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Supply chain finance factors and the role of supply chain finance on Chinese SMEs innovation performance: The moderating effect of financial constraints

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Abstract

Purpose: The investigation of the innovation performance (IP) of small and medium enterprises (SMEs) is of paramount importance for the sustainable development of the entire social economy. This paper seeks to elucidate the internal mechanism through which financial constraints (FC) impact the IP of SMEs, with a particular focus on supply chain finance (SCF) and the associated influencing factors by proposing a thorough conceptual framework.

Design/methodology/approach: Via the process of the literature review and subsequent analysis, relevant content on the key terms of IP, SCF, FC, long tail theory (LTT) and social network theory (SNT) is explored. By evaluating the current research in the Web of Science, Google Scholar and authoritative websites, the relationships between crucial concepts are elucidated and a research framework is constructed.

Findings: This study results that the advancement of SCF is shaped by a multitude of factors, including the structure of the supply chain network, the extent of digitization, the level of trust and the practice of information sharing. The IP of SMEs may be enhanced by the implementation of SCF, and the presence of FC, as a moderating variable, serves to moderate the relationship between the aforementioned variables.

Research limitations/implications: The study exclusively employed a literature review method and the region is limited in China, the possible absence of empirical evidence may hinder a thorough comprehension of the relationship mechanism. Nevertheless, this research framework offers guidance and fresh theoretical angles for future empirical investigations and riches the literature of the relevant areas.

Practical implications: The paper offers a theoretical reference on the IP and SCF of SMEs for the policymakers and firms who are interested in this topic, enabling a greater comprehension and resolution to the challenges encountered in this arena while promoting related practices across all sectors of society.

Originality/value: This article uses LTT and SNT to analyze the moderating effect of FC, the relationship between the IP of SMEs and SCF and the related factors, which is unique and offers a helpful resource for future research in related fields, both theoretically and practically.

Keywords: Innovation performance, Supply chain finance, Financial constraints, SCF factors, Long tail theory, Social network theory

Introduction

SMEs have always been regarded as the new force of global economic growth and innovation (Allocca & Kessler, 2006; Kolsi & Al-Hiyari, 2022). They are essential to a vast majority of economies, notably those located in developing economies (Karmaker et al., 2023; Manzoor et al., 2021). SMEs constitute a fundamental pillar of the global economic system, playing an vital function in job creation and global economic expansion (Das, 2021). Data from the website of World Bank, SMEs contribute to above 50% of all jobs worldwide as well as roughly 90% of all businesses can contribute up to 40% of formal SMEs' share in the GDP of emerging economies (World Bank, 2019). The International Labour Organization predicts that by 2030, accommodating the expanding global labour force will require the creation of 600 million jobs (ILO, 2023), making the development of SME's a matter of great importance to many governments around the globe (World Bank, 2019). What's more, the global Sustainable Development Goals of 8 (decent work and economic growth) and 9 (industry, innovation, and infrastructure) are dependent on SMEs to be accomplished (United State, 2023). Although SMEs are so important in economic and social development, they often face huge financing challenge (Taghizadeh-Hesary, 2016), which limits their development in the field of innovation (Oudgou, 2021). With 41% of SMEs in the least developed areas revealing financial constraints are major limitation to their growth and development, in middle-income countries this figure is about 30% (United State, 2023). This highlights the urgent necessity to understand the issue's solution.

In China, SMEs have long been valued as crucial contributors to China's economy. They are numerous and significantly boost employment, GDP, and other factors at the national level. Additionally, they offer a great deal of innovation potential and are crucial for maintaining social and economic resilience (Zhou & Li, 2020). Relevant data demonstrate that Chinese SMEs exhibit the "56789" characteristics, which include a greater than 50% tax revenue contribution, a greater than 60% GDP contribution, a greater than 70% technological innovation completion rate, a greater than 80% employment rate in urban areas, and a greater than 90% enterprise share (Kemeng, 2023). The Chinese authority has also developed various new strategies to greatly advance the private economy of SMEs in order for them to engage in innovative activities and improve IP (MIIT, 2022). However, a significant barrier for SMEs engaged in creative activities is difficult to access funding (Wang, 2016). Data from the "Small and Micro Financing Development and Prospects Research Report" indicates that a major obstacles encountered by SMEs is attaining the necessary financial resources, by the end of 2021, 66% of small and micro firms would need loans, but only 21% of them have gotten support from banks (IResearch, 2023). The ability of SMEs to invest in creative projects is severely restricted, endangering their survival and innovative development, leading to worse corporate IP.

