Supply Chain Financing System Factors, Solutions, and Benefits: A Systematic Literature Review

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ABSTRACT

Supply Chain Finance (SCF) improves the business efficiency and effectiveness of suppliers, distributors, buyers, and financial institutions within supply chain collaboration. SCF implementation has risen to prominence worldwide, smoothing physical, product, and information flows within the supply chain as a means of maximizing profits. Due to a lack of research into SCF-related factors, solutions and benefits, this paper utilizes a systematic literature review methodology and content analysis to examine 56 papers drawn from major academic databases. The findings incorporate theoretical framework reviews which help to explain how SCF solutions can leverage enhanced supply chain (SC) performance by demonstrating the potential application of SCF to assist facilitators, reduce obstacles to sustained SC performance and develop an integrated conceptual framework illustrating how SCF accelerated overall supply chain performance.

Keywords: financial flows, SCF, supply chain financing system, systematic literature review

1. INTRODUCTION

Supply chain-related financial activities have become critical factors in improving business efficiency. The supply chain has specific business processes and technology to achieve its profit objective. Within the financial arrangements covering debt, equity, or the boosting of overall financial performance, at least two supply chain partners have financial contracts which the focal company implements (Steeman, 2014). Finance and Supply Chain Management (SCM) must collaborate closely to manage volatile market supply and demand effectively (Dooley et al., 2010; Olson, 2010). SCF involves the application of three levers: supply chain collaboration, supply chain technology, and supply chain financing (financial and funding aspects) (Templar et al., 2016).

Competitive pressure is intensifying in the rapidly changing contemporary commercial environment. In order to establish and maintain advantage, the effectiveness and efficiency of the entire SC must be considered (Hang and Tung, 2019). However, the SC’s financial aspect has yet to receive sufficient attention in comparison to that afforded it during the previous decade (Pfohl and Gomm, 2009). Since then, the issue of SCF has continued to attract ever-increasing interest from both scholars and practitioners, as evidenced by the number of recently published textbooks (Coyle, 2003; Seifert, 2009; Tate, 2019; Templar, 2016).

Until recently, research into SCF, its integration with logistics, and its internal information flow has been largely ignored (Caniato et al., 2016; Lekkakos and Serrano, 2016; Pfohl et al., 2003; Sanders and Wagner, 2011; Vickery et al., 2003; Wuttke et al., 2016).

As a result of extensive coverage in financial magazines and banking training courses, SCF has become one of the most widely covered SCM-related topics (Zhang et al., 2015). The SCF concept is at the epicenter of the interface between SCM and trade finance. Due to the impact of the global financial crisis and recession, numerous companies are facing liquidity problems to the extent of being at risk of significant financial shortages. Moreover, small and medium enterprises (SMEs) are usually the first to experience the effects of economic crises, such as the financial distress wrought by the COVID-19 pandemic (Caniato et al., 2020). While suppliers encourage their customers to pay in advance, buyers are extending their payment terms. Commercial banking SCF solutions are becoming increasingly popular among SMEs and their house banks, as they support businesses (buyers) and their suppliers to improve payment terms and reduce working capital costs (Zhang et al., 2015).

In recent years, SCF has developed rapidly and SMEs have made a significant contribution to the global economy. However, the capital constraints caused by the poor creditworthiness of companies remains unresolved. This is how SCF supports companies to raise funds from banks. At the same time, SCF can promote the expansion of commercial banks’ customer bases. Therefore, numerous such institutions have established specialized SME business departments to expand their provision of various SCF services.

SCF faces contrasting challenges around the world. Individuals and businesses in developing countries face different obstacles to those of affluent western countries, be they a general lack of seed capital, overly restrictive regulations, or political instability. SMEs face far more numerous barriers in developing countries than in developed countries.
economies, including limited access to raw materials, financing, and production resources (London et al., 2010). SMEs typically lack sufficient capital to absorb large financial losses in comparison to large companies. Consequently, SMEs experience greater difficulty in identifying external funding such as loans and venture capital which would support an increase in their production capacity and sales (Chen and Zhang, 2021). This study, therefore, focuses on SCF implementation since it represents just one of numerous interconnected challenges countries face in managing general supply chain-related financial issues, while generating more profits on an equitable basis for all supply chain members.

Previous research on this topic has focused predominantly on SCF actors, instruments, and contextual factors, while largely ignoring the interconnection between the factors, solutions and benefits of SCF implementation (Bals, 2019; Huang and Chung, 2022; Jia et al., 2020; Liu et al., 2015; Marak and Pillai, 2018; Xu et al., 2018). Therefore, further investigation which elaborates on the factors of SCF implementation, in addition to the type of solutions and benefits is required. Moreover, it is necessary to develop systematic knowledge based on the current literature which includes theoretical development and creative applications such as agricultural uniqueness in developing countries and technological advancements in the field of SCF. To fulfil the objectives of this academic paper, namely: systematizing SCF and elaborating on future research opportunities, while distinguishing it from other studies, we conducted a comprehensive and systematic literature review (SLR) which identified 56 relevant papers published between January 2000 and March 2022. By subsequently reviewing the content of these publications, we undertook a content analysis based on journal characteristics to produce a deep content analysis which collated detailed information. The findings provide a robust roadmap of an integrated conceptual framework demonstrating how SCF accelerates across an entire supply chain.

