

Bibliometric Analysis on SCF Adoption: A Key to Growth for Cross-Border E-Commerce SMEs

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Abstract

Despite the growing importance of Supply Chain Finance (SCF) for cross-border e-commerce SMEs, research on their adoption factors remains scarce. This study analyses 257 publications to bridge this gap. Findings reveal a rapidly growing field with China leading in both research and adoption. Performance, management, and impact are central themes, while blockchain and online SCF platforms emerge as trends. Future research directions include investigating blockchain's impact on risks, understanding the role of e-retailer platforms, and analysing specific challenges faced by cross-border e-commerce SMEs. This research highlights the increasing importance of SCF and identifies key areas for further exploration to optimize its benefits for this crucial sector.

Introduction

Cross-Board E-commerce small and medium enterprises (SMEs) are the lifeblood of the global economy, contributing significantly to job creation, innovation, and economic growth. However, access to capital often remains a major hurdle for SME growth, hindering their ability to scale operations, compete effectively, and navigate economic fluctuations. In this context, supply chain finance (SCF) has emerged as a powerful tool, unlocking liquidity within the supply chain and offering unique benefits for both cross-board E-commerce SMEs and their larger trading partners. Supply Chain Finance (SCF) is a broad term encompassing various financial methods aimed at optimizing working capital and improving cash flow within a supply chain. It leverages technology and financial partnerships to expedite payments and unlock liquidity for both buyers and suppliers. Here's a deeper dive into its key aspects,

e.g., improving cash flow, enhancing access to financing, strengthening supplier relationships, increasing competitiveness, and reducing risk. Early payment for invoices enables suppliers to access funds faster, freeing up working capital for investments and growth. Conversely, buyers can extend payment terms without impacting supplier relationships. SCF programs often bypass traditional creditworthiness assessments, providing alternative finance options for cross-board E-commerce SMEs or suppliers with limited access to traditional loans. Timely payments incentivize quality goods and timely deliveries, fostering stronger collaboration and trust between buyers and suppliers. Improved cash flow and access to financing empower cross-board E-commerce SMEs to offer competitive pricing and terms, enhancing their market position. SCF programs often mitigate payment risks by using instruments like guarantees or factoring, providing financial security for both parties.

SCF holds immense potential for cross-board E-commerce SMEs. However, its adoption across the globe presents a mixed landscape. It is facing challenges, including cross-board E-commerce SMEs having limited knowledge of SCF, technical barriers, costly transaction, risk of transaction, and unequal accessibility. Many SMEs still lack awareness or a full grasp of the specific benefits and complexities of SCF programs. cross-board E-commerce SMEs concern fees and potential discounts associated with SCF programs can deter some cross-board E-commerce SMEs from participating. Integrating SCF platforms with existing financial systems can be challenging for smaller businesses with limited resources. Risk aversion and concerns about potential liabilities can dissuade some cross-board E-commerce SMEs from exploring SCF options. Larger corporations often have easier access to SCF programs due to their stronger bargaining power and creditworthiness. However, there is no bibliometric research that focus on factors for SMEs Adoption of Supply Chain Finance. By the Bibliometrix (R package), this research aims to shed light on the key factors that cross-board E-commerce SMEs adopting to SCF.

Method and Data

This research uses Bibliometrix, which is an R package for bibliometric analysis, boasts popularity due to its diverse features. It offers comprehensiveness, covering multiple analysis aspects, user-friendliness for non-experts, and automated workflows. Flexibility, big data handling, and rich visualizations further enhance its appeal. This open-source tool, applicable across disciplines, empowers researchers with deeper insights into academic literature.

The corpus data that this research analysed is obtain from the Web of Science core collection by conducting following search strategy: supply chain finance (All Fields) and small medium enterprise (All Fields) and cross-board e-commerce (All Fields). Initially, 257 publication data are obtained. After manually check to identify duplicates, no duplicates is detected. Eventually, there are 257 publication data are valid for next stage.

Results

Table 1 shows an overview of analysed data. This research involves 257 publications from 125 sources, 634 authors. The number of publications was fluctuating between 2005 to 2017, then sharply increasing (Figure 1). Annual growth rate was 10.78%.

Table 1 Main Information of Analysed Corpus

Timespan	2005:2024
Sources (Journals, Books, etc)	125
Documents	257
Annual Growth Rate %	10.78
Document Average Age	3.37
Average citations per doc	20.18
References	12290
Keywords Plus (ID)	522
Author's Keywords (DE)	852
Authors	634

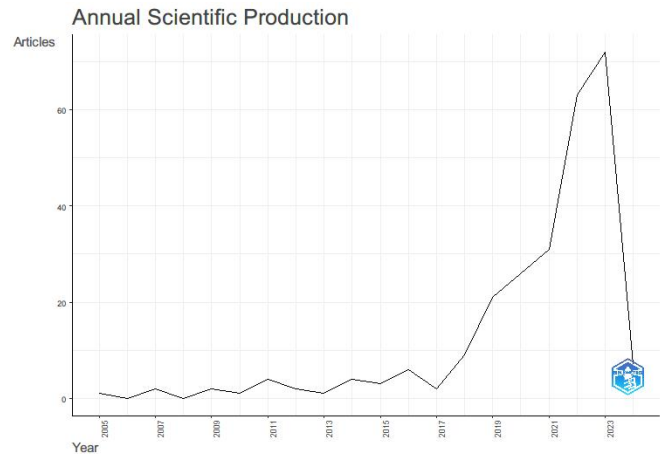


Figure 1 Annual Scientific Production

In term of source, Figure 2 shows that Sustainability is outstanding in this rank with 17 publications. Following are Annals of Operations Research, Journal of Cleaner Production, and International Journal of Production Research.

Table 2 The Most Relevent Source

SUSTAINABILITY	17
ANNALS OF OPERATIONS RESEARCH	9
JOURNAL OF CLEANER PRODUCTION	9
INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH	8
ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH	7
INDUSTRIAL MANAGEMENT & DATA SYSTEMS	7
INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS	7
JOURNAL OF BUSINESS & INDUSTRIAL MARKETING	6
FRONTIERS IN PSYCHOLOGY	5
INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGEMENT	5

Song H leads this rank with 10 publications, and is the most cited author (shown in Table 2). This indicates Song H has made significant contribution in this field. Ali Z is another author who has made significant contributions, and published 7 articles, and received 31 citations. Mehreen A ranks the third in Table 3, although published only 6 articles.

Table 3 The Most Cited Authors

SONG H	36
ALI Z	31
MEHREEN A	31
BI GONGBING BG	30
WANG GJ	25
XIE C	25
ZHU Y	25

YU K	23
LU Q	22
CANIATO F	19

Figure 3 shows the most productive institutions, Renmin University of China leads the rank with 26 publications, following are Central University Finance and Economic of China, and University Science and Technical (China). It is noticeable that Chinese university occupies this rank. This is reasonable, due to China is leading country in cross-border e-commerce. Table 3 shows the most productive country. China is the most productive country, followed by UK and Malaysia. This doesn't like other fields. Generally, China and USA are the two leading countries. Figure 4 show the collaboration among countries. China is the core of cooperation network. South-east Asia is dynamic region.

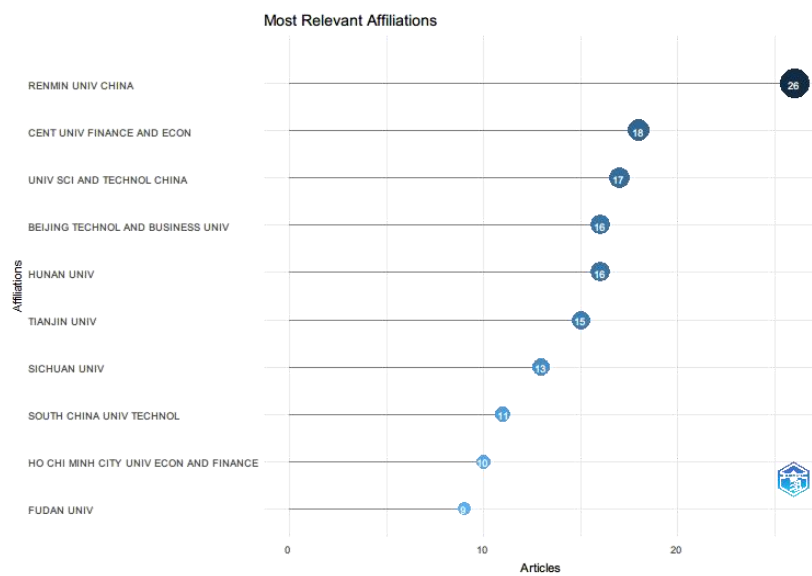


Figure 3 The Most Productive Institutions

FRANCE

13

CHINA	563
UK	47
MALAYSIA	46
INDIA	41
USA	38
AUSTRALIA	29
SOUTH KOREA	25
ITALY	20
VIETNAM	20

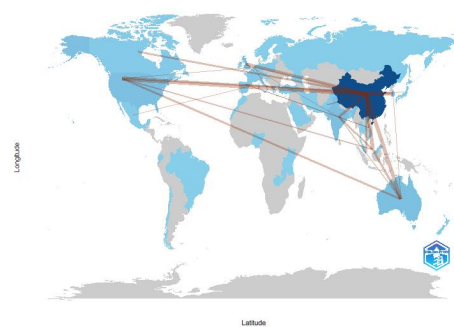


Figure 4 Countries Collaborations

In bibliometric analysis, a "highly cited article" indicates a research publication that has been referenced a significant number of times by other researchers in the same field. Table 4 shows the 10 most cited articles.

Table 4 The Most Cited Articles

Paper	DOI	Total Citations
BHAGWAT R, 2007, COMPUT IND ENG	10.1016/j.cie.2007.04.001	367
WONG LW, 2020, INT J INF MANAGE	10.1016/j.ijinfomgt.2019.08.005	295
KIEFER CP, 2019, BUS STRATEG ENVIRON	10.1002/bse.2246	169
ZHU Y, 2019, INT J PROD ECON	10.1016/j.ijpe.2019.01.032	152
CAGNO E, 2013, APPL ENERGY	10.1016/j.apenergy.2012.10.053	147
DAMIANOS LEKKAKOS S, 2016, INT J PHYS DISTRIB LOGIST MANAG	10.1108/IJPDLM-07-2014-0165	122
CABALLERO-MORALES SO, 2021, RES INT BUS FINANC	10.1016/j.ribaf.2021.101396	117
YAN N, 2020, EUR J OPER RES	10.1016/j.ejor.2019.10.046	107
THUN JH, 2011, INT J PROD RES	10.1080/00207543.2011.563901	93
CHONG AYL, 2009, INTERNET RES	10.1108/10662240910965379	83

In bibliometric analysis, a word cloud can indicate the most prominent words in the cloud likely represent the main themes and topics discussed within the analysed text collection. This helps identify overarching areas of research focus or key concepts within a specific field. Figure 5 represents the keyword cloud. Performance, management, and impact are dominant words. This indicates that How dose SCF influent performance of cross-border e-commerce SMEs, and Managerial aspect and impact of SCF for cross-border e-commerce SMEs are hotspot of this field.

In bibliometric, a thematic map is a visualization tool that uses co-word analysis to identify and represent the main themes within a collection of research publications. It essentially creates a two-dimensional map where themes are represented as clusters of keywords that frequently appear together in the analysed texts. This visualization tool offers invaluable insights. It unveils the dominant research areas within a field, allowing researchers to grasp the landscape and identify their place within it. By uncovering connections between themes, the map fosters understanding of the broader research ecosystem, highlighting synergies and potential collaborations. Tracking thematic shifts across timeframes becomes possible, revealing emerging trends and fading topics. Thematic maps even facilitate comparisons between different groups of publications, enabling researchers to identify distinctions in focus and direction. Figure 6 shows thematic map. The themes that are in the first quadrant is motor theme. Motor theme are worth to further dig into.