Concurrently, SCF has garnered substantial amount of consideration as a financial innovation tool since it is thought to have the potential to give SMEs the financial assistance they require for innovation (Song et al., 2018). Especially in light of the latest advancements of information technology, digital trade commerce is gradually conducted across many participants in the supply chain network, which reinforces the clarity and traceability of transactions (Ahmed & MacCarthy, 2023). The supply chain network is strengthened through mutual trust and sharing information among its participants (Gaurav Kabra, 2016). The degree of cooperation across all chain participants encourages the growth of the supply chain financial industry and further opens up additional opportunities for the majority of SMEs to enhance their IP and ease financing limitations (Rufei et al., 2017). In particular, with the recent rise of ChatGPT-like big language model products such as BloombergGPT (Wu et al., 2023a) used in the financial

field, it has broadened new application prospects for the further development of SCF, and combined with the application of knowledge graph, it effectively improves the professionalism and service capability of SCF practitioners, and drastically reduces supply chain operation costs (Yan et al., 2023). In light of this, international and Chinese research has begun to delve into the intricate connection between SME IP, FC, SCF and its factors (Guo et al., 2023; Qiang Wang, 2023). Although some research has made important progress in these fields, there are still many unsolved problems and opportunities to explore. This article aims to study these issues in depth, including whether SCF affects IP, the complex moderating role of FC in the IP of SEMs and the impact of SCF influencing factors on SCF. By integrating previous research results and the latest data, this paper will provide new insights and provide practical management and policy suggestions for the IP and financing support of SMEs.

Literature Review

Innovation Performance

IP is an assessment of the outcomes or impacts of innovation initiatives on a business or organization, which reflects the degree of enterprise innovation success (Duan, Mu, et al., 2021). The evaluation of IP has a significant impact on the competition and further development of enterprises, especially for SMEs. Therefore, numerous academics have extensively studied on the IP classification, measurement and strategies.

According to the type of innovation, IP can be categorized into four categories: product innovation (development of new products / services) (Guimarães et al., 2016), process innovation (improving production or service processes) (Alegre & Chiva, 2013), market innovation (entering new markets or expanding customer base) (Wang et al., 2020), and organizational innovation (improving internal management and operations) (Cordero, 1990). Based on the resource-based perspective, evaluation of IP can be sorted by two dimensions of internal innovation and external innovation (Qinxuan et al., 2016). Some scholars assess IP by dividing the developed and the developing regions into different categories, as well as dividing enterprises into high- and low-tech enterprises (Kirner et al., 2009).

Different types of innovation may use different measurement techniques and key performance indicators. The market share of new goods, the return on R&D investment, the success rate of innovation initiatives, the number of patent applications, customer happiness, etc. are only a few examples of these indicators (Duan, Liu, et al., 2021). Depending on their innovation plans and objectives, businesses from different areas and industries may select various measures to evaluate IP. For example, the financial services industry tends to focus more on operational efficiency (pre- and post-implementation efficiency of new technologies and processes), risk management indicators (credit risk, market risk) (Zhao et al., 2019), while industrial manufacturing enterprises are more focused on profit growth, product quality indicators (Al-Shuaibi et al., 2016). Furthermore, the performance of innovation may be separated into two categories depending on the timeline: short-term IP (such as the growth in annual new product sales) and long-term IP (such as accumulated knowledge assets and brand value) (Roh et al., 2022). The Global Innovation Index (World Intellectual Property Organization, 2020) and the European Innovation Scoreboard (European Commission, 2024) are the two most famous indices for evaluating innovation performance and are widely recognized around the world.

Additionally, different businesses will use various innovation tactics, such as open innovation (Jiao et al., 2022), co-operative innovation (Obradović et al., 2021), imitation innovation (Wang & Chen, 2020) and development innovation. The performance of innovation in SMEs will be impacted differently by these distinct innovation strategies. To improve the IP of SMEs,

it is essential to have a thorough understanding of the factors that influence IP. These factors can be divided into internal factors (such as R&D investment ability and willingness, a culture that fosters innovation and effective knowledge management, and high-quality employees), and external factors (market competitive position, regulatory environment, supply chain partnerships) (Cillo et al., 2019).