2. THEORETICAL PERSPECTIVE

SCF was defined as a method for two or more organizations within an existing SC to create value by controlling, planning, and steering the flow of financial resources on an inter-organizational level to optimize capital usage within the SC (Hofmann, 2005; Pfahl and Gomm, 2009; Vallet-Bellmunt et al., 2011). Consequently, the efficiency of product movement, information provision, and currency, among other factors, may be improved (Silvestro and Lustrato, 2014; Song and Chen, 2016; Yang and Song, 2017).

Another perspective regards SCF as a financial tool and a technological solution (He and Tang, 2012) since it is a trade financing hybrid and a technology platform that selectively connects trading partners and financial institutions (Aberdeen, 2011). Orders and invoices will be checked and issued utilizing a technological platform based on this technique. According to Steeman (2014), SCF focuses on providing both pre- and post- shipping liquidity to SCs. SCF may support organizations in extending their payment schedules by selecting which invoices to pay when cash is limited or economize by resorting to early payment programs during prosperous times. As a result, SCF impacts all elements of working capital which is calculating on the basis of the difference between current assets and liabilities (Aberdeen, 2011).

Camerelli (2009) suggests that SCF can accelerate the integration of financial, informational and physical flows within the SC, thereby facilitating SC collaboration. One of the most promising features of SCF concerns the management of capital flows. SCF impacts working capital management (WCM) which, in turn, directly impacts the performance of SC members.

One traditional means of measuring a company’s WCM is that of its Cash Conversion Cycle (CCC) which has been employed in several articles to analyze the benefits of SCF (Gelsomino et al., 2016; Hofmann and Kotzab, 2010; Lamoureux and Evans, 2011; Randall and Farris 2009), and is a traditional key operating efficiency performance indicator of working capital management (Farris and Hutchison, 2002). Farris and Hutchison (2002) identified a higher net cash flow present value which ensures that a shorter CCC provides sufficient liquidity and, therefore, has a positive impact on the performance of individual companies.

The CCC also constitutes a bridge connecting the operational and trading activities of suppliers and customers. From a supply chain perspective, Randall and Farris (2009), building on the research undertaken by Hofmann and Kotzab (2010) and Lamoureux and Evans (2011), present ideas for traditional ways to optimize CCC which may constitute sub-optimal strategies for enhancing the financial management practices of SC companies. Therefore, CCC management which extends the payment period, while shortening the collection period, underpins the optimal strategy for SC members.

From another perspective, commercial banker S. H. Yang described "supply chain finance" as a new financing strategy geared to the needs of SMEs. It effectively integrates funding flow into SC management, thereby providing trade finance business services to companies and new loan financing services to disadvantaged SC companies (Yang, 2005). According to Y. F. Hu, SC finance uses future cash flows as a direct funding source for banks based on their actual trading background while also employing key corporate credit SC levels based on product-specific repayments. This constitutes the financing model for Corporate Trade Practices (Hu, 2007). J. H. Yan described how, in Europe and the United States, SCF refers to the banks and third-party logistic service providers within the SC which provide clients with a comprehensive clearing and financial services process (Yan and Xu, 2007).

Traditional lending involves lenders and borrowers, whereas SCF consists of a network of interconnected and coordinated entities that confront similar adaptive problems and produce mutual value via an exchange of services (Ketchen et al., 2014; Lusch et al., 2016). SCF has been described as a key SC management innovation, given the evidence of increasing momentum, in solving the worsening SC funding problem (Stennieller, 2002). The general SCF concept includes a set of financial practices that create value by integrating financial flows between SC members and third parties into the physical SC (Hofmann, 2005; Timme & Williams-Timme, 2000).

SCF represents a bridge between financial institutions/focal companies and financially constrained SC
3. RESEARCH METHODOLOGY AND DESCRIPTIVE ANALYSIS

3.1 Research Methodology

This study aims to review recent research on the development of factors, solutions, and benefits relating to SCF implementation. This paper employs the systematic literature review approach proposed by Marrak and Pillai (2018) to broaden the scope and identify articles relating to SCF within the aforementioned context.

To include all of the topics in SCF, we first determined all of the potential combinations of (‘supply chain financing’ OR ‘supply chain finance’ OR ‘SCF’ OR ‘SCFS’) and (‘model’ OR ‘SME’ OR ‘SMEs’ OR ‘loan’ OR ‘loans’ OR ‘credit’ OR ‘credits’ OR ‘factor’ OR ‘factors’ OR ‘solution’ OR ‘solutions’ OR ‘benefit’ OR ‘benefits’). All three strings were subsequently combined in a single search to produce preliminary findings. The keywords related to SC or finance are drawn from Xu et al. (2018), while those related to factors, solutions, and benefits appear in Marrak and Pillai (2018).

The initial searches in the ‘Keywords’ fields were conducted using the Scopus research database in accordance with the following procedure. The language of publication was limited to English, the document types to ‘article,’ ‘conference paper,’ and ‘review,’ and the research focus to the most pertinent subject matter (see Figure 1).

Given that over 90% of the publications in the initial search results were published after 2000, it was decided to restrict the research to the period between January 2000 and March 2022. Following the application of these constraints, the initial search yielded 241 results which were then scanned for titles and abstracts using three broad inclusion criteria (see Figure 1). This process identified 131 documents to be included in the second round of selection which applied more specific inclusion and exclusion criteria (see Figure 1). Fortyseven papers were selected for inclusion in the review after the full texts of these 131 papers had been read. The references in the publications were also checked to confirm the review’s scope. If significant references were cited, the original sources were taken into account in the final evaluation. From among these sources, eight additional papers meriting investigation were identified. As a result, 56 papers were reviewed as part of the content analysis. Figure 1 depicts the detailed review methodology employed.

3.2 Descriptive Analysis

Figure 2 contains the number of SCF-related papers published between 2000 and 2022 which fall within three distinct phases. During this first phase covering the period 2008 to 2011 an extremely limited number of articles (i.e., one or two) were published on the subject. In each year between 2008 and 2011, a total of five articles were published. Stage 2 spans the years from 2013 to 2018. By 2018, the number of articles released annually had increased to four, expanding the number of publications published during each phase (2019 to 2022). During Stage 2, a total of eight papers were published, while Stage 3 (2021), witnessed a significant rise in the number of articles published. In 2021, 16 papers were published on SCF, a figure representing more than a quarter of the total number included in this
literature review (56). Given the annual distribution of publications, SCF is gaining in popularity and, consequently, further publications are expected to appear in the future.

Sources that have published at least two articles on this subject are shown in Figure 3, with the majority of papers being provided by the Annals of Operations Research and International Journal of Production Research (5), followed by the Computers and Industrial Engineering and International Journal of Production Economics (4 each), Procedia Computer Science (3), Uncertain Supply Chain Management, International Transactions in Operational Research, Journal of Purchasing and Supply Management, and International Journal of Physical Distribution and Logistics Management. During the period that the research for this article was conducted, two editions of each journal were published. More than 60% of the articles reviewed appeared in these nine journals, indicating their significant influence on SCF research. The journal distribution also reveals that SCF constitutes a prominent subject for study in a variety of publications. Our review of the research methodologies employed in the literature confirmed that the modeling method is that most commonly used to analyze SCF, accounting for 66.07 percent of the study, while the empirical method (i.e., survey or secondary-data analysis) ranks second, accounting for 23.22 percent. In the current study, the qualitative method is the least frequently employed (10.71 percent).

We observed that the majority of articles covering this issue provided a broad background without the application of a specific research context, regardless of whether the study focused on regional or industrial issues. Only five papers focused on a single industry, including agriculture (Belhadi et al., 2021; Chen et al., 2018; Liang et al., 2021; Song et al., 2020; Ye, 2021), logistics (Guo et al., 2019; Lacono et al., 2015; Ma et al., 2020), manufacturing (Abbasi et al., 2019; Babich and Kouvelis, 2018; Dong et al., 2021; Jin et al., 2021; Li et al., 2019; Lin and Xiao, 2018; Nigro et al., 2021; Shen et al., 2019; Tang et al., 2021; Xu et al., 2021; Yan and Sun, 2013), dairy (Huang et al., 2019), and construction (Min and He, 2019). Twenty-one research studies investigated SCF within the context of a particular region, predominantly China. These regions included Italy (Moretto et al., 2019), India (Marrak and Pilai, 2021), Pakistan (Ali et al., 2020), the US (Chen et al., 2018), Vietnam (Hang and Tung, 2019; Nguyen et al., 2022; Vu et al., 2021), and China (Amankwah-Amoa et al., 2019; Fangchun and Xiaoyun, 2010; Hanwu and Weijiao, 2011; Liu et al., 2019, 2021; Ma et al., 2021; Pei et al., 2022; Qu and Ma, 2011; Shaoyu, 2009; Song et al., 2016; Wang et al., 2020; Xin and Tingjie, 2008; Yan, 2017; Zhang et al., 2021).

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### 4. FINDINGS AND DISCUSSION

#### 4.1 SCF Factors

Inductively, the reviewed literature on connecting factors in financing mechanisms lists four distinct motivations for SCF implementation: (1) the global crisis, (2) financial constraints, (3) industrial landscapes, and (4) technology adoption. Figure 4 depicts the comprehensive, integrated conceptual framework based on the research findings.

#### 4.1.1 Global Crisis

We identified three major global crisis themes, the first of which is stakeholder needs. When stakeholders learn about the harmful environmental and social equality implications of multinational companies’ SCs, they demand that these commercial entities demonstrate higher levels of corporate social responsibility. This increases the demand for more effective management of SC environmental and social performance (Carter and Easton, 2011). According to Zhou et al. (2018), companies are seeking innovative methods of reducing the environmental and social impacts of their SC as a means of meeting their stakeholders’ demands. Tseng et al. (2018) also stated that stakeholder satisfaction with long-term corporate performance might help organizations improve their brand perception and consumer loyalty which would enable them to maintain their competitive advantage (Markley and Davis, 2007), thereby providing a significant incentive for SCF implementation.

The second global crisis driver is the urgent need to address social issues in developing countries. In order to minimize overall production costs, companies seek to outsource certain manufacturing processes to developing nations with lower labor and/or raw material prices (Mani et al., 2018). However, in general, developing regions’ lack of adequate regulatory regimes precipitates major societal challenges such as sweatshop manufacturing and the use of child labor (Awaysheh and Klassen, 2010). This need for regulation has motivated businesses to investigate innovative methods for improved control of their suppliers’ behavior, which has pushed corporations to implement SCF solutions as a new approach to improving SC performance in terms of addressing social concerns (Tseng et al., 2018) and social inequality (Zhou et al., 2018).
4.1.2 Financial Constraints

The controller for accounts payable (A/P) and accounts receivable (A/R), the cash management treasurer, outstanding sales, promotional and procurement activity, and SC and manufacturing for inventory planning are all included in the full view of SCF. These elements focus on various functional groups but may also report to different executives. The emphasis of comprehensive SCF should be on engagement at the executive level to guarantee that all elements are collaborating in the achieving of a single objective, rather than individual goals which, when aggregated, produce a less desirable result.

