A SYSTEMATIC LITERATURE REVIEW ON SUPPLY CHAIN FINANCE ACTORS, INSTRUMENTS AND PROCESSES

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Abstract
Supply Chain Finance (SCF) aims at managing the financial flows along the supply chain with an objective of maximising the creation and delivery of financial services. The literature on SCF is complex and focuses on SCF actors, SCF instruments and supply chain processes. However, the connection between these elements is weak, and the configurations of actors, instruments and processes that maximises financial value creation is unclear. In the light of this gap, this article aims at reviewing the literature on SCF, with a specific focus on actors, instruments, coordination, performance of processes and their interrelation. A systematic approach has been taken to the literature review, which ensures it is auditable and repeatable. The selection criteria are clearly aligned with the review questions and relevant information is extracted from the selected papers and synthesised into a set of constructs. Furthermore, the constructs are used to develop a conceptual framework to align SCF actors and instruments along with the contextual factors.

Keywords:
Literature review, supply chain finance, actors, instruments, coordination, supply chain processes.

1 INTRODUCTION
Supply Chain Finance (SCF) is an emerging area for facilitating and supporting the de-risking of Supply Chain (SC) and relieving the firms from financial constraints. SCF has become a ‘key-term’ among the academics and practitioners, increasingly being used to highlight the importance of financial flows with a core objective of aligning material, informational and financial flows [1]. By aligning these flows, SCF not only optimises the finances and financing processes, but it also enhances the integration among customers, suppliers and service providers. SCF increases the value of all participating organisations [2] and creates an alternative source of competitive advantage [3]. It also plays a crucial role to correlate SC metrics with the financial metrics in order to have a tight integration between physical operations, exchange of data and information and injections of liquidity [4]. Furthermore, SCF has also become crucial in providing a short-term credit access to the suppliers and buyers, which in turn results in the financing of their Working Capital (WC) that is otherwise difficult to obtain [5].

SCF is complex and largely ‘event-driven’. The successful implementation and adoption of SCF requires variable levels of coordination by the SCF actors. The variability of coordination depends on the factors, such as, company relationship, level of coordination, and intra and inter-level collaborations [1, 6-9]. For the successful associations, SCF actors initiate SCF instruments to coordinate SC members, SCF services and SC processes for maximising the value generated and captured by the financial flows along the SC [10]. By doing so, SCF actors align the financial flows with the ultimate objective of cash-flow management [10-13].

Through the Systematic Literature Review (SLR), this article addresses two crucial questions:
ReQ1: What are the SCF instruments that different actors can implement to improve the performance of SC processes and finances in SC?
ReQ2: What are the enablers and inhibitors for the implementation of SCF instruments by the different actors?
Answer to these questions will contribute to the existing knowledge base and lead to the extension of the theory towards SCF.

2 SYSTEMATIC LITERATURE REVIEW
According to Denyer and Tranfield (2009), SLR process can be divided into 5 main stages. The five stages include, guiding questions for review, literature searching/locating studies, inclusion and exclusion criteria, literature retrieval and analysis and synthesis of findings and presenting results [14].

For accomplishing the SLR, primary and subsidiary questions are considered. The primary review questions that this particular review seeks to address are ReQ1, ReQ2 and the subsidiary questions (questions directed towards SCF Actors, SCF instruments, SC processes and SCF enablers and inhibitors) are used to support them. The next stage is to search the literature and locate the relevant studies. The key decisions to be taken at this stage is the selection of keywords, phrases, databases, and search engines (including searching criteria). After consultation with the review advisory panel, four search engines were chosen: ProQuest – ABI/INFORM Global, EBSCOhost, Web of Science and Scopus. The search was limited by the searching criteria based on the year of publication, language, scientific field, and source type and journal quality. After searching databases and removing duplicates, 1,751 articles were selected.

As SCF field is a fragmented field of research, authors didn’t reduce the number of articles further by refining the search strings. Instead, inclusion and exclusion criteria and quality assessment is used to filter out the studies. Finally, the number of full-text articles was reduced to 97.

Considering the fact that certain publications might not have satisfied all the selection criteria but supplement the body of literature, additional publications were selected. This strategy resulted in an additional 34 Journal articles, 10 reports and 1 conference paper. Following this stage, literature retrieval was performed using a data extraction form and a reference manager. After retrieval, each selected publication was analysed for its descriptive and thematic content.

3 DESCRIPTIVE RESULTS: CHARACTERISING THE SUPPLY CHAIN FINANCE LITERATURE
The publications selected during the inclusion and exclusion stage are analysed in this section. The analysis is based on the type of publication, publication year and research methodology, main scope of the research, ABS
rating, ABS categories, geographical location of the authors’ affiliated institution and industrial sectors. The main objective of this analysis is to understand the trends in this body of literature relevant to the SCF actors, instruments, processes and associated ‘enablers and inhibitors’ for the adoption of SCF.

Taking into account the type of publications, 91% of the publications identified through SLR and cross-referencing are from academic journals, followed by reports that account for 7% of the publications.

Articles and reports selected are published between 1995 and 2017. About 80% of the publications are published between 2009 and 2017. This indicates an increasing interest in SCF and its associated mechanisms. This might have been fuelled by the financial crisis in 2008, during which firms required more financing (internal and external) to absorb the financial stress in the post financial crisis period. The statistical analysis (30% of the papers) and modelling and simulation (36% of the papers) are used to a similar extent and are clearly most frequently used research methodologies. The empirical case studies and literature reviews were carried out during recent years, indicating the requirement for more theoretical development. Interestingly, practitioner’s viewpoints represent only about 8.5% of the selected publications, thereby illustrating the demand for the knowledge development in case of practitioners. While considering the research scope of the publications, Trade Credit (TC) leads with 52% of the publications followed by core SCF related publications with 38% and Financial Supply Chain Management (FSCM) related publications with 10%. This multi-disciplinary research scope is supported by wide-ranging body of literature involving many disciplines.

The 131 articles identified in the literature review were published in 76 journals. The journals with designated ABS field and rating accounted for 82% of the publications. Indeed, 50% of journals has only one article published on the topic. This highlights that this topic has a wide range of relevance across various disciplines, as expected. Furthermore, 30% of journals were published in the journals within Operations and technology management category, with many journals focusing on logistics management, production management and supply chain. In fact the International Journal of Production Economics publishing the most papers (10). Operations and technology management field is followed by Operations Research and management science (16% of selected articles) with European Journal of Operational Research publishing 9 articles and finance (15% of the selected articles). The distribution of the publications in accordance with the ABS field clearly signifies the relevance of various business processes, functions and mechanisms in the SCF field.

Considering the geographical location of authors’ affiliated institutions, 24% of the articles originated from USA, suggesting the strong interest for SCF in USA. China accounts for second largest proportion of papers at 15%, followed by the UK (9%), Switzerland (6%), and Germany (5.5%). Other countries account for less than 5% with 11 countries being origin of one article each.

Finally, it is important to determine which industrial sectors have made contributions to the body of knowledge on SCF. Among all the articles reviewed, the vast majority of articles studied manufacturing sector (34%), followed by service providers sector mainly involving Logistics Service Providers and Financial Service Providers (22%) and consumer goods sector (11%). This distribution is consistent with the concept of SCF which involves various SC actors from different industries.

4 THEMATIC RESULTS: UNDERSTANDING THE SUPPLY CHAIN FINANCE LITERATURE

The SLR has identified eight major constructs for defining the state of SCF actors, instruments, associated SC processes and ‘enablers and inhibitors’ for the adoption of SCF. The constructs allow to capture the scope of SCF literature by relating its associated mechanisms with SCM and ultimately with SC. The constructs identified from the literature are: SCF perspectives, underlying theories, SCF intermediaries (actors), SCF instruments, SC processes and trigger points, coordination mechanisms, SCF adoption and financial performance.