Supply Chain Finance

In the context of the accelerated expansion of global economic trade and the pervasive integration of internet technologies, SCF, in its capacity as a nascent financial service instrument, has emerged as a pivotal force propelling economic growth in recent years, particularly evident in the alleviation of financing challenges faced by SMEs (Vu et al., 2022). Essentially, SCF involves financial institutions leveraging the creditworthiness of core enterprises and authentic transaction backgrounds, harnessing emerging technologies to deeply integrate financial services into supply chain operations, thereby tailoring comprehensive financial solutions encompassing financing, payment settlement, and risk management for supply chain members (Du et al., 2020). By highly integrating logistics, capital flows, information flows, and trade flows within the supply chain, this model enhances both the working capital efficiency and financial health of the supply chain ecosystem, fostering an optimized financing environment for SMEs within the supply chain network (Guo et al., 2022). Further more, SCF presents a multitude of advantages over conventional financial methods in numerous operational domains. Supply chain financial institutions no longer rely solely on an enterprise's credit and historical operating data to offer financing for a single enterprise. By tracking the ongoing transaction data, they may dynamically identify the enterprise's operating status and promptly mitigate the enterprise's capital requirements. The emergence of novel technologies like Blockchain technology (Zheng et al., 2022) has facilitated greater transparency and traceability in supply chain transactions and information exchange between corporations. Such advancements help in mitigating the likelihood of information asymmetry and associated risks (Moro et al., 2015; Song et al., 2020), both upstream and downstream enterprises may benefit as a result.

Financial Constraints

The term "financial constraints" is intended to describe the challenges faced by businesses in acquiring the necessary capital to preserve their operational stability and facilitate growth. FC exert a considerable influence on the innovation activities of enterprises. In developing countries, FC have been identified as a significant impediment to corporate innovation (Ayalew & Zhang, 2020). As innovation activities typically necessitate substantial upfront investments and protracted payback periods, FC can impede companies from fully capitalizing on their innovation potential. For growing companies, FC may result in an inability to obtain sufficient capital to support their rapid expansion, thus limiting their growth rate and market opportunities (Denis & Sibilkov, 2010). Furthermore, FC may also result in companies exhibiting an excessive sensitivity to cash flow in investment decisions. This can manifest as over-investment when cash flow is abundant and under-investment when cash flow is tight (Chiu et al., 2022). In this study, the term "financial constraints" is employed to denote the factors that impinge upon the capacity of Chinese SMEs to secure SCF, thereby influencing their investment and innovation activities and IP. It is of the utmost importance that FC are resolved in order to facilitate the advancement of SMEs and enhance their IP.

Factors to SCF

SCF develops fastly, it is likely to continue to evolve in different areas and directions, especially for the field of SMEs' IP. These factors—supply chain networks (Yildiz et al., 2016), trade digitization (Ali et al., 2019a), trust (Kartikasari & Ali Ridho, 2023) and information sharing (Beka Be Nguema et al., 2021)—play an indispensable part in SCF advancement, which explains why it can grow so quickly and help SMEs become more innovative. The social network perspective offers a range of techniques to examine the supply chain network structure and various theories to elucidate the observed patterns (Wasserman, S. & Faust, K,1994).

Supply chain networks have evolved beyond traditional business models. SMEs are no longer isolated entities, but are integrated into global supply chain networks. Winkler (2008) discovered that SMEs can boost supply chain flexibility by utilizing strategic supply chain networks. Ali et al. (2019b) proved the strong and bridge tie strengthens the role between enterprise performance and credit quality. High credit quality from SMEs in supply chain networks can benefit them getting more financing opportunities from financial institutions. SCF institutions or core enterprises can also take advantage of the diverse SMEs needs and credit quality conditions in the networks to provide various financial products and services to help SMEs better meet their funding needs (Song et al., 2020). SCF becomes accessible to SMEs through the establishment of supply chain networks.

Trade digitization provides unprecedented convenience and transparency for SMEs in the supply chain networks. One of scholars Somjai (2019) from Thai explored the positive impact of trade digitization on the enhancement of SCF and the performance of SMEs. It was highlighted that financial institutions, and Fintech platforms in particular, must embrace digital transformation (Du et al., 2020). At the same time, digital trade not only makes the transaction process more efficient and reduces operational risks, but also provides more data for SCF (Bi et al., 2021), which helps finance institutions more comprehensively gain the SMEs' credit risks and provide them with more financing opportunities, which means the advent of digitization has furnished technical assistance for SME access to financial resources in the supply chain.

Trust has a fundamental part in SCF networks (Ta et al., 2018). All parties in the supply chain must establish trusting relationships to facilitate information sharing and cooperation. Trust helps reduce the risks of financial transactions and improves SMEs' chances of obtaining financing (Martin, 2017). Trust can also drive all parties in the supply chain to more actively share and transfer information, including trade data, inventory information (Du et al., 2020), even more complex and invisible knowledge. This information is a key decision-making basis for supply chain financial institutions. Hence, SMEs have a significant presence within the supply chain landscape and gain the trust of all parties involved, which makes it more feasible for them to obtain finance.

Information sharing is one of another key factors to SCF networks. By sharing key information about the supply chain, SMEs and SCF institutions can better understand the financial flows and risks in the supply chain. This enables financial institutions to more precisely provide financing products to SMEs to meet their specific needs. At the same time, SMEs can also obtain insights about the SCF market from financial institutions, which will help them better plan innovation activities (Beka Be Nguema et al., 2021). While Şahin and Topal (2018) examined that SCF and information sharing in supply chain system did not appear to be significantly correlated. The different results indicate that the effect of information sharing on SCF merits more investigation.

SCF and IP

The progress of all kinds of technology such as Blockchain technology, machine learning, big data analytic, etc. promotes the continuous development of SCF (Huang et al., 2021; Zheng et al., 2022), and the improvement of the overall service capacity of SCF in turn provides financial guarantee for solving the FC of the majority of SMEs to enhance their IP. The utilization of digitalization and internet technologies has facilitated the continued growth of this long-tail business (Yang & Wang, 2023). Different from traditional financial services, which are typically targeted at large businesses, in SCF, digital platforms link the various demands of SMEs with the availability of financial institutions, supporting them more financing possibilities (Kaur et al., 2022). SCF platforms will facilitate financial institutions expanding the financial market and make it more convenient for SMEs to get the innovation funding, which will boost IP.

Moderating Role of FC on SCF and IP

The extant literature indicates that FC exert an influence on the impact of SCF on IP. Ayalew and Zhang (2020) posit that heightened FC engender greater challenges for firms leveraging SCF for innovation, thereby moderating the relationship between SCF and IP. Specifically, when FC are low, firms are better able to utilize SCF resources for innovation investment, thereby enhancing their IP. Conversely, in the context of high FC, especially at the beginning of the innovation activities design phase, funds obtained from SCF operations may be redirected towards more pressing daily activities, which can impede innovation activities and consequently lead to a decline in IP (García-Quevedo et al., 2018; Savignac, 2008). In conclusion, FC exert a moderating influence on the relationship between SCF and IP.

Long Tail Theory

The long tail hypothesis was initially put forth by Chris Anderson (2004), who emphasized how the development of the Internet had altered the structure of markets. This theory represents a significant contribution to the field of further research, despite the fact that it does not directly address SCF research. The development of the long tail theory in SCF networks has attracted considerable research interest, reflecting the rapid advancement of science and technology. In order to stimulate innovation in the SCF domain, Jiang (2022) introduced the long-tail theory into the field by highlighting the ways in which technology fosters the growth of the long-tail market. The existence of millions of SMEs represents a substantial long-tail financing market. Although the financing demand of each SME is relatively modest, when aggregated, the capital needs of the entire SME sector represent a significant figure. The benefits of the supply chain financial ecosystem allow previously financially constrained and excluded SMEs to become free of their financial limitations as long-tail customers. Additionally, financial institutions may capitalize on the ongoing expansion of the SME customer market within the SCF ecosystem. The advent of digitization and Internet technologies has facilitated the growth of this long-tail business even further (Yang & Wang, 2023).

Social Network Theory

During the initial phases of social network theory's development, researchers primarily concentrated on interpersonal relationships. With further in-depth research conducted by scholars, the range and scope of social network theory have subsequently become richer and more extensive. The theory was initially introduced by renowned British anthropologist R. Brown in the 1930s. Later on, Wellman and Berkowitz (1988) proposed that social networks consist of relatively stable connections between specific individuals. Current research primarily centers on three aspects: strong and weak ties, social capital, and structural holes. The area of supply chain finance has also garnered interest from scholars. Song et al. (2020) discovered

that higher degrees of embeddedness within the SMEs supply chain ecosystem lead to greater availability of working capital; He also scrutinized the strong and weak ties' varying effects in SMEs' supply chain networks on their financing capabilities (Song et al., 2019). Borgatti and Li (2009) examines the impact of sparsely structured gaps and densely structured gaps on supply chain management companies in varying situations.A supply chain network with strong connections facilitates the rapid flow and diffusion of knowledge between firms. Conversely, a supply chain network with weak connections and a high number of structural holes is more likely to acquire diverse resources and foster enterprise innovation.

Conceptual Framework

Figure 1 presents the proposed conceptual framework which explores the consequences of SCF on IP in Chinese SMEs and the factors to SCF, whereas a moderating variable of FC moderates the correlation of SCF and IP in SMEs. The Long Tail Theory and Social Network Theory are used in this framework. The LTT (Anderson, 2004) explains SCF as a new funding tool to alleviate the FC from Chinese SMEs in the large long tail market to improve the IP, while the SNT explicates the diverse aspects affect SCF development in the supply chain network.

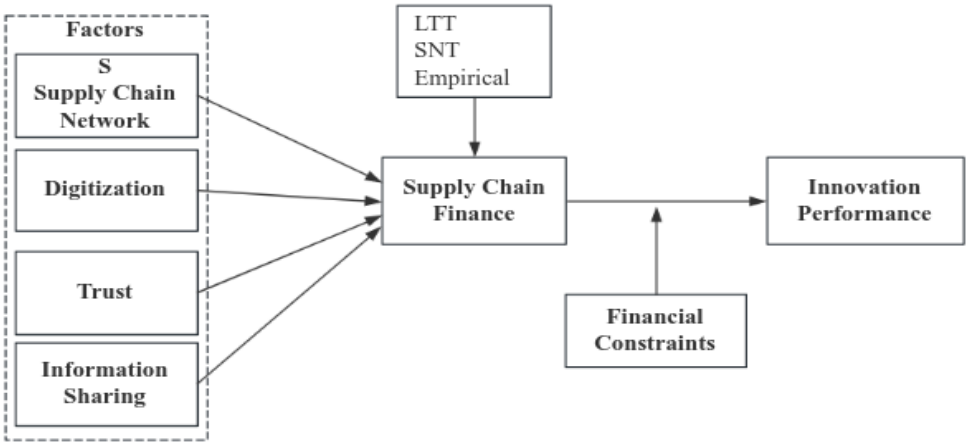

Figure 1: Conceptual Framework

Discussion and Conclusion

Through the literature review, a conceptual framework has been constructed which reveals the potential relationship between the influencing factors of Chinese SMEs on SCF, and how SCF regulates IP in the face of FC.

Firstly, the study emphasizes the significant role of the supply chain network (Song et al., 2020). Whether it strong or weak, all parties engaged in the supply chain system could derive benefits from it. Secondly, the key position of digital technology in enhancing SCF efficiency is highlighted. Digitization has capacity to facilitate the optimization of information transfer, as well as optimizing enterprises' capital flow, thereby providing more steadfast backing for innovation. In addition, fostering trust relationships and sharing information are essential drivers of SCF. Furthermore, in driving the advancement of IP among SMEs, SCF is pivotal as a kind of innovative financial measurements, particularly when faced with financial limitations.

Theoretical Implications

This research broads the application scope of the two theories of LTT and SNT and contributes new insights to the understanding of the relationship among SME IP, SCF management and FC, which riches to the theoretical system of these disciplines.

Practical and Social Implications

The study has significant guidelines for policymakers and SMEs alike. SMEs with limited funding, in particular, can gain from the insights offered. SCF is a tactical instrument that they can employ to improve IP. In addition, since SCF has the ability to spur innovation and economic expansion, policymakers can create focused campaigns to encourage SMEs to adopt it.

Limitations and Suggestions for Future Research

Several limitations exists in this work, such as the restrictions on the research methods (mainly relying on literature review) and study area (China). Subsequent investigations may rectify these limitations by utilizing distinct methods (empirical data, case study) and scrutinizing conditions in diverse regions more thoroughly.

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