In the opinion of Raghavan and Mishra (2011) a lender providing finance to a manufacturer is also incentivized to fund a retailer. These authors divided the decision-making process of lenders into two categories: one involving loans provided to two enterprises agreed upon independently of each other and another entailing a joint decision. According to their numerical analysis, a shared decision favors both the lender and the debtor enterprise if either the retailer or borrower provided to two enterprises agreed upon independently of each other and another entailing a joint decision. Because the social credit system is not ideal, an effective mechanism for creating SCF in this region remains flawed. Despite several efforts by bank officials, the credit rating system suffers from certain drawbacks. Despite several efforts by bank officials, the mechanism for creating SCF in this region remains flawed. Because the social credit system is not ideal, an effective information platform has yet to be developed (Qu and Ma, 2011).

Significant challenges to the banking industry have impeded the rapid growth of SCF since the participation of the banking sector has been limited and it rarely collaborates with logistics enterprises. For example, the credit rating system which underpins the viability of the banking industry demonstrates various shortcomings. However, the banking industry experiences significant credit risk due to inadequate market risk warning and management competence in the field of access regulations relating to SMEs (Qu and Ma, 2011).

4.1.3 Industrial Landscapes

The growth of China’s agricultural business is impeded by insufficient financial support, making it difficult and expensive for agricultural SMEs and farmers to obtain funding (Miller and Jones, 2010, Zhu et al., 2016). Commercial banks, rural-based credit cooperatives, and other financial institutions are often reluctant to lend to those active in agriculture due to their low credit scores, high need for cash, extended production cycles, and considerable credit risks.

The logistics industry should progress due to more robust logistics enterprises having been attracted. The basis for the growth of SCF is sufficiently sound following the formation of the logistics sector and a plethora of worldwide standard logistics enterprises having been established (Qu and Ma, 2011).

According to Abbasi et al. (2019), the manufacturing industry requires a more scientific approach to assessing financial credit and developing a more precise method of measuring the SC’s existing financial risk using the Internet of Things which has exacerbated the economic dilemma of SMEs. When commercial banks provide credit to SMEs active in the SC, the likelihood of failure rooted in SMEs’ own deficiencies or environmental repercussions will cause them financial losses.

4.1.4 Technology Adoption

Traditional agricultural loans, the primary form of microcredit extended to farmers, are insufficient to meet the industrialized development requirements of the agricultural sector (Li et al., 2013). Large loans are rarely granted to these new farmer groupings, a fact which jeopardizes their development. A collaborative credit-granting system might be constructed using bank e-commerce platform-based network governance through organizational innovation in the SC. This would also involve a collaborative debt enforcement mechanism to achieve complete incentive compatibility, lower agricultural loan risks, and, therefore, the elimination of credit rationing among farmers (Chen et al., 2018).

It is necessary to strengthen both the social credit system and the trading platform for banks and enterprises. SCF engagement in the inner banking business is inadequate, while the credit rating system suffers from certain drawbacks. Despite several efforts by bank officials, the mechanism for creating SCF in this region remains flawed. Because the social credit system is not ideal, an effective information platform has yet to be developed (Qu and Ma, 2011).

Information asymmetry represents another critical issue in SME funding. SMEs can easily receive working capital from financial institutions if relevant information is accessible. However, where trustworthy information is available, a particularly unusual scenario in the case of startups, this leads to the considerable risks surrounding the operation of SMEs (Berger and Udell, 2006). Brealey et al. (1977) noted that: “Where major information asymmetries exist, and the supply of poor initiatives is large relative to the supply of good projects, venture capital markets may fail to exist.”
4.2 SCF Solutions

Trade credit, prepayment, factoring, and reverse factoring are all examples of SCF solutions. As a result, this study will evaluate SCF-oriented practice that violates standard corporate finance theory by using an expanding total range of SCF solutions, such as trade credit, and prepayment, as novel SCF proxies. This study aims to investigate the tension between SCF-oriented practice and standard corporate finance theory and to address the following questions: "Will SCF improve supply chain performance?" and, should this be the case, "What forms of SCF solution would prove most beneficial?".

4.2.1 Agricultural Supply Chain Financing

Credit guarantees from core agricultural enterprises underpin their SC activities, as do logistics integration, capital flows, and information flows for the purchase of raw materials, agricultural production links (planting and breeding), and agricultural product processing-distribution-consumption links. Each SC stage has the potential to help close the financial gap between SMEs and farmers by increasing the trust that banks have in their agricultural clients, lowering credit risks for SMEs and farmers, and delivering a win-win solution for commercial banks, agricultural enterprises, and farmers (Gelsomino, 2016). Furthermore, the ASCF may increase agricultural production, accelerate agricultural modernization, industrialization, intensification, and rural urbanization, while also promoting long-term rural finance and agricultural development (Silvestro and Lustrato, 2014). As a result of SMEs' limited repayment capacity and their reluctance to repay debt, commercial banks may experience losses resulting in ASCF credit risk (Lekkakos and Serrano, 2016).

It has been revealed that certain commercial banks prefer to blindly operate a SCF business, thereby potentially exposing themselves to unforeseeable risk (Gelsomino, 2016). As a result, while commercial banks can profit financially from using SCFs, they must be fully aware of, identify, and analyze the underlying ASCF credit risks, while devising financial risk mitigation measures for the agricultural SC.

For example, China’s agriculture SCF model is problematic since SC companies are interdependent. Both upstream and downstream supply chain SMEs are less risk-averse and, therefore, more sensitive to volatility which can exert a domino effect on regular operations across the SC. Consequently, this potential default risk significantly impedes development throughout the whole industrial chain, exacerbating bank loss risks and eventual losses resulting in ASCF credit risk (Lekkakos and Serrano, 2016).

4.2.2 Online Supply Chain Financing

Three types of online SC financing exist: bank SC finance, e-business SC finance, and bank SC finance based on the e-Business platform (Lekkakos and Serrano 2016) as shown in the points below:

1. Commercial bank SC financing constitutes a predominantly web-based version of the classic concept whose primary purpose is to integrate each participant's information on the SC platform to enable data to be visualized by all other participants. The information on the platform regarding SMEs enables the provision of effective and convenient financing services. The online SC finance model is shorter than its traditional counterpart (Chang et al., 2016).
2. Scholars have, to date, undertaken minimal study of SC finance for e-commerce. Microfinance institutions constitute the vast majority of fund suppliers. Internet users represent the primary group engaged in e-commerce who manage their own credit transactions and, depending on the platform, might be categorized as B2B or B2C (Gonsalvez and Inman, 2016).
3. With SCF using an e-commerce platform to better serve SMEs, commercial banks cooperate with e-Business platforms to expand their SCF services. Consequently, a bank SCF based on an e-Business platform has emerged. This financial solution may meet the financing requirements of network merchants, while also increasing the area of operations (Muhammad et al., 2018).

Reza-Gharehbagh et al. (2019) undertook numerical research and argued that the government's direct intervention program generates a greater return for local SCs when financed through an online P2P financing platform. In contrast, the share exchange ratio in EF is a key component in selecting the preferred intervention policy for the local SC. These researchers discovered that when the share exchange ratio is sufficiently high the local SC favors the government's indirect participation.

According to Abbasi et al. (2019), the credit risk assessment model within the Internet of Things-based SC financial model delivers high accuracy for SMEs, providing solid assurance of the rapid expansion of SCF security. It has been shown that SCF based on the Internet of Things has supported SMEs in solving their financial problems.

4.2.3 Technology of Supply Chain Financing

The introduction and rapid development of Blockchain technology has provided significant technological assistance in tackling the two fundamental challenges (information asymmetry and business communication) confronting SME finance. Blockchain is a data system that organizes information chronologically. The distributed ledger system is a novel application model for networked data storage, point-to-point transmission, a consensus process, an encryption algorithm, and other computer technologies. Centralized data storage across numerous independent devices, referred to as distributed data storage, enhances the reliability and security of this activity. Each node applies a consensus process to secure the accuracy of the data in the chain and the consistency of the data stored. A consensus mechanism is a technology used in blockchain transactions to achieve widespread consensus. A fundamental component of blockchain technology is establishing uniform and transparent rules for each node in order to maintain the distributed network's data status. The asymmetric encryption technology enhances system security by validating blockchain data updates (Zhang et al., 2020).

Yao et al. (2020) employ blockchain benefits to represent, both objectively and authentically, the entire SC’s business logic, monitor the entire SC process, effectively ease the SC credit crisis, and support the growth of the SCF company. However, blockchain infrastructure development...
is still in its initial phase, and technological challenges exist to connecting the Internet to the blockchain network whose limited capacity and poor transaction speed will inhibit the widespread adoption of blockchain technology.

Zhang et al. (2021) studied both the traditional and smart contracts of the present SC to continue blockchain technology research. Blockchain technology’s unique decentralization and transparency can genuinely materialize smart contracts and address the lack of trust, traceability challenges, and privacy protection created in actual SC management by information asymmetry and opacity between supply and demand parties. This process involves tokenizing asset rights digital encryption, widening the scope of credit radiation and addressing the financing issues relating to SMEs.

### 4.2.4 Supply Chain Financing Practices

SCF practices provide various options, including factoring, reverse factoring, trade credit, and prepayment (Hofmann, 2005; Klapper, 2006; Pföhl and Gomm, 2009). Chen and Wang (2012) showed that a trade credit contract might provide value to a SC involving a single supplier and retailer, while also assisting SC coordination. Because this research analyzes the SC at three levels (supplier, focal company, and customer), the influence of providing company performance-based SCF has been evaluated separately within the contexts of upstream and downstream SCs.

One of the primary reasons SC members seek loans is inadequate cash flow. SCF frequently uses bank credit and trade credit financing (Xu et al., 2018; Zhao and Huchzermeier, 2015). According to Cai et al. (2014), merchants prefer trade credit financing when the trade credit market is more competitive than the bank credit market (i.e., the prevailing interest rate in the trade credit market is lower than that in the bank credit market). In the absence of any retail competition, manufacturers prefer to use trade credit financing (bank credit financing) when the retailer’s interest rate is suitably low.

Lin and Xiao (2018) conducted a study in which they developed a SC involving an SME producer and a creditworthy retailer. The manufacturing procedure is time-consuming and the producer has just one production opportunity before the selling season. The merchant can place orders with the manufacturer under push and pull contracts. According to the findings, the retailer expects increased revenue from the pull contract, and the bank will raise interest rates to prevent and control risks associated with this form of contract. A retailer’s profit under a pull contract is higher than under a push contract.

Morento et al. (2019) studied the potential for creating a SC credit rating by combining typical financial ratings produced by financial institutions with vendor ratings (used by purchasers to monitor their suppliers). They have demonstrated empirically that the buyer vendor rating of important suppliers (i.e., on-time delivery, quality, responsiveness, flexibility) has a high potential value when paired with financial data to generate a higher credit rating.

In their study, Nigro et al. (2021) concluded that the retailer’s attempts to boost market demand leverage order quantity and, hence, the supplier’s profit. Consequently, if earlier research indicated that trade credit improves SC efficiency and if the retailer’s efforts persuade suppliers to finance his buyer, they conclude that this new factor merits further investigation.

#### Table 5

<table>
<thead>
<tr>
<th>Activity</th>
<th>3PL Role</th>
<th>SCF “organizer”</th>
<th>Financial Services Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods</td>
<td>Delivery transportation, logistics, and supply chain services – i.e., transport the goods.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Information</td>
<td>Collect and provide information regarding the distribution of goods among customers, organizers, and financial services providers.</td>
<td>Verify data transfer, aggregate, analyze, manipulate, and provide data; authorize financial transactions.</td>
<td>Receive data from organizer in order to authorize financial transactions.</td>
</tr>
<tr>
<td>Funds</td>
<td>N/A</td>
<td>Participate in finding of financial service and assume a proportionate share of the risk.</td>
<td>Participate in finding of financial service and assume a proportionate share of the risk.</td>
</tr>
<tr>
<td>Sales &amp; Marketing</td>
<td>Identify prospects, participate in sales calls, and store commoditization.</td>
<td>Identify prospects, market SC, participate in sales calls, identify financial risks, assist in structuring credit solutions.</td>
<td>Identify prospects, participate in sales calls, assist in structuring credit solutions.</td>
</tr>
<tr>
<td>Financial Benefits</td>
<td>Transportation-related revenue; deeper relationship with customer and organizer.</td>
<td>Interest income, fee income, deeper relationship with customers, financial services providers, and logistics/transportation providers.</td>
<td>Interest income, deeper relationship with customers, organizer, and logistics/transportation providers.</td>
</tr>
</tbody>
</table>

**Figure 5 3PL role in collaboration with SCF**

Zhang et al. (2008) elaborated the role of third-party logistics (3PL) in collaboration with SCF (see Figure 5), physical and informational controls being key to a SCF solution. Logistics providers and financial services companies must collaborate to develop accurate visualization tools that provide SC managers with the necessary data and lenders with the security required to deliver capital. Once a robust information-based system is in place, trading partners, logistics companies and banks need to be able to access information quickly and efficiently.

The starting point for information about transported goods must be the entity that transports them (SC service provider, carrier, and/or logistics partner). These are the entities that physically manage the goods within the SC. Access to this information is essential from a demand planning perspective. Financial services providers know where their goods are located, enabling them to more securely raise funds at various SC milestones.

### 4.3 Benefits of SCF

SCF serves as a connection between financial institutions/focal enterprises and financially constrained SC members (Liu et al., 2015). Both traditional corporate finance theory and SCF theoretical findings imply that SCF solutions help reduce the financial challenges of SC participants (Hofmann, 2005; Klapper, 2006; Liu et al., 2015; Randall and Farris, 2009; Stemmler, 2002). According to some experts, SCF encourages long-term SC growth since it can provide suppliers and/or consumers with working capital. Additionally, significant buyers of SCF solutions can negotiate more favorable terms with their partners (Klapper, 2006). Based on earlier SCF research findings, several conceptual additions have been proposed. The advantages of SCF adoption for customers, suppliers, financial institutions, and governments are discussed further below.

#### 4.3.1 Buyers

The first benefit of SCF for buyers is that they may expect longer payment periods from suppliers without incurring higher costs (Aberdeen, 2011). The prospect of resolving time issues and automating processes is the second advantage. Because SCF is built on technological platforms,
businesses may minimize paperwork and expedite information processing (He and Tang, 2012). Furthermore, by effecting payment on invoice maturity, purchasers may benefit from early settlement discounts which contribute directly to profits (Vliet et al., 2015; Wuttke et al., 2016).

According to Yan (2017), SCF benefits the leading company by allowing it to grow its operations and strengthen its position within the SC. Firstly, it promotes commercial expansion by increasing the scope of purchases and sales. Secondly, it contributes to a considerable reduction in the collection and purchase cycle and improved financial and operational efficiency. Thirdly, it lowers the cost of capital by reducing cash utilization. Finally, it contributes to reducing the gap between the leader and SC members, thereby consolidating its position within the SC.

SCF’s role is to maximize capital availability and cost within a particular buyer-supplier SC. Lenders can reduce financial risk within the SC by combining information and physical control. Reduced risk allows for more capital to be accessed, more money to be available at an earlier stage, or capital to be raised at lower interest rates (Shaoyu, 2009).

4.3.2 Suppliers

In addition to the advantages for buyers, SCF provides numerous benefits for suppliers. On the basis of previous studies, these can be listed as follows:

1. Lower trade receivables and higher cash position: As SCF extends buyers’ DPO, Accounts Payable (AP) rise, signaling that buyers have more cash to support their value-creation operations (Aberdeen, 2011; Rogers et al. 2016). Buyers may extend their payment terms under these circumstances, suppliers may receive payments earlier, and financial institutions may profit from charging a discounted rate (Aberdeen, 2011).

2. Under acceptable payment delay conditions, SCF is an impawn finance pricing model which takes into account both backorders and backlogs, as well as any discount (Yang, 2013). Finance may be provided by suppliers, core businesses, or distributors, depending on the present economic condition and the financial strength of the SC partner (He and Tang, 2012).

3. Increased cooperation with the purchasing company offers a competitive advantage: businesses are urged to interact and subsequently collaborate with an external partner and another which is internal to a SC with which they have a strong relationship. This mutual trust will result in a long-term commercial partnership (Hofmann, 2005; Aberdeen, 2011).

4. Transparency: internal and external information is transferred when two financial institutions or companies within an SC utilize a technological platform to execute financial transactions. Consequently, sharing events between actors within an SC becomes apparent, thereby lowering risk (Rogers et al., 2016; He and Tang, 2012).

5. Controlling: businesses may predict possible issues and develop actions/solutions to ensure compliance with internal and external standards (Hofmann, 2010). Numerous companies also enable their partners to make payments after a specific time with no requirements as a means of enticing them to place an order that may exceed their financial capacity with less risk. In some cases, customers are eager to settle their account more quickly in order to benefit from trade credit (Thangam and Uthayakumar, 2009).

6. Prediction: using automation to complete financial transactions and provide information will enable companies to access various data and analytical sources. The management team can then estimate future demand (Aberdeen, 2011).

7. Faster cash conversion: historically, commercial credit policy has affected the cash cycles of a SC. Because some cash is typically trapped in non-value creation activities, an opportunity exists to free up this additional cash and improve financial flows within the SCs (Hofmann, 2010).

Yan (2017) also noted how SCF handles the problem of capital limits and maximizes their payment, financing, settlement, and other demands for participating companies. Firstly, it enables them to access previously unavailable finance and expand their buying or production capacity. Secondly, the finance is inexpensive. Thirdly, it enhances settlement efficiency by facilitating online loans, repayment, and settlement. Finally, it contributes to the growth of the credit score of the financial system’s follower companies.

4.3.3 Financial Institutions

Apart from the benefits to buyers and suppliers, SCF paves the way for financial institutions to reap numerous benefits which, according to previous research, include the following advantages.

SCF enables the financial institution to investigate new funding requirements and more properly assess credit options. Firstly, it promotes better understanding of the credit status of SC follower companies and enhances the credit evaluation procedure. Secondly, it facilitates the commercial entity’s expansion to support numerous small and medium-sized following companies that could not previously acquire financing. Thirdly, using electronic transaction data to assess credit is advantageous (Yan, 2017).

However, the SCF “organizer”, the company with experience in logistics/transportation and financial services, is absent from this equation. The organizer is the subject matter expert, bringing all parties (transportation and logistics, banks, buyers and sellers) to the table and being aware of their respective needs (Shaoyu, 2009).

Financial SC services may significantly improve a bank’s reputation and influence. Consequently, banks will be able to offer additional financial products to raise loan interest income. Furthermore, SCF services have the potential to enhance existing SC processes and reduce the dependency of companies or SCs on banks. This leads to banks being the principal clearing institutions for SCs (Hanwu and Weijiao, 2011).

4.3.4 Governments

In addition to the benefits to buyers, suppliers, and financial institutions, SCF paves the way for governments to reap numerous benefits which previous research suggests are as follows.

Governments and politicians are expected to act financially and assist the entrepreneurial movement by opening up formerly closed industries (e.g., banking and finance) and exploiting the expertise of MNEs as economic development stimulants (Wu and Jia, 2018).

From a public policy perspective, the government must enhance the business environment, while legal and financial institutions must eliminate barriers to accessing financing.
and create favorable circumstances for small enterprises to expand (Zhou et al., 2014). Furthermore, SCF requires the government’s encouragement and cooperation to promote and support SME access to SCF products, thereby enhancing market competitiveness (Nguyen et al., 2022; Vu et al., 2022).

In addition to corporate businesses, the government should consider certain calibrated policies, laws, and regulations to support SCF adoption (Pei et al., 2022). They must focus on building information infrastructure and developing rules to support enterprises that have made progress in their adoption of SCF, notably financial institutions, that directly generate SCF products. The SME currently has greater SCF access because of government legislation (Yan et al., 2021). Furthermore, a legislative framework should be designed to ensure smooth SCF operations and the rights of all interested parties to enhance national income. This might, in turn, support SMEs and encourage national economic development (Hang and Tung, 2019; Liu et al., 2020).

4.4 Integrated Conceptual Framework

This research provides an integrated conceptual SCF framework based on the previous thematic findings and discussion (see Figure 6). SCF factors are shown on the left side of the framework, where SC actors are classified into four types based on their distinct characteristics. All flows (information, financial, and product) are expected to be transparent and integrated within a region/industry-implemented technology. In general, business processes flow from supplier to producer, through distributor to retailer, culminating in the consumer who purchases the product. All these actors and activities are recorded in a technological space with the result that an actor can collaborate with any financial institution without fear of being exploited. Financial institutions have the right to access all actors’ transaction data across the industry/region in order to monitor the loan burden they should ideally assume in order to further develop their business. Finally, the collaboration of actors, financial institutions, and the market was expected to produce a win-win solution which would benefit business, government, and society. Compared to conceptual frameworks proposed in previous research (Belhadi et al., 2021; Lin and Xiao, 2018; Liu et al., 2021; Ma et al., 2021; Pei et al., 2022; Song et al., 2018; Wang et al., 2020; Xu et al., 2015; Yan, 2017; Yao et al., 2020; Zhang et al., 2009; Zhang et al., 2020), our study provides a more robust connective framework between SC actors, third party logistics and financial institutions through SC financing systems, explaining how products, information and finance flow throughout the SC. We also suggest that process/technological advancements improve SCF performance (e.g., risks and credit rating, blockchain technology implementation) to produce more seamlessly collaborative shared information between actors and financial institutions resulting in higher profits.

Notes: Order of events with examples: (1) information, product and financial integration in a platform (Demand, Supply and Goods Movement recorded seamlessly in order that all actors involved can obtain information whenever and wherever required), contract initially drawn up between Financial Institutions (FI) and actors; (2) suppliers deliver raw materials to manufacturers using 3PL services requested through the SCFS platform with profits and fees enclosed; (3) manufacturers deliver Finished Goods to Distributors using 3PL services requested through the SCFS platform with profit and fees enclosed; (4) distributors deliver the goods to retailers using 3PL services requested through the SCFS platform with profit and fees enclosed; (5) retailers sell the products to end-customers, earning profits as recorded in the SCF platform; (6) end customers purchase the products with payments and profits distributed among the actors; (7) financial institutions monitor contract loans and await payments for each actor, for example, suppliers for maintaining material-producing machines and 3PL Services; manufacturers for operational costs and 3PL Services; distributors for thematic regional and operational costs, also 3PL; (8) further technological advancement in a platform, for example Blockchain, could benefit the SCF operation in general; (9) 3PL contributed to all delivery services throughout SC members recorded all in SCF platform; (10) in every period, FI may conduct financial evaluation of all SC members. Furthermore, it is recommended that FI enter into a partnership with an insurance company to manage defaulted payments (Ma et al., 2022; Song et al., 2018).

5. RESEARCH GAPS AND PROSPECTIVE RESEARCH DIRECTIONS

Despite academic debate on SCF, relatively few publications in the reviewed literature directly establish an end-to-end elaboration of factors, solutions and SCF benefits. Therefore, further research should be conducted on this area of growing academic interest. This paper identified several gaps in the literature on SCF through a review and suggests solutions for each identified shortfall.

A fundamental omission in this systematic literature review is the lack of field research on SCF practice. Discussions of SCF often center on financial and operational improvements, while SCF implementation is not addressed. Recent SCF research has centered on the motives for implementing SCF and its results, with only a limited number of studies (Zhan et al., 2018; Zhou et al., 2018) elaborating on how SCF leveraged throughout the whole SC. As a result, research in this area should focus on empirically proven SCF's solutions.
Secondly, SCF implementation lacks a theoretical framework. All of the selected academic papers elaborated on the evolution of SCF, yet none developed any theoretical basis for SCF implementation, demonstrating that the issue is still in its infancy. Study of SCF should integrate and formulate important hypotheses in the future.

Thirdly, a key hurdle to the adoption of SCF by commercial agriculture is insufficient financial resources for SMEs and individual suppliers. This lack of access limits their capacity and inclination to engage in environmentally friendly behavior (Ye, 2021; Liang et al., 2021; Song et al., 2020; Chen et al., 2018). As a result, future research, particularly that conducted in developing countries, should focus on providing evidence to justify the use of SCF in agricultural SCs.

Fourthly, current SCF research lacks a sufficiently strong regional focus. Future studies can investigate SCF in a variety of locations with a range of economic features in emerging countries (e.g., medium high income, medium low income, and low income). The expansion of corporate operations worldwide has considerably influenced society, resulting in several severe societal challenges (Olaniyi et al., 2014). Consequently, future studies should examine how SCF might support improvements in social sustainability in developing countries.

6. CONCLUSION

This review examined the end-to-end implementation of SCF in terms of factors, solutions, and benefits. A total of 56 publications dating from the period between January 2000 and March 2022 were reviewed. Thematic results explored the theoretical evolution of SCF, in addition to its factors, solutions, and benefits. To further investigate the possible application of SCF in developing nations, this study elaborated the solution of SCF in resolving the financial obstacles affecting the SC. The review then merged topic findings and debate outcomes into an integrated conceptual framework. Finally, based on the findings and discussion, the study identified various gaps in existing research and offered possible approaches to future investigation.

This review contributes significantly to the theoretical significance of the literature on SCF. It is, to the best of our knowledge, the first study to perform a comprehensive evaluation of all literature on SCF factors, solutions, and benefits. Previous works on SCF issues tend to evaluate them individually, failing to integrate the three research concepts, therefore restricting its contribution to the evolution of the concept of SCF. This paper presents a theoretical framework describing how SCF solutions may be leveraged to improve SC. This evaluation also supported overall development of the SCF concept by identifying research gaps and suggesting future research topics.

Secondly, based on the findings of the literature research, this review established, for the first time, the concept of SCF and proposed a framework defining the connection and collaboration between financial institutions and SC actors. It also examined the role of SCF in promoting SC sustainability, more specifically how SCF solutions may enhance financial activities and overcome financing obstacles within the SC. Certain material in the framework (for example, SCF practice) was drawn from previously conducted case studies and business reports. This lends management value to the study, as businesses may utilize its conclusions to better understand SCF and implement SCF solutions in their SCs, thereby enhancing financial performance.

We also recognize the limitations of this study. Firstly, the evaluated material was selected solely from the Scopus research database. Therefore, enriching the search scope to include other databases may produce additional results. Secondly, this study covered only journal articles written in English, omitting content created in other languages that may have further informed it.

DECLARATION OF COMPETING INTEREST

The authors declare that no competing financial interests or personal relationships have been identified that could influence the research findings reported in this paper.

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