4.1 Supply chain finance perspectives

4.1.1 Supply chain orientation

There has been considerable research done on the physical and informational flows but there is interrelation with financial flows is one of the aspects that has been neglected and overlooked to a large extent [6, 7, 10, 15-18].

SCF brings in the innovativeness in the SC [19, 20] with the main objective of aligning and relating physical, information and financial flow [1] and unlocking the trapped financial resources in the SC [18]. Thereby, taking into account the five main value contributors for the optimisation of financial resources in the SC as proposed by Mathis and Cavaino (2010).

Research on SCF is predominantly developed on the supply side and it is primarily localised in the literature on the interface between operations and finance and interface between logistics and finance [6, 16, 20-22]. The operations and finance perspective takes into consideration the operational flexibility and financial flexibility. Operational and financial flexibilities encompass adaptation, time frame, timing, quantity of material flows in the SC, access to financial resources and restructuring of financing at a low cost. On the other hand, logistics and finance perspective takes into account the interrelation between the financial and logistics decisions in the SC in order to improve the physical flow.

4.1.2 Research streams

The two major research streams that correlate with SCF are FSCM and TC. In literature, FSCM is used as an umbrella term focusing mainly on the supplier-buyer relationships and the flow of cash running parallel to the physical and informational flows [10, 16, 23, 24]. In general, FSCM considers SCF as a part of FSCM but it should be stressed that under FSCM, SCF includes a range of financial instruments taken into account under SCF service portfolio. This differentiation between the SCF and FSCM is clearly supported by the ideas presented in the literature except some exceptions. Exceptions include the FSCM being considered same as SCF and SCF being limited in scope by considering it as financing instrument such as Reverse Factoring [25] and Logistics Financing (LF) [26].

The financial literature on short-term financing in SC revolves around the TC [10] and SCF is considered as an extended version of TC [1, 3, 25, 27, 28]. These points make it immensely essential to see SCF also through the lens of TC. TC is considered as a starting point in the corporate finance and it plays a crucial role in the development of SCF as it provides important insights into short-term financing. Petersen and Rajan (1997) has provided a detailed insight into the TC theories. They have filled the gap between TC theories and conducted empirical tests to provide evidence of TC extension. TC utilises operational, commercial and financial perspectives for the advantages of suppliers and buyers, hence important from the SCF perspective.
4.2 Underlying theories

Literature provides an insight into the numerous theories supporting SCF. The theories based on transaction cost, SC relationships, financing advantage, constraints, information sharing have been used by the authors to base the theoretical and empirical aspects of the research in SCF. Most commonly used theories in the literature supporting SCF are Transaction Cost Theory (TCT), Principal Agent Theory (PAT), Theory of Constraints (TOC) and Pecking Order Theory (POT).

TCT is useful in anchoring the observations and explaining the phenomenon of SCF. Wuttke et al. (2013) argues that TCT underpins the core concepts of opportunism that helps in understanding the financing in SC and reducing the transaction costs in the SC. Application of TCT in SC reduces collection costs and optimises inventory and cash level. Despite of this relevance, the literature on SCF still lacks the empirical evidence to show that TCT can really reduce the transaction costs while using SCF.

PAT acts as a theoretical linkage by addressing the issues related to the successful coordination and collaboration in the SC. The main issues addressed by the theory include the hidden information and goal conflicts, hence directly correlating it with the buyer-supplier dyad [29] and consequently influencing financing of SC. Subsequently, Pföhl and Gomm (2009) has used PAT to describe the advantage of supply chain internal financing as compared to external investors.

In order to overcome the challenges related to SCF, five thinking process tools of TOC can be employed. These thinking process tools help firms in the early stages of implementing SCF initiatives [30] by developing current reality, future reality, and prerequisite for SCF initiatives. Finally, POT is related to the cost of financing and asymmetric information. Using POT, it can be established that under information asymmetry, firms favour internal over external financing, short-term over long-term debt, and debt over the issue of shares [31].

Extension of the above stated theories might result in the financial and information advantage for various SC members implementing or adopting SCF e.g. information advantage can give an added advantage to the primary SC members and disintermediate banks, who are required to overcome the additional barriers to obtain the information relevant to SCF. These theories will also lead to better control and better ability to coordinate the SCF mechanisms along the SC. Hence, they might act as a catalyst for the implementation of SCF mechanisms.

4.3 SCF intermediaries (actors)

SCF actors are the members of SC involved in the implementation or adoption of SCF. The main role of the SCF actors include coordination of the financial instruments in order to deliver the financial services. Literature clearly presents the SCF actors and their differentiation. Actors in the SCF landscape can be broadly classified as primary and supportive actors [2]. Primary actors include the members, who are directly connected with each other in SC e.g. focal company/buyer and supplier whereas supportive members provide the support services to the primary members and include service providers and traditional banks. Service providers are further categorised into LSPs, Financial Service Provider (FSPs) and Trade Platform Providers (TPPs) [32].

Traditionally, LSPs provide logistics services to their customers. As handling logistics services induces financial flows and all other supporting processes [2]. LSPs might be in a better shape to provide and support financing. FSPs are the financial intermediaries/institutions beyond the traditional banks. FSPs play a critical role in the implementation of SCF practices [33] and their integration into SCF is based on the service requirements. According to Pföhl and Gomm (2009), FSPs can be considered in the narrow or broader context. Under narrow context, FSPs just include financial intermediaries specialised in the balance of asset and financial requirements of investors, whereas under broader context, FSPs offer performances in order to allow the completion of financial contracts. TPPs include technology providers and trade platform providers (Business-to-Business /Business-to-Customers), their role in SCF is profound and they typically provide financing by liaising with FSPs or traditional banks. Traditionally banks consists of state-owned or private-owned banks (foreign and domestic) and may be directly or indirectly involved in providing SCF related services.

4.4 SCF instruments

SCF actors coordinate SCF instruments to provide the financial services. SCF instruments include financial instruments, services and mechanisms that are used to overcome the financial constraints in SC. SCF instruments can be categorised in various ways. One of the most widely used categorisation of SCF instruments is to categorise SCF instruments into pre-shipment, in-transit and post-shipment [7, 11, 34]. Pre-shipment instruments include the financing instruments available before invoice release, in-transit instruments are aimed at financing inventories and post-shipment instruments refer to the financing instruments available after invoice release. Whilst this categorisation is used by many authors, it simply limits the scope of SCF in incorporating range of available financial instruments as it focuses only on the operational part of SC (Working Capital based). This notion is also supported by de Boer et al. (2015). According to de Boer et al. (2015), SCF instruments can be categorised into operational, tactical, and strategic. Operational instruments are used to finance Net Working Capital (NWC), tactical instruments are used to finance fixed assets and strategic instruments are related to the equity. Taking into account more specific view on the SC and its members, Bryant and Camerinelli (2014) provided a more discrete and robust categorisation of SCF instruments by categorising them into buyer-centric, supplier-centric, inventory-centric, traditional documentary trade finance and complemented (other types of instruments). The buyer-centric instruments are based on the discounted payment of accounts payable, supplier-centric instruments take into account ‘Accounts Receivable’ and inventory-centric instruments are based on purchase order financing and Inventory Financing (IF). IF can be provided by directly by banks, LSPs or by both banks and LSPs (Logistics financing). On the other hand, traditional documentary trade finance instruments employ the solution centred on trade credit and complemented instruments include the instruments based on the asset finance, longer-term export and project finance, and hedging.

Most recent categorisation of SCF instruments is provided by Caniato et al. (2016), categorising the SCF instruments into traditional, innovative and Supply Chain collaborative. This categorisation takes into account a completely different aspect based on the adoption level of SCF instruments, which is determined by the enablers of SCF, such as, trade process digitalisation, bargaining power, financial attractiveness, and intra-company and inter-company collaborations. In spite of being a new concept of categorisation, the categories are rather weak as they don’t provide a proper insight into the background of categories and the qualification criteria for various instruments to be categorised under a particular category. Additionally, the financial instruments included in the categorisation are limited.
4.5 SC processes and trigger points

In order to understand the ‘event-driven’ nature of SCF, it is crucial to explore SC processes and the corresponding trigger points. Trigger points create the points of intervention, where SCF actor can coordinate a particular SCF instrument. According to the literature, SC can be considered as an inter-relationship between Physical Supply Chain (PSC) and Financial Supply Chain (FSC). PSC and FSC perspectives of SC are critical in understanding the coordination of SC processes and each intervention (finance or payment) in the FSC is driven by an event in the PSC [35]. PSC includes a series of business processes by which goods and services are purchased, transformed and delivered, whereas FSC covers the series of financial processes/flows that support the PSC [24, 36]. As FSC and PSC are correlated to each other by the trigger points, it is these trigger points which initiate the use of financial value-added services like SCF.

The three major SC processes integrating the FSC and PSC are Source-to-Pay (S2P), Order-to-Cash (O2C) and Fulfil-to-Service (F2S) [24, 35, 36]. According to Popa (2013), S2P process is buyer-centric and O2C process is supplier-centric. The SC processes are interrelated to each other with the help of various business processes [36]. These business processes play a major role in offering SCF related services. SCF offering is also based on the event-driven process and comes into picture when a financial significant event is triggered by a SCF process. A single comprehensive and robust framework related to SC process mapping and trigger points is proposed by Bryant and Camerinielli (2014). It clearly highlights the points of interest (where financing can be offered), interrelation between FSC and PSC, coordinating SCF actor, SCF instruments and the processes that require coordination.

4.6 Coordination mechanisms

Each and every SCF instrument needs a coordination mechanism in order to provide a financial service. SCF actor initiating the financial service acts as a coordinator with the main role of coordinating other SC members, SCF instruments and SC processes (FSC and PSC interventions). Most of the coordination mechanism are derived from the SCM or TC. By employing the coordination mechanisms the interdependence between SC members increases, hence providing an appropriate environment for SC financing. Though coordination is an important aspect in SC but some authors argue that coordination without appropriate cooperation incentives measures may incur loss of SC members [37]. Though coordination is very vital for win-win situation in SC, the precise coordination mechanisms related to the SCF are still lacking in the literature. Albeit this, literature on the coordination mechanisms supporting TC gives an insight into the mechanisms that might qualify for SCF as well. These mechanisms are based on the quantity discount, information sharing, and revenue sharing [38].

The most commonly used coordination mechanisms involve usage of contracts. Literature on coordination involving contracts highlights the relationship between the type of contract, actor and corresponding financial instrument being used. According to Gao et al. (2014), certain contracts are better than others as they increase the performance of overall SC and manage the SC when there is a risk of bankruptcy. According to Yan et al. (2016), contract type and their coordination effect can be categorised in accordance with the type of financing scheme [39]. Under different financing schemes coordinated by different actors, the coordination effect of same type of contract can vary, a very important aspect of all the coordination contracts is the allocation of the role of coordinator (a leadership role). The leadership role in providing financing solutions plays a key part in coordinating SCF. This directly implicates that SCF actor can be a conditional coordinator or a full coordinator or a super coordinator.

4.7 SCF adoption

Once SCF actors, instruments and coordination mechanisms are identified and defined, it is important to highlight the adoption/implementation of SCF. According to reviewed literature, successful adoption/implementation of SCF is driven by the set of enablers, whereas inhibitors delimit it. The main enablers for the SCF adoption are SC coordination, capital access, product market position, transaction pooling, credit rationing and control protection [9, 40-42]. The impact of these enablers include, decrease in the overall costs or increase in the overall profit, increase in the purchases and effective lowering of the price, reduction in costs by pooling transactions, facilitation of trade by providing a contractual alternative to immediate money use, providing alternative source of financing for firms ‘credit rationed’ by the banks, and additional concessions for lenders during the financial distress.

According to More and Basu (2013), the main inhibitors of SCF can be classified in to six categories. The six categories are: human resource (HR), information technology (IT), finance, inter as well as intra-firm coordination, collaboration and alliance, organizational policy, strategies and practices and macro-institutional. HR is one of the core challenge faced by SCF as lack of knowledge about SCF mechanisms hinders the adoption of SCF. Apart from the lack of knowledge related to SCF, inefficiencies in financial transactions and poor visibility of movement of goods taking place in SCs are also challenging. This also points in the direction of low process digitisation which has a negative impact on the adoption of SCF [1]. Furthermore, intra and inter silos effects the global dimension demanded by SCF and leads to the ineffective SC planning that is an essential requirement for successful SCF [43, 44]. Another major inhibitor includes the policies, government laws and regulations that mainly hinders the cross-border transactions due to multiple currencies, different languages and multiple legal jurisdictions and makes processes like Know Your Customers (KYC) and Anti-Money Laundering (AML) more complicated.

From the buyer’s perspective, the need to change the internal process, the difficulty to get suppliers on board, lack of common standards, organisational culture, introduction timing, payments terms (interest rate) and conflicts of interest (creditworthiness and risk-adjusted interest rates) are the major inhibitors for adopting SCF [3, 43, 45, 46].

4.8 Financial performance

The effect of SCF on the performance of the firms can be measured by evaluating the financial performance of the firms before and after implementing SCF. Two common indicators mainly used to measure the financial performance in SCF field are the Return on Assets (ROA) [47, 48] and Cash Conversion Cycle (CCC)/Cash to Cash Cycle (C2C). CCC/C2C is widely used to measure the financial performance of the firms based on accounts receivables, accounts payables and inventory holding costs.

From the literature, it is evident that the usage of SCF instruments positively affects ROA of the firms. On the other hand, a shorter CCC indicates better utilisation of cash resources, hence improved financial performance. Though CCC is widely used, Talonpoika et al. (2013) argued that CCC is not an appropriate measure as it doesn’t measure any advance cash payments, hence
proposed a modified Cash Conversion Cycle (mCCC). Both CCC and mCCC focus on the single firm. To extend this measure to an entire SC, a new measure is developed from CCC. This measure is termed as Collaborative Cash Conversion Cycle (CCCC)\[19].
By taking a network perspective (CCCCC), it is possible to determine an optimal combination of CCCs for all the members in a SC by leveraging the differences in capital cost between members in the chain. In addition to these measures, it might be also crucial to use Economic Value added (EVA) measure for the concerned SC members as it will provide a linkage between the financial performance and the creation of shareholder value.

5 CONCEPTUAL FRAMEWORK
Based on the thematic analysis, authors have proposed a conceptual framework to align the SCF actors and instruments along with the contextual factors (see figure 1).

As clear from figure 1, the trigger points highlighting the interventions between FSC and PSC will act as the points of application for financial services (SCF instruments). SCF actors will be taking on the coordination role, thereby coordinating other SCF actors (SC members) and SCF instruments based on the contextual factors. Contextual factors will mainly highlight the enablers and inhibitors for the adoption/implementation of SCF.

6 CONCLUSION
SLR suggests that the SCF actor initiating a SCF scheme can be a supplier, buyer, logistics service provider, financial service provider and a traditional bank. Depending upon whether the actor is primary or supportive member in the SC, buyer-centric, supplier-centric and inventory centric instruments can be implemented to manage the financing and cash flows. Although, literature clearly highlights the various types of SCF actors in SC and ‘inhibitors and enablers’ for SCF adoption, there is an interesting knowledge gap related to the SCF instruments and coordination mechanisms. The SLR has identified eight major constructs to develop a conceptual framework highlighting the inter-relation between SCF, FSC and PSC. Taking into account the insufficiencies in SCF literature, future research direction might include extension of the conceptual framework to take into account: SCF instruments that can be offered as a part of value-added service portfolio, coordination mechanisms between members of SC involved in SCF scheme, impact of financial value-added services (offered by service providers) on the financial performance of SC and SCF implementation framework.

7 REFERENCES
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