centers. The very large size of China's node and its connectivity intensity with various countries indicate a central role in forming the research frontier. These findings are consistent with the rapid development of fintech and digital payment systems in East Asia, particularly China, which has become a laboratory for digital financial policy and innovation. In the literature, digital finance is often associated with payment system transformation and aggressive financial technology expansion in the region (Yadav & Banerji, 2023). Strong connectivity between China and developing countries such as Indonesia and Pakistan indicates knowledge diffusion to the Global South region. This indicates that the frontier of digital supply chain finance is formed not only in developed countries, but also in the

context of developing economies experiencing rapid digitalization. Thus, the geographical structure of the literature reflects a shift in the center of gravity of digital finance to Asia.

The institutional structure centered on Chinese universities increasingly reinforces the findings of geographical dominance. Institutions such as Southwestern University of Finance and Economics and Peking University form core clusters within the collaboration network. This concentration indicates the presence of research centers that serve as knowledge hubs in the domain of digital finance. The literature emphasizes that institutional concentration often reflects research capacity, policy support, and investment in digital technology (Maier & Meyer, 2017). With that dominance, the research frontier tends to be shaped by the regulatory and innovation perspectives developing in that region. However, the involvement of institutions from Europe and Africa shows that the literature remains global even though it is centralized. This pattern also indicates the potential for epistemic asymmetry, where knowledge production is largely concentrated in one region. Therefore, cross-regional collaboration becomes important to broaden conceptual and contextual perspectives.

From the conceptual structure perspective, the co-occurrence findings show the dominance of the keywords “finance” and “integration” as the center of the discourse. This indicates that the literature still focuses on the integration of financial systems with digital technology and supply chain networks. These findings are consistent with literature that positions payment modernization and system efficiency as the main determinants of digital finance development (N. & B., 2025). In addition, cross-system integration is also relevant to the discourse on open finance and platform interoperability (Chatzarakis et al., 2024). The strong connection between “analysis” and “case” indicates the dominance of empirical case study-based approaches in the early period of topic development. In other words, the initial frontier was formed through empirical exploration before developing into a broader macro analysis. The relatively simple conceptual structure indicates that this field is still at the stage of thematic consolidation. This opens opportunities for the differentiation of sub-themes such as sustainability finance or green supply chain digitalization (Das-Gupta, 2025)

The temporal evolution of themes through overlay visualization shows a shift towards focusing on “growth” and economic impact in the most recent period. This shift indicates that the discourse is no longer limited to technology adoption but has evolved towards evaluating macroeconomic impacts and development. Previous literature emphasizes the relationship between digital finance and economic growth and financial inclusion (Agarwal et al., 2006). Thus, the latest frontier seems to move from the question “how systems are integrated” to “what is the impact on growth and economic stability.” This shift has theoretical significance as it connects digital finance literature with development and macroeconomic theory. In the context of supply chain finance, the focus on growth indicates attention to improving the efficiency of global value chains. Therefore, the evolution of themes indicates analytical deepening and an expansion of research scope.

Answering the research problem formulation, the intellectual structure of digital finance and supply chain finance literature in the period 2021–2025 shows a foundation dominated by the discourse of system integration and digital finance modernization. The conceptual structure shows a concentration on the core themes of finance and technology integration, with an emerging theme on economic growth. The social structure shows fragmentation in author collaboration, yet a geographical and institutional dominance from China as the center of knowledge production. The current research frontier is moving towards the analysis of economic impact and the strengthening of cross-system integration. Thus, the literature forms a hub-dominant pattern with a thematic concentration on integration and growth. Overall, the answer to the problem formulation indicates that the frontier of digital supply chain finance is undergoing conceptual consolidation and geographical expansion. Thus, the literature forms a hub-dominant pattern with a thematic concentration on integration and growth. Overall, the answer to the problem formulation indicates that the frontier of digital supply chain finance is undergoing conceptual consolidation and geographical expansion.

The theoretical contribution of this research lies in providing a map of the intellectual, conceptual, and social structure based on large-scale empirical data. By using 3,936 documents, this study shows how digital finance develops from a system integration perspective to economic impact evaluation. Its methodological contribution is the application of a large-scale network bibliometrics design that is transparent and replicable according to science mapping practices (Yang et al., 2023). Academically, these results provide a foundation for further research that aims to explore more specific sub-themes. Practically, understanding the centers of collaboration and dominant themes can help policymakers and industry players formulate strategies for supply chain financial digitalization. However, this study has limitations, including the use of a single database (Dimensions) and a relatively short time period, so some citations are not yet mature. In addition, the interpretation of the network structure depends on the threshold parameters used. Therefore, future research can expand the scope of databases and conduct longer longitudinal analysis. Considering these limitations, the findings still provide a comprehensive overview of the digital finance research frontier in the context of the global supply chain.

## **CONCLUSION AND RECOMMENDATION**

This study aims to explore and map the research frontier in the domain of digital finance and supply chain finance through a large-scale bibliometric approach using 3,936 documents indexed in Dimensions for the period 2021–2025. Based on the analysis of publication trends, social structure, conceptual structure, as well as thematic mapping and topic density, it was found that this field has experienced exponential growth over the last five years and has entered an early consolidation phase in the science development cycle. A significant surge in the number of publications during the 2024–2025 period indicates increasing academic attention to the transformation of digital financial systems, the integration of technology in financial intermediation, and its economic implications in the supply

chain ecosystem. The social structure shows fragmentation in author collaboration, but geographically and institutionally there is strong dominance from China as a center of production and knowledge collaboration. Meanwhile, the conceptual structure shows a concentration on core themes such as finance, integration, and analysis, with the theme of growth emerging as the newest frontier that marks a shift in focus towards the evaluation of economic impact. Thus, the frontier of digital supply chain finance research is currently moving from the stage of integrative exploration towards systemic impact analysis and development.

The main contribution of this research lies in providing a comprehensive map of the intellectual, conceptual, and social structure in digital finance literature related to supply chain finance. Theoretically, these findings show that the evolution of the field is determined not only by technological innovation but also by cross-system integration and global collaboration dynamics. Methodologically, the application of large-scale network bibliometric analysis with transparent parameters provides a replicable model for similar research in the field of digital finance. Practically, the identification of collaboration centers, thematic hotspots, and emerging themes can serve as a basis for formulating future research agendas as well as supply chain financial digitalization policies. For future research, it is recommended to expand the scope of the database, conduct longitudinal analyses with longer time spans, and explore specific sub-themes such as sustainability, cybersecurity, and blockchain integration in supply chain finance. Comparative approaches across regions are also important to reduce geographical bias and enrich conceptual perspectives. Thus, this research provides a strong empirical foundation for the development of theory and practice in digital supply chain finance in the era of global digital economic transformation.

## **SUGGESTION**

This research still has limitations so further research is needed regarding *Tracing Research Frontiers in Digital Finance and Supply Chain Finance: A Large-Scale Bibliometric Analysis*. Representation to perfect this research and increase insight for readers and writers.

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