Figure 5 Keywords Cloud

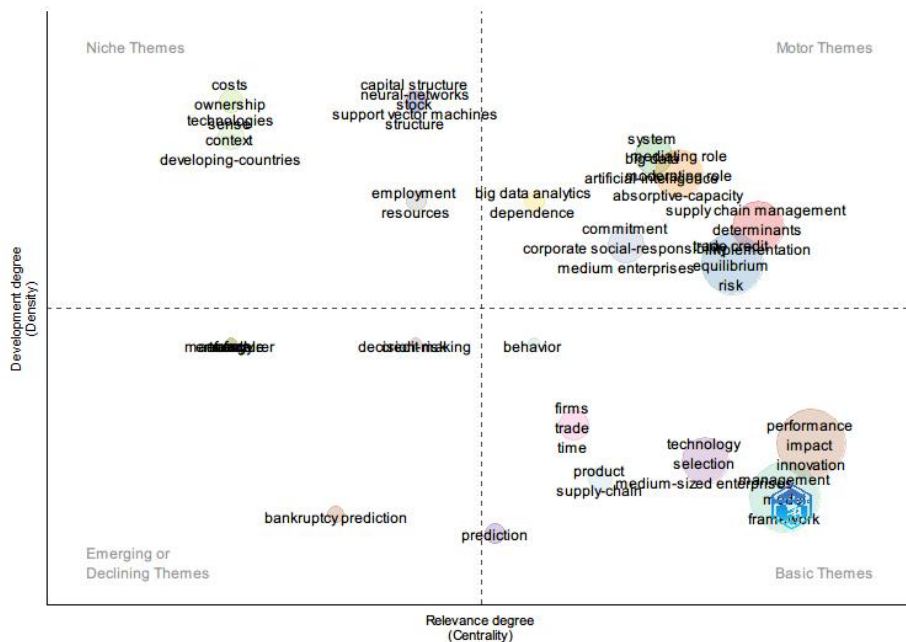


Figure 6 Thematic map

Discussion

The research by Xiao and et.al. (2023) focuses on the risk assessment of blockchain-driven supply chain finance (SCF) (Xiao et al. 2023). The study highlights the significance of blockchain technology in enhancing SCF solutions due to its distributed, immutable, and tamper-proof nature that can address issues of asymmetric information and low financing efficiency. In China, the use of blockchain for SCF became widespread after 2016, offering increased transparency that potentially reduces credit risk for both buyers and sellers. Through their analysis, they found that blockchain technology has the potential to improve supply chain risk management by increasing transparency and accelerating integration, which is critical in global supply chain financial operations. However, there are gaps in previous studies regarding the actual impact of blockchain on supply chain risks, particularly concerning risk assessment within the context of blockchain-driven SCF. The paper emphasizes the importance of understanding how different stakeholders perceive the influence of blockchain on SCF and suggests that future work should consider financial

constraints faced by all participants in the supply chain, as well as how blockchain technology can be applied to other SCF solutions.

The article by Wong et al. (2020) investigates the adoption of blockchain technology in operations and supply chain management (OSCM) among Small-Medium Enterprises (SMEs) in Malaysia (Wong et al. 2020). The authors adopt the Technology, Organisation, and Environment (TOE) framework to analyse how technological factors like relative advantage and complexity, organizational aspects such as upper management support and cost, and environmental elements including market dynamics, competitive pressure, and regulatory support impact SMEs' intention to adopt blockchain for BOSCM. The study found that while blockchain has potential benefits for improving visibility, traceability, provenance, risks, privacy, and security within supply chains, its adoption is a gradual process influenced by several significant factors: competitive pressure, complexity, cost, relative advantage, upper management support, market dynamics and regulatory support. The paper contributes to the literature by identifying key drivers and inhibitors of blockchain adoption in SMEs and underscores the necessity for businesses to consider the unique challenges and opportunities posed by blockchain within their individual contexts to leverage digital transformation for sustainable growth and competitive advantage in the global marketplace.

Zhu et al. presents a novel hybrid ensemble machine learning approach called RS-Multibooting to address the critical issue of forecasting credit risk for small and medium-sized enterprises (SMEs) within the context of supply chain finance (SCF) (Zhu et al. 2017). The authors note that traditional credit risk models are inadequate for accurately predicting SME credit risk, which is particularly important given the high non-performing loan ratios associated with these businesses in China. This research contributes to the development of more robust and accurate forecasting tools for FI managers, enabling them to make better-informed decisions on lending to SMEs engaged in SCF arrangements. By effectively identifying and quantifying credit risks, the proposed RS-Multibooting model supports the enhancement of SMEs' financing capabilities while mitigating the inherent risks involved in SCF transactions.

Caballero-Morales discusses the role of innovation as a recovery strategy for small and medium-sized enterprises (SMEs) in emerging economies amidst the COVID-19 pandemic. The author highlights that SMEs, which are often family-owned and have limited resources, face significant challenges due to the containment measures implemented worldwide, such as social isolation, closure of public places, and disruption of non-essential activities. These actions have led to decreased economic flow, unemployment, business closures, and exacerbated social inequality. The methodology implicitly supports SCF relationships by advocating for strategic management of cash flows, supplier relations, and risk mitigation. By innovating and optimizing operations, SMEs can improve their financial stability and creditworthiness, thereby potentially enhancing their access to SCF instruments such as trade financing, factoring, or supply chain collaboration that can strengthen their supply chains and sustain their businesses during times of crisis (Caballero-Morales 2021).

Yan et al. emphasize that compared to traditional supply chain finance (SCF), there is a growing interest in online SCF, also known as e-retailer finance, where digital platforms offer an alternative source of funding (Yan et al. 2020). This novel form of SCF addresses SMEs' capital needs more efficiently by leveraging technology and platform-based transactions, lowering financing costs, and improving fill rates for orders and supplier borrowings. The paper contributes to understanding the strategic importance of integrating e-retailer finance

into a dual-channel retail setting, demonstrating that it can optimize working capital management and profitability for SMEs. By providing guidelines for e-retailers and capital-constrained suppliers, the study offers insights into utilizing e-retailer finance to enhance the competitiveness and efficiency of the dual-channel structure and to make optimal pricing decisions. Overall, the relationship between SCF and SMEs in this scenario is characterized by the e-retailer's pivotal role in facilitating better access to funds and markets for SMEs, thus overcoming some of their most pressing challenges in today's competitive landscape.

Thun et al. presents an empirical analysis of supply chain risk management in small and medium-sized enterprises (SMEs), with a focus on the automotive industry in Germany. The authors address the heightened need for efficient and lean processes, which exposes manufacturing companies to significant supply chain risks due to increased business dynamics and complexity. the study underscores the challenges SMEs face in mitigating supply chain risks due to their financial constraints and resource limitations. SCF, though not explicitly discussed, could be considered a complementary strategy that may help SMEs better manage cash flow and liquidity issues, enabling them to either buffer against supply chain uncertainties or invest in the necessary risk mitigation tools that large-scale enterprises typically deploy(Thun et al. 2011).

Draw from above discussed literatures. Supply Chain Finance (SCF) presents a wealth of opportunities for cross-border e-commerce small and medium-sized enterprises (SMEs) as they grapple with the complexities of accessing finance, managing cash flow, and mitigating various risks inherent in international trade. One key opportunity lies in leveraging the creditworthiness of larger buyers or core companies within their supply chains to gain access to affordable working capital, particularly crucial for SMEs with limited collateral and established credit history who may struggle to secure traditional bank loans.

Real-time tracking capabilities enabled through digital systems streamline trade finance processes such as factoring and invoice discounting, accelerating payments and cutting administrative costs. This improved liquidity management is invaluable for cross-border SMEs looking to manage their cash flows effectively. Furthermore, blockchain-driven SCF solutions can integrate IoT data and real-time inventory visibility, empowering these businesses to make more informed decisions and allocate resources efficiently.

Machine learning techniques applied to risk assessment within blockchain-based SCF have the potential to significantly improve the accuracy of predicting SME credit risk, allowing financiers to provide tailored funding options and mitigate default rates. These advancements contribute to a safer, more inclusive environment for cross-border commerce, where even SMEs without extensive track records can establish credibility and engage in larger-scale operations. However, several challenges accompany the adoption of blockchain-driven SCF. For instance, many SMEs might face hurdles in investing in new infrastructure and developing the necessary skill sets to integrate advanced technologies into their operations. Regulatory differences across jurisdictions create complex legal and compliance landscapes, making it difficult to implement uniform SCF solutions worldwide. Standardization efforts are essential to ensure interoperability between different platforms and data formats used in global supply chains. Despite these challenges, the benefits of SCF for cross-border e-commerce SMEs are substantial. By providing timely access to funds and flexible payment terms, SCF can bolster financial stability, foster growth, and enhance business resilience. Enhanced risk management capabilities through SCF enable SMEs to respond effectively to supply chain disruptions, ensuring continuity of operations. Improved financial accessibility

leads to greater capacity for market expansion, strategic partnerships, and entry into new markets. Additionally, the streamlining of financial processes through automation results in reduced transaction costs, increased efficiency, and ultimately higher profit margins.

Conclusion

This research, analysing 257 publications, explores factors influencing the adoption of Supply Chain Finance (SCF) by cross-border e-commerce SMEs. While research exists on SCF and SMEs, studies specifically focusing on cross-border e-commerce SMEs' adoption factors are scarce. This research addresses this gap. The field is experiencing rapid growth, with publications increasing at a 10.78% annual rate, indicating heightened interest in SCF and its impact on cross-border e-commerce. China leads in both research output and adoption, followed by the UK and Malaysia, reflecting China's dominance in cross-border e-commerce. Performance, management, and impact are central themes, suggesting research focuses on how SCF influences performance and how it's managed for cross-border e-commerce SMEs. Emerging trends include blockchain technology and online SCF platforms, offering potential solutions for risk assessment, efficiency, and financing access.

Future research directions include investigating the actual impact of blockchain on SCF risks for cross-border e-commerce SMEs, exploring how financial constraints and regulations impact SCF adoption across different regions, examining the role of e-retailer finance platforms in facilitating SCF access for SMEs and its impact on dual-channel retail models, and analysing the specific challenges and opportunities faced by cross-border e-commerce SMEs in adopting SCF compared to other industries.

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