

Supply Chain Finance: Impact on Supply Chain Competency and Organizational Performance

Mujtaba Zia

University of North Texas at Dallas

Philip Bond

Southern Arkansas University

Kenneth Green, Jr.

Southern Arkansas University

Limount Zhao

Southern Arkansas University

Supply chain finance (SCF) has begun to garner some attention in the supply chain management literature, yet we find no empirical works assessing the role that SCF plays within a supply chain context and the impact it has on supply chain competency (SCC) and organizational performance (OP). This paper is an attempt to fill this literature gap in supply chain management and provide empirical evidence on the role of SCF. This study employs a structural equations model to investigate the role of SCF in the context of supply chain management on U.S. manufacturing firms. The results map SCF in the center of the supply chain management spectrum with supply chain management strategy (SCMS) and information sharing (IS) as the antecedents to, and SCC and OP as the consequences of SCF. Supply chain finance, together with supply chain competency positively impacts 51% of the variations in organizational performance.

Keywords: supply chain finance, supply chain management strategy, information sharing, supply chain competency, organizational performance

Introduction

Supply chains developed and evolved to efficiently and effectively satisfy the demands of final customers (Jarratt and Fayed, 2001). The most successful supply chains are adaptable, agile, and aligned (Lee, 2004; Whitten et al., 2012). These imperative capabilities are possible only when strong, long-term relationships have been established among the supply chain partners (Heizer and Render, 2006; Fynes et al. 2004). Supply chain management is the integration and coordination of the business processes and management improvement programs throughout the supply chain to satisfy the end customers (Green et al., 2012). This integration and coordination of business processes strengthen the

relationships among supply chain partners and supports the development of capabilities such as adaptability, agility, and alignment. The supply chain management literature contains strong evidence that successful supply chain management yields both improved supply chain performance and organizational performance (Green & Inman, 2005; Green et al., 2008; Green et al., 2014).

Given that successful supply chain management leads to improved performance, the question then turns to how best to optimize the efficiency and effectiveness of supply chains. Which combination of business processes should be integrated and coordinated to better satisfy customers? Green et al. (2012) provide a list of business processes that should be integrated and coordinated throughout supply chains including purchasing, manufacturing, marketing, logistics, and information systems. This study argues that finance should also be included in the list of processes that must be integrated and coordinated throughout the supply chain. It is important to manage the financial flows, as well as the inventory and information flows through the supply chain (Martin & Hofmann, 2017), as “the financial and operating activities of an organization are closely connected and interdependent” (Hofmann, 2005, p. 204).

The primary purpose is to assess the role of supply chain finance within a supply chain context and to assess the impact that supply chain finance has on supply chain and organizational performance. Supply chain finance has begun to garner attention in the supply chain literature (Xu et al., 2018; Caniato et al., 2019), but this study finds no empirical works assessing the role that SCF plays within a supply chain and the impact that SCF has on supply chain competency and organizational performance. This study theorizes a structural model with supply chain finance as the focal construct, supply chain management strategy (SCMS) and information sharing (IS) as antecedents to, and supply chain competency (SCC) and organizational performance (OP) as the consequences of supply chain finance (SCF). Supply chain finance is operationally defined and a new measurement scale is developed for its measurement. Data collected from a sample of U.S. manufacturing managers are analyzed using a multi-method structural equation modeling methodology.

The rest of this paper is as follows. Section two provides a review of the literature. Section three describes the theoretical model and the embedded hypotheses. Section four discusses the data collection procedure and methodology. Section five presents the results and robustness tests. Finally, section six concludes with a summary and brief remarks.

Literature Review

Theoretical Background

Resource advantage theory, systems theory, complementarity theory, and transaction costs theory all play a role in underpinning this research. Resource advantage theory (Hunt, 1997) is based on the idea that organizational resources can be developed in such a way as to provide a competitive advantage. In this case, the study posits that organizations that develop a supply chain management strategy and the ability to share information with supply chain partners coupled with the ability to efficiently and effectively manage the financing of inventories throughout the supply chain, benefit from a strategic and tactical competitive advantage. Systems theory (Johnson et al., 1964) supports a logical argument that the integration and coordination of subsystems yield greater performance levels than the implementation of the subsystems separately. Supply chain processes such as manufacturing, purchasing, selling, logistics, and finance combine to create a supply chain system that optimizes the allocation of resources and customer satisfaction. Complementarity theory (Milgrom & Roberts, 1990; Narasimhan et al., 2010) supports the argument that capabilities such as information sharing and supply chain finance interact to provide performance superior to levels that could be achieved if only one of the capabilities is possessed. Transaction costs theory (Rindfleisch, 2020) also plays a role in explaining the need for and development of supply chain finance in that organizations seek to shift

and delegate activities to supply chain partners such as third-party financial services providers in such a way as to minimize costs and maximize profits throughout the supply chain.

Hofmann (2005, p. 206) describes supply chain finance as “an approach for two or more organizations in a supply chain, including external service providers, to jointly create value through means of planning, steering, and controlling the flow of financial resources on an inter-organizational level.” While the optimization of financial resources through financial contracts is a century-old concept, supply chain finance is a relatively new one that started at the beginning of the 21st century (Hoffman, 2005; Pfohl & Gomm, 2009). This new concept mainly pertains to the management of internal and external financial resources in conjunction with supply chain management giving rise to both internal and external perspectives of supply chain finance. The internal aspect focuses on the financial optimization of working capital while the external aspect focuses on the outsourcing of working capital finances through an external source involving a third-party financial institution.

The supply chain finance literature describes both supply chain and finance orientations (Gelsomino et al, 2016). The supply chain orientation requires that supply chain partners integrate and coordinate financial flows and structures throughout the supply chain for better customer satisfaction at a relatively low cost (Hofmann, 2005; Pfohl & Gomm, 2009; Gomm, 2010; Grosse-Ruyken et al, 2011; Wuttke et al, 2016). The finance orientation focuses on the financial products and services of a third party to facilitate and optimize the processes related to the flow of funds, products, and information among supply chain stakeholders (Camerinelli, 2009; Chen & Hu, 2011; Lamoureux & Evans, 2011; More & Basu, 2013).

“Cost reduction has become a preeminent goal for businesses” (Bharadwaj & Matsuno, 2006, p. 62). Supply chain finance has evolved as an important supply chain capability to reduce transaction costs and to better align the finance-related objectives throughout the organization and subsequently the supply chain. Materials, products, information, and services flow through the supply chain at significant costs. These costs, which are primarily associated with working capital components, may constrain supply chain competency, if not managed effectively. The misalignment of objectives among supply chain decision-makers (different departments within the firm) and between the supply chain stakeholders (suppliers, producers, and clients) may create inefficiencies leading to a reduced level of supply chain competency. For instance, operations managers may be concerned with and compensated based on the speed of production and delivery, while finance managers may be more concerned with maintaining certain financial ratios than the speed of production and delivery. The operations and finance departments may have different objectives and these objectives may not be integrated and coordinated well. Integration and coordination of financial decisions within the organization and throughout the supply chain are the primary focus of supply chain finance as supply chain managers attempt to reduce the total cost of the product or service delivered to customers. Conducting an empirical study in supply chain management, Heide and Stump (1995) study the performance implication of buyer-supplier relationships in U.S. manufacturing firms from a transaction cost perspective and find that establishing strong relationships positively impacts the overall performance for the supply chain partners.

Empirical studies focusing on supply chain finance are scarce and mainly limited to case studies (Gelsomino, et al. 2016, Chakuu et al. 2017). Conducting 40 interviews, Wuttke et al. (2013) investigated the supply chain finance practices of eight European firms. They explored how these firms manage upstream cash flows to determine whether supply chain finance practices lead to improved supply chain performance. They report that managers can improve working capital and reduce risk by engaging in supply chain finance activities based on transaction cost economics. A case study conducted by Blackman et al. (2013) investigates supply chain finance practices at Motorola and finds cost savings for the parties involved by cooperatively managing financial flows in conjunction with customers, suppliers, and banks. Similarly, Mathis and Cavinato (2010) adopt the case study

method to investigate the supply chain management strategies adopted by Toyota and Zara and document that both companies reduce costs through supply chain finance strategies and practices. Surveying 62 companies from Switzerland and conducting ten expert interviews, Martin and Hoffmann (2017) study the reasons why companies involve financial service providers in supply chain finance practices and derive a structured need for companies to be matched with available service offers from financial service providers.

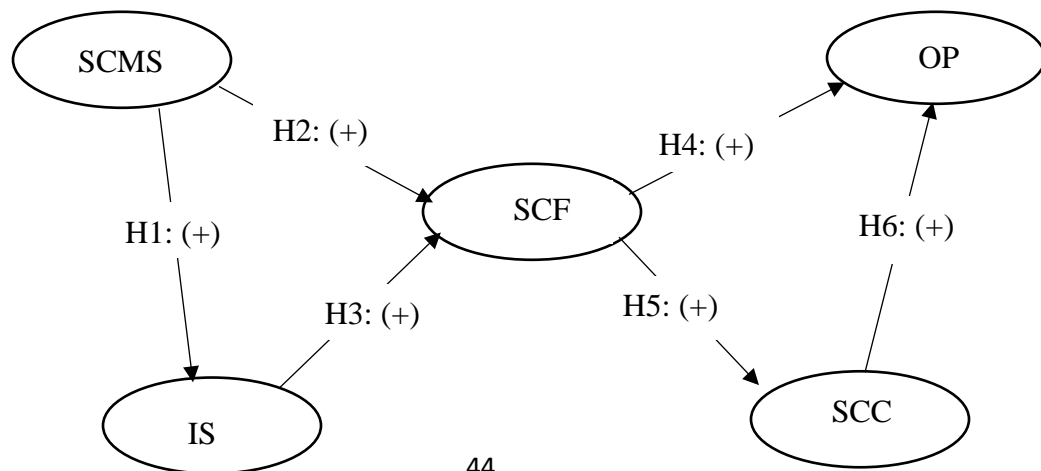
While these case studies document the benefits of supply chain finance on cost reduction and better supply chain performance, the mechanism through which supply chain finance affects supply chain performance is unclear. Xu et al. (2018) do identify six recent empirical studies in an exhaustive literature review of supply chain finance articles. None of those articles investigate the role that supply chain finance plays within a supply chain context. In particular, the available literature fails to map supply chain finance as an important component of a comprehensive supply chain management strategy. This research study attempts to fill this gap in the supply chain finance literature by establishing the role that supply chain finance plays in conjunction with an established supply chain management strategy and the complementary ability to synchronously share real-time information among supply chain partners on supply chain and organizational performance.

Theoretical Model

Figure 1 depicts the theorized structural model with supply chain finance as the focal construct, supply chain management process and information sharing as antecedents to, and supply chain competency and organizational performance as the consequences of supply chain finance. This study proposes that the adoption of a supply chain management strategy coupled with the ability to share information among supply chain partners through an established enterprise resource planning information system supports the implementation of supply chain finance. Further, it posits that the successful implementation of supply chain finance will lead to improved supply chain competency and organization performance. The structural model incorporates five constructs: supply chain management strategy, information sharing, supply chain finance, supply chain competency, and organizational performance. All of the constructs have been previously defined in the supply chain management literature.

Cohen and Roussel (2005) and Wisner (2003) argue that an effective supply chain strategy focuses on an end-to-end integration of business processes including purchasing, manufacturing, and selling throughout the chain for providing optimal value to customers and consumers.

Figure 1 – Theorized Structural Model with Hypotheses



Legend:

SCMS	Supply Chain Management Strategy
IS	Information Sharing
SCF	Supply Chain Finance
SCC	Supply Chain Competency
OP	Organizational Performance
(+)	Positively affects

Green et al. (2007) and Zelbst et al. (2010) define information sharing as the ability to synchronously share real-time information with suppliers and customers. The information is available to all supply chain partners as needed on a real-time basis. Generally, both Green et al. (2007) and Zelbst et al. (2010) acknowledge that this type of information is made available through established ERP [Enterprise Resource Planning] systems.

Following Camerinelli (2009), Chen and Hu (2011), Lamoureux & Evans (2011), and More & Basu (2013), this study defines supply chain finance as the use of third-party financial services providers to finance inventory as it moves from end-to-end through the supply chain, thereby maintaining optimum cash flow levels for all supply chain partners. To this end, supply chain and operation decisions are supported by the finance function in such a way that the customers are provided with the products and services they desire in a timely fashion and at a relatively low total cost. The judicious application of financing by third-party financial services providers eliminates finance-related bottlenecks that would otherwise lead to delivery delays and unwarranted costs. Supply chain finance smooths the flow of products through the supply chain to the customers.

Bowersox et al. (2000) defines supply chain competency as the ability of supply chains to respond to customer demands with high-quality products and services at low costs. Whereas, Claycomb et al. (1999), Green et al. (2004), and Green and Inman (2005) define organizational performance or success as a firm's ability to compete in return on investment, return on sales, and profitability categories against its peers.

Hypotheses

There are six hypotheses embedded within the supply chain finance performance model we propose in this paper. Hypotheses one and six have been previously studied. The remaining four hypotheses incorporate the supply chain finance construct. These four hypotheses have not been empirically assessed. These hypotheses that include the supply chain finance construct form the basis of our claim of significant originality. The four original hypotheses tie supply chain management strategy and information sharing to supply chain finance as antecedents and supply chain competency and organizational performance as the consequences. Essentially, the model is structured in such a way as to highlight the role of supply chain finance within the context of supply chains. This study argues that the implementation of supply chain management serves as the foundation for the successful implementation of supply chain finance which leads to improved supply chain competency and subsequently to improved organizational performance.

Successful supply chain management depends upon the ability to share real-time information synchronously among all supply chain partners. Once the decision to manage at the supply chain level has been made, organizations must develop and implement a supply chain management strategy that is supported by the implementation of an enterprise resource planning system (Green et al., 2007). Green et al. (2007) analyze data from a sample of U.S. manufacturing managers and report that supply chain management strategy has a significant positive impact on information sharing. They empirically test and support the following hypothesis, which is the first hypothesis in our SCF model.

H1: SCM strategy positively impacts information sharing

The financial supply chain runs parallel to the flows of physical goods and information and its integration with the physical supply chain is a critical and ubiquitous aspect of supply chain integration (Silvestro & Lustrato, 2014). Supply chain finance extends financing to suppliers by purchasing accounts payables from buyers and moves the risk of financing towards the stronger party in the supply chain, i.e., the buyer, and therefore, improves the financial resilience of the supply chain (Cavenagly, 2014). It is becoming an increasingly important tool that could bring benefits to both suppliers and buyers across the integrated supply chain, and mitigate and minimize supply chain risk (De Meijer & De Bruijn, 2014; Cavenagly, 2014). Successful SCM strategy calls for and contributes to efficient supply chain finance. Companies should include financial service providers in the integrated supply chain through SCF practices. Therefore, this study hypothesizes as the following:

H2: SCM strategy positively impacts supply chain finance

The idea behind supply chain finance is to leverage the real-time supply-chain data to accelerate payments and help suppliers receive their payments sooner (Cavenaghi, 2014). Specifically, buyers are often able to validate the goods received and approve the related invoices in a matter of days, thanks to modern efficient global supply chains, which allow buyers and suppliers to manage the entire delivery-to-payment cycle in a semi-automatic fashion. However, the approved invoice will not be paid until it becomes due in typically 30 to 90 days, depending on the industry sector and country. If the information about approved invoices (i.e., account payables for buyers, or accounts receivable for suppliers) is passed on to third-party financial service providers (FSP), it becomes more cost and time-efficient. Therefore, efficient information sharing makes supply chain finance possible and establishes the basis for successful supply chain finance. Hence, the study hypothesizes that:

H3: Information sharing positively impacts supply chain finance

Working capital management plays an increasingly important role in the performance and success of the firm. Seifert and Seifert (2011) estimate that an average company can increase its after-tax returns on invested capital by 16% if it can reduce its working capital by 30%. However, improving working capital position is not costless and may negatively impact organizational performance. For instance, extending trade credit requires higher working capital for suppliers and raises their financial risks in supply chains. With supply chain finance, approved account payables are financed by financial service providers at lower costs since it is based on the credit risk of the buyer, which is typically the financially stronger party in the supply chain. Additionally, supply chain finance significantly reduces the cash conversion cycle (CCC) (Huff & Rogers, 2015). Jose, Lancaster, and Stevens (1996) show that shortened cash conversion cycle is associated with higher profitability for several industries. Therefore, SCF can reduce the need for both parties' working capital, reduce CCC and mitigate financial risks leading to improvements in organizational performance. Hence, the study hypothesizes that:

H4: Supply chain finance positively impacts organizational performance

Supply chain finance leads to better supply chain competency of firms as financial service providers furnish the suppliers and buyers with reliable access to liquidity. In that sense, SCF programs act as safety nets during unexpected financial situations and improve the financial resilience of the supply chain. With SCF programs, suppliers typically enjoy sooner payments for their products

delivered to buyers. The process enables them to focus on delivering according to the requests of the buyer without relying on the payments from buyers. This will lead to better delivery speed, delivery dependability, and delivery response. On the other hand, buyers also benefit from the SCF process as they can order supplies without relying on funds from customers. SCF can smooth unexpected delays in cash flows and ease disruptions in production chains. Therefore, SCF eases unexpected delays in cash flows and makes the supply chain more resilient. Hence, this study hypothesizes that:

H5: Supply chain finance positively impacts supply chain competency

Organizations must now compete at the supply chain level. Attempts by managers to directly impact organizational performance may have adverse effects on the performance of the overall supply chain (Meredith & Shafer, 2002; Chopra & Meindl, 2004). Supply chain management is necessarily focused on improving supply chain performance which subsequently improves organizational performance (Green et al., 2014). Conducting an empirical study on US manufacturing firms, Green et al. (2014) report that supply chain competency has a positive and significant impact on organizational performance.

H6: Supply chain competency positively impacts organizational performance

Data and Methodology

Data Collection Process and Sample Description

The data collection process was managed by Qualtrics, a third-party data collection service. The use of such third-party data collection is well established in the supply chain management literature (Inman et al., 2011; Green et al., 2012). Data were collected from 130 manufacturing managers working for U.S. manufacturing plants. Of the 130 respondents, 25 (19.2%) identified their field as finance, 103 (79.2%) identified their field as supply chain management, and 2 left the field blank. Respondents have been in their current positions for an average of 9.7 years. The average plant size for the respondents' work was 564.5 employees. Table 1 displays frequencies by manufacturing industry category and position title.

The descriptive statistics and frequencies in Table 1 indicate that the sample of U.S. manufacturing managers is relatively well experienced and relatively diverse. This is in line with the study's goal of developing such an experienced and diverse sample to support the ability to generalize results across the U.S. manufacturing sector.

Table 1 – Data Description Frequencies

Panel A: Data Frequencies by Manufacturing Industry Category		
<u>Manufacturing Industry Category and Codes</u>	<u>Frequency</u>	<u>Percent</u>
311 - Food	10	7.69%
312 - Beverage and Tobacco	2	1.54%
313 - Textile Mills	2	1.54%
314 - Textile Product Mills	1	0.77%
316 - Leather and Allied Product	1	0.77%
321 - Wood Product	3	2.31%
322 - Paper	2	1.54%

323 - Printing and Related Support Activities	4	3.08%
324 - Petroleum and Coal Product	3	2.31%
325 - Chemical	4	3.08%
326 - Plastics and Rubber Products	6	4.62%
327 - Nonmetallic Mineral Product	3	2.31%
331 - Primary Metal	14	10.77%
332 - Fabricated Metal Product	17	13.08%
333 - Machinery	14	10.77%
334 - Computer and Electronic Product	9	6.92%
335 - Elec Equipment, Appliance and Component	8	6.15%
336 - Transportation Equipment	3	2.31%
337 - Furniture and Related Product	5	3.85%
339 - Miscellaneous	19	14.62%
Total	130	100.00%
Panel B: Data Frequencies by Manager's Position Title		
Position Title	Frequency	Percent
Accounting Manager	7	5.38%
Buyer	3	2.31%
Controller	4	3.08%
Engineering Manager	8	6.15%
Financial Services Manager	3	2.31%
Inventory Control Manager	1	0.77%
Logistics Manager	5	3.85%
Operations Manager	40	30.77%
Plant Manager	14	10.77%
Purchasing Manager	5	3.85%
Sales Manager	14	10.77%
Supply Chain Manager	3	2.31%
Other	23	17.69%
Total	130	100.00%

Measurement Scales

Extending the work of Martin and Hofmann (2017), this study developed a new measurement scale for supply chain finance.¹ It uses the work of Wisner (2003) for the supply chain management strategy measurement scale. It employs the work of Green et al. (2007) for the information sharing measurement scale² and the work of Bowersox et al. (2000) for the supply chain competency measurement scale. The organizational performance scale is based on the work of Green and Inman (2005). Except for the supply chain finance scale, all scales have been previously assessed and found to be sufficiently valid and reliable (Wisner, 2003; Green et al., 2007; Bowersox et al., 2000; Green and Inman, 2005). All measurement scales are assessed for sufficiency in terms of validity and reliability using the assembled dataset.

¹ Martin and Hoffmann (2017) use a survey instrument to capture supply chain finance exclusively defined as third-party financial services providers or the external dimension. This study extends that instrument and add three more measurement items. These items are number one, seven and eight in the SCF measurements listed in Table A.3 in Appendix A. This captures supply chain finance from both dimensions, external and internal or both finance oriented and supply chain-oriented dimensions as defined in this paper

² Item number 10 was added to the list of measurement instruments of Greet et al. (2007) to capture information sharing related to supply chain finance

Common Method Bias

To test our dataset for possible common method bias, we employ statistical tests before running our models. To assess the impact of common method bias on the data collection for this study, as it was collected in a single wave that may raise the issue of common method bias, this study adopts the smallest correlation proxy method recommended by Malhotra et al. (2017), Lindell and Brandt (2000), and Malhotra et al. (2007). The smallest correlation among the items in our dataset is .031 between SCF2 and SCC6. This study compares .031 to the smallest correlation among the latent constructs in our study which is .349 between supply chain finance (SCF) and supply chain competency (SCC) using the equation recommended by Malhotra et al. (2017). The final result of solving the equation is a computed z-score of 11.31 indicating significance at the .01 level. This result indicates that our data is statistically significant and does not suffer from a common method bias.

Validity and Reliability Assessment

Apart from supply chain finance, all other measurement scales are directly utilized from previous research (Wisner, 2003; Green et al., 2007; Bowersox et al., 2000; Green & Inman, 2005). The supply chain finance scale items are partly derived from the work of Martin and Hofmann (2017). To be certain that the dataset is valid and reliable, this study uses partial least square (PLS) and structural equation modeling (SEM) analyses. The indicator loadings and cross-loadings matrix produced by the PLS/SEM analysis indicate that measurement scale items are sufficiently convergent and valid. Table 2 displays reliability scores, correlations, and the square root of the average variance extracted for each of the measurement scales in the study.

The square root of the average variance extracted values for each construct is higher than the correlations with other constructs indicating sufficient discriminant validity (Wetzell et al., 2009). Except for the average variance extracted value for supply chain competency (SCC) which is .477, other statistical scores such as Cronbach's alpha, composite reliability, and the average variance extracted (AVE) for all measurement scales including SCC exceed the respective recommended thresholds of .70, .70, and .50, as prescribed by Garver and Mentzer (1999). The average variance extracted value of .477 for SCC is slightly smaller than the recommended .5 threshold. Since the focus of this study is on the supply chain finance (SCF) parameter and the average variance extracted value for that is .748 (well above the recommended .5 value) and all other reliability and validity scores for all parameters (including SCC) are above the recommended thresholds, the constructs used in the research model exhibit sufficient levels of content, discriminant, convergent validity, and reliability.

Table 2 – Reliability Scores and Correlation among First-Order Latent Constructs

<u>Variables</u>	<u>Cronbach's Alpha</u>	<u>Composite Reliability</u>	<u>Average Variance Extracted</u>	<u>SCMS</u>	<u>IS</u>	<u>SCF</u>	<u>SCC</u>	<u>OP</u>
SCMS	0.925	0.936	0.551	0.743				
IS	0.935	0.946	0.638	0.514	0.799			
SCF	0.955	0.963	0.748	0.585	0.539	0.865		
SCC	0.907	0.922	0.477	0.485	0.553	0.435	0.691	
OP	0.891	0.915	0.605	0.555	0.614	0.349	0.667	0.778

Legend:

SCMS Supply Chain Management Strategy
 IS Information Sharing
 SCF Supply Chain Finance

SCC Supply Chain Competency
 OP Organizational Performance
 Bold Square Root of AVE

Statistical Analysis

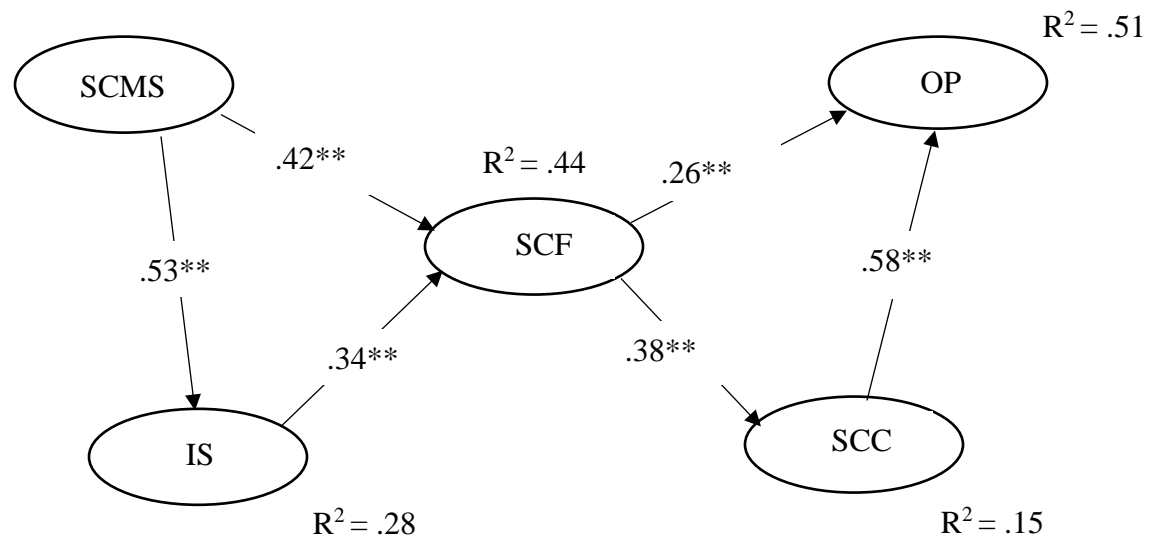
This study uses a multi-method structural equation modeling (SEM) methodology similar to that employed by Inman and Green (2018) to assess the theorized model. Specifically, the partial least squares structural equation modeling (PLS/SEM) methodology is used to test the hypotheses and determine the percentages of variation that the model explains in the outcome variables. Next, covariance-based structural equation modeling (CB/SEM) is used to validate the PLS/SEM hypotheses to determine how well our theorized model reflects reality in the U.S. manufacturing sector. This combination of structural equation modeling methods is based on the discussion by Hair et al. (2011) related to the appropriate uses of both PLS/SEM and CB/SEM.

Results and Discussion

Structural Model Results Based on PLS/SEM

PLS/SEM is well suited for hypothesis testing when the goal is to examine and explain the variation in parameters (Wetzels et al., 2009; Hair et al., 2011). Testing the hypotheses within the model and assessing the fitness of the model based on the percentage of variation explained for each of the dependent constructs (SCMS, IS, SCF, SCC, and OP) in the model are the primary objectives of the study. The focal point is to empirically map supply chain finance (SCF) in the spectrum of general supply chain management. To accomplish these objectives, this study employs the PLS/SEM methodology. Figure 2 displays the PLS/SEM results derived using WarpPLS 6.0 software. The PLS/SEM results support all our hypotheses at the .01 significance level.

Figure 2 – Partial Least Squares Structural Equation Modeling Results



Legend:

** .01 Significance Level
 SCMS Supply Chain Management Strategy
 IS Information Sharing

SCF Supply Chain Finance
 SCC Supply Chain Competency
 OP Organizational Performance

These findings empirically support the hypotheses. The model shows that supply chain finance (SCF) plays an important role in the spectrum of supply chain management. Together with supply chain competency (SCC), it explains 51% of the variation in organizational performance. While alone, it explains 15% of the variation in supply chain competency (SCC). To isolate the impact that SCF alone has on OP, squaring the correlation coefficient between SCF and OP of .349 (see Table 2) yields an R^2 value of .1218 indicating that SCF alone explains 12.18% of the variation in OP. These results imply that supply chain finance (SCF) is an important part of the supply chain processes and practices affecting supply chain competency and organizational performance.

The research model indicates that 44% of the supply chain finance (SCF) variation can be explained by the supply chain management strategy (SCMS) and information sharing (IS). On the other hand, the supply chain management strategy (SCMS) explains 28% of the variation in information sharing (IS).

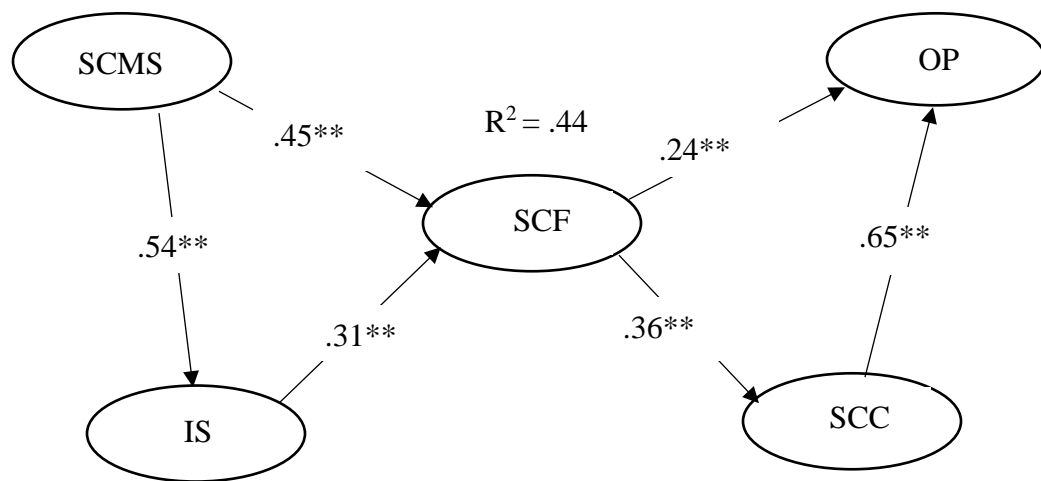
Structural Model Results Based on CB/SEM

For robustness purposes, the model analysis uses structural equations modeling based on CB/SEM. CB/SEM is well suited to assess the goodness of fit of structural models (Hair et al, 2011; Inman et al., 2011; Green et al., 2012). The coefficients for each hypothesis in the research model are significant at the .01 level. These coefficients are very close to the ones derived from the PLS/SEM analysis as shown in Figure 2.

The results from the CB/SEM analysis are presented in Figure 3. It shows that each of the coefficients for hypotheses testing is significant at the .01 level, thus validating the results derived from the PLS/SEM analysis. The CB/SEM results shown in Figure 3 indicate that the model fits the sample data well. The chi-square statistic for the model is 1.79, which is well below the threshold of 3 as prescribed by Kline (1988), therefore the goodness-of-fit of the research model is analytically supported.

For robustness purposes, the root mean square approximation for the model is also calculated. The test statistic is .07 which is also smaller than the prescribed level of .08 by Schumacker and Lomax (1996). These results increase the confidence in the overall goodness-of-fit of the model.

Figure 3 – Covariance-based Structural Equation Modeling Results



Legend:

- | | | | |
|------|----------------------------------|-----|----------------------------|
| ** | .01 Significance Level | SCF | Supply Chain Finance |
| SCMS | Supply Chain Management Strategy | SCC | Supply Chain Competency |
| IS | Information Sharing | OP | Organizational Performance |

Discussion

This study theorizes a structural model with supply chain finance as the focal construct, supply chain management strategy and information sharing as antecedents to supply chain finance, and supply chain competency and organizational performance as consequences of supply chain finance. Both partial least squares structural equation modeling (PLS-SEM) and covariance-based structural equation modeling (CB-SEM) are used to assess the model. PLS-SEM is used to test the hypotheses embedded in the model and CB-SEM is used to test the overall fit of the model. The PLS/SEM results include standardized path coefficients that are positive and significant for all study hypotheses. The PLS-SEM analysis produces an R^2 value of .51 for the organizational performance construct indicating that supply chain finance together with supply chain competency explains 51% of the variation in organizational performance. Supply chain finance alone explains 15% of the variation in supply chain competency. Furthermore, the successful implementation of supply chain finance depends upon the existence of an established supply chain management strategy accompanied by a functioning enterprise resource planning information system. CB-SEM was utilized for robustness purposes and produced standardized path coefficients that are significant at the .01 level, confirming the results from the PLS-SEM analysis. CB-SEM is also used to assess the overall fit of the model. The results indicate that the model fits the data sufficiently well and that all hypotheses are supported. The combination of a supply chain management strategy with an enterprise resource planning system capable of sharing information among supply chain partners supports the successful implementation of supply chain finance. The successful implementation of supply chain finance leads to improved supply chain competency and organizational performance.

Conclusion

Supply chain finance plays an important role in supply chain management as managers strive to efficiently and effectively finance inventories as those inventories move through the supply chain from suppliers to customers. While customers do make final payments for goods and services received at the end of the supply chain, the associated inventories must be financed until such final payments are made. Third-party financial service providers intermediate the financing of inventories in such a way as to minimize the associated transaction costs. These third-party financial service providers are important partners who complement and support suppliers, manufacturers, and customers.

The results of this study identify the context in which supply chain finance can be successfully applied. Supply chain finance is a strategic tool that is effective only when the supply chain management strategy is accompanied by a fully functioning enterprise resource planning system that affords both transparency and traceability of inventories at all stages in the supply chain. The study finds positive and significant antecedent links from both supply chain management strategy and information sharing. The study also identifies the positive significant impact that supply chain finance has on the ability to satisfy supply chain customers and bolster organizational profits. The results show positive and significant antecedent associations between supply chain finance and both supply chain competency and organizational performance.

Therefore, the study concludes that supply chain finance is an important subsystem within the overall supply chain management system. Supply chain finance complements other established supply chain subsystems such as purchasing, manufacturing, marketing, and logistics. A supply chain system that incorporates supply chain finance is arguably both more efficient in terms of lowering total costs to final customers and effective in terms of providing final customers with quality products where and when demanded.

Contributions

The study further develops and describes the supply chain finance construct within the context of supply chain management and develops a measurement scale that exhibits the properties of validity and reliability. This assessment establishes supply chain finance as an important component of an overall supply chain management strategy that improves an organization's ability to support the firm's ability to satisfy customers. The authors believe that this study is one of the few that offer empirical evidence for the value of implementing supply chain finance. The study establishes that supply chain management strategy and information sharing are important antecedents of supply chain finance. The strong, long-term relationships that come from the adoption of a supply chain management strategy and the ability to synchronously share information among supply chain partners through established enterprise resource planning systems are necessary for the successful implementation of supply chain finance. The financing of inventories as they move through the supply chain from suppliers to manufacturers to customers who are working with third-party financial services providers requires supply chain transparency and traceability that is possible only when supply chain management strategy and a functioning enterprise resource planning system are in place. The study also posits that the implementation of supply chain finance improves supply chain performance in the form of supply competency which ultimately improves organizational performance. Additionally, further evidence is provided to support the established links between supply chain management strategy and information sharing (Green et al., 2007) and between supply chain competency and organizational performance (Green et al., 2014).

Implications for Practitioners

Supply chain managers struggle to achieve profitability for their organizations while managing both the organizational and supply chain levels. They continually search for strategies and tactics that will ensure a strong supply chain and organizational performance. Research supports the implementation of a supply chain management strategy to improve the alignment of supply chain partners in conjunction with an enterprise resource planning system that facilitates supply chain transparency and traceability as products and services move toward the end customers. Research also verifies that the implementation of supply chain purchasing, manufacturing, and marketing programs improves supply chain performance which, in turn, improves organizational performance. Based on the results of this study, supply chain management practitioners working to improve both supply chain and organizational performance will be well served to implement supply chain finance. It is logical then to argue that supply chain finance should be added to the firm's portfolio of supply chain programs (e.g., purchasing, manufacturing, marketing, and logistics) to achieve a competitive advantage.

Limitations and Future Research

The statistical results presented in this study are based on data from the manufacturing sector of only the United States thus limiting generalization of the results. It is important to conduct similar studies with samples from other countries around the world to verify the results presented here. It is also suggested to incorporate supply chain finance within a more comprehensive model that includes other business processes such as manufacturing, purchasing, marketing, and logistics. It should also be noted that the definition of supply chain finance offered and studied here is relatively narrow in that it focuses solely on the role of third-party financial services providers in the financing of inventory as it moves through the supply chain to final customers. Other financial services that can be provided by third parties should also be considered in future research.

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Appendix A - Measurement Scales

Table A.1. - Supply Chain Management Strategy (Wisner, 2003)

<i>Please indicate the importance of each of the following issues/concerns to your organization's supply chain management efforts (Low Importance=1, High Importance=5).</i>
1. Reducing response times across the supply chain.
2. Improving the integration of activities across the supply chain.
3. Searching for new ways to integrate SCM activities.
4. Creating a greater level of trust throughout the supply chain.
5. Identifying and participating in additional supply chains.
6. Establishing more frequent contact with supply chain members.
7. Creating a compatible supply chain communication and information system.
8. Involving all supply chain members in your firm's product/service marketing plans.
9. Communicating customers' future strategic needs throughout the supply chain.
10. Extending supply chains beyond your firm's customers/suppliers.
11. Communicating your firm's future strategic needs to suppliers.
12. Creating SCM teams including members from different firms.

Table A.2. - Information Sharing (Green et al., 2007)

<i>Please indicate the extent to which agree or disagree with each statement (1= strongly disagree, 7=strongly agree).</i>
1. We can more quickly respond to customer needs by sharing information with our suppliers.
2. Information flows seamlessly between the suppliers, manufacturers, and customers in our supply chain.
3. We openly share information with our suppliers and customers.
4. Our suppliers and customers openly share information with us.
5. The information shared by participants (suppliers, manufacturers, and customers) in our supply chain is available on a real-time basis.
6. Our customers make inventory and sales information visible to us on a real-time basis.
7. Visibility of customer inventory and sales information has allowed us to quickly replenish customers' inventories with precise quantities at precise locations at precise times.
8. Information distortion is minimized throughout our supply chain through quick, frequent, and accurate information transfer among supply chain members.
9. As a part of our supply chain management efforts, we have worked to develop an information system that is compatible with the systems of our suppliers and customers.
10. We involve our finance department (CFO, Treasurer, Financial Analyst, Financial Manager, Financial Controller....) in our supply chain decisions.
<i>Note: Items 1-9 are directly from the work of Green et al. (2007). Item number 10 was added to capture information sharing related to supply chain finance.</i>

Table A.3. - Supply Chain Finance Practices (Martin & Hofmann, 2017)

<i>Please indicate the extent to which you are with each of the following statements (strongly disagree=1; strongly agree=7)</i>
1. We use third-party financial service providers to finance accounts receivables.
2. We use third-party financial service providers to finance accounts payables.
3. We use third-party financial service providers to finance inventories.

4. We use third-party financial service providers to manage working capital flows.
5. We use third-party financial service providers to shorten order-to-cash cycles.
6. We use third-party financial service providers to shorten forecast-to-fulfill cycles.
7. We use third-party financial service providers to shorten purchase-to-pay cycles.
8. Financial decision-making in our company is well aligned with our supply-chain decisions.
9. We are well satisfied with our third-party financial service providers.
<i>Note: Items number 2-7 are directly from the work of Martin & Hofmann (2017), items 1,8, and 9 are added to better capture supply chain finance measurement.</i>

Table A.4. - Supply Chain Competency (Bowersox et al., 2000)

<i>Please rate your company's performance in each of the following areas as compared to the performance of your competitors (1=much worse than the competition, 5=much better than the competition).</i>
1. Customer satisfaction
2. Product customization
3. Delivery speed
4. Logistics cost
5. Delivery dependability
6. Responsiveness
7. Order flexibility
8. Delivery flexibility
9. Information systems support
10. Order fill capacity
11. Advance ship notification
12. Inventory turnover
13. Return on assets

Table A.5. - Organizational Performance (Green & Inman, 2005)

<i>Please rate your organization's performance in each of the following areas as compared to the industry average (1= well below the industry average, 5 = well above industry average).</i>
1. Average return on investment over the past three years.
2. Average profit over the past three years.
3. Profit growth over the past three years.
4. Average return on sales over the past three years.
5. Average market share growth over the past three years.
6. Average sales volume growth over the past three years.
7. Average sales (in dollars) growth over the past three years.