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ABSTRACT

This paper examines the impact of supply chain relationship quality (SCRQ) on firm performance (FP) through the mediators of supply chain management processes (SCMP) and supply chain performance (SCP). In the literature, these linkages have been examined separately; in contrast, this study takes a holistic perspective on the antecedents of FP. The model was tested using survey data from manufacturing companies. Variance-based structural equation modelling revealed that both SCMP and SCP lead to FP, unlike SCRQ. On the other hand, SCRQ affects SCMP. Drawing on the resource-based view, consistency in SCRQ can lead to not only efficient and effective supply chain management but also improvements in FP and SCP. This research has practical implications, providing supply chain decision makers with insights on enhancing FP. Supply chain decision makers will be able to benefit from the findings of our study by improving supply chain relationships with supply chain members and ensuring FP. This research also highlights how effective management of SCRQ, SCMP and SCP can provide better FP and a competitive advantage.

Introduction

Even before the first appearance of the term supply chain management (SCM) in Oliver and Webber (1982), early-day economists such as Shaw (1912, 747) had identified increased costs, thus leading to lacking profitability, due to 'ill-organized systems of distribution'. Moreover, the major goal of the earliest SCM is still unchanged, being '(1) to arouse a maximum of demand and (2) to supply that demand with a minimum of leakage … ' (Shaw 1912, 737).

Today, SCM is widely accepted as the management of upstream and downstream relationships with chain members that increase value and reduce costs (Christopher 2013). This incorporates the integration of key business processes, from the end user through to the original suppliers (Lambert, Cooper, and Pagh 1998), which are related to manufacturing, distribution and facilitating processes performed to convert raw materials into finished products (Heizer and Render 2014).

The main consideration in SCM is the evaluation of the entire supply chain as a built system requiring a positive attitude towards business relationships (Mentzer et al. 2001). This study focuses on the constructs that improve relationship quality facets of the supply chain in the firm. A review of the extant literature exposes that a comprehensive conceptualisation and measurement of supply chain relationship quality (SCRQ) is lacking.

When they are able to manage the business relationships between their suppliers and customers, firms consequently become able to improve their supply chain performance (SCP) by simultaneously increasing the value of their products and services to their customers (Wisner 2003) and reducing costs (Van der Vorst et al. 1998; Fynes, Voss, and De Búrca 2005). The purpose of SCM has a two-dimensional perspective: improving the performance of an organisation and improving the performance of the entire chain (Council of Logistics Management [CLM] 2000; Li et al. 2006). This is possible when individual firm performance (FP) and SCP are enhanced.

We identify certain research gaps and deficits that we want to close with our research. One gap refers to the understanding of SCM processes (SCMP) whose study has been narrowed down, in the identified studies, to that of information sharing (see e.g. Zhao, Xie, and Zhang 2002; Kim 2006; Fawcett et al. 2007) or isolated upstream or downstream functions (see e.g. Kim 2006; Green, Whitten, and Inman 2008; Khan et al. 2009; Chang, Tsai, and Hsu 2013). Supply chain integration, defined as integration with supply chain partners (including upstream and downstream information exchange, participation level in upstream and downstream processes, and frequent interaction with customers and suppliers) as well as cross-functional integration within the company (such as data integration among different functions, integrative inventory management and frequent cross-functional interaction), has a positive effect on total cost reduction and customer satisfaction. Supply chain integration refers either to the existence of certain internal and external prerequisites, such as organisational culture, alignment of strategies, involvement, good cooperation and easy access to

information or to how much a firm is participating in certain decisions and efforts (see e.g. Zailani and Rajagopal 2005; Won Lee, Kwon, and Severance 2007; Sezen 2008). When supply chain costs and service dimensions are taken into consideration, the existing literature fails to provide how financial and non-financial SCP indicators affect SCMP (e.g. by Lambert, Cooper, and Pagh (1998) and the implementation of such key processes (e.g. Kotzab et al. 2015). When it comes to SCP, we are able to see from the literature that a huge variation of SCP indicators has been used. Some authors have referred to Beamon's (1999) main SCP indicators of flexibility, resource and output performance (e.g. Sezen 2008; Khan et al. 2009). Other authors have focused on the service dimensions of SCP in detail and on costs on a more global level (see e.g. Fawcett et al. 2007; Cadden, Marshall, and Cao 2013).

Overall, we cannot determine how the degree of engagement in a supply chain relationship, which is defined by Fynes, de Búrca, and Marshall (2004) and Fynes, de Búrca, and Mangan (2008) as SCRQ, impacts upon SCMP, SCP and FP. To the extent of our knowledge, the effect of SCRQ on FP, mediated by SCP and SCMP, has so far not been investigated. Concerning this, any holistic perspective on the antecedents of FP is still limited. Therefore, the linkages between SCRQ, SCMP, SCP and FP need comprehensive examination, as the literature has not yet done so.

Based on this, the aims of our paper are, first, to discuss and deliberate how SCRQ impacts SCP and SCMP, then, to theorise on the interaction between SCMP and SCP and determine the impact of SCRQ on FP through their mediation, and finally to validate this conceptualisation empirically. Consequently, our research question is on revealing the impact of SCRQ on SCMP and SCP and proposed as follows:

- How does SCRQ impact FP, SCMP and SCP?

As our research question mainly focuses on the linkage between SCM and FP, we take manufacturing firms as our level of analysis, an industry in which supply chain relationships have received an increasingly large amount of attention. Consequently, we develop a structural model that is used to examine the interactions between SCRQ, SCMP, SCP and FP. Examining these relationships is significant because doing so gives us a deep understanding of how SCRQ leads to FP.

Conceptual model

Theoretical perspective

SCM has turned out to be an important competency that hinges on particular capabilities, such as the ability to build relationships with supply chain members (Yu et al. 2018). The resource-based view (RBV) posits that resources which are rare, valuable, costly to imitate and non-substitutable results in competitive advantage (Barney 1991; Barney et al. 2001); Peteraf 1993). The resources are the tangible and intangible assets of the firm, while capabilities point to the ability to utilise resources to meet the objectives of the firm

(Laosirihongthong, Prajogo, and Adebanjo 2014). One of the main premises of the RBV is that resources are significantly heterogeneous across firms, so that each firm has uniquely different resources (Wittmann, Hunt, and Arnett 2009). The differences in the resources of firms can be considered a factor in explaining the differences in their performance levels, while the way firms manage their resources also impacts on their performance (Combs and Ketchen 1999). The RBV takes the firm as the primary unit of analysis (Yu, Chavez, and Feng 2017). It takes FP into consideration as a key outcome variable and specifies relationships to obtain competitive advantage (Wang and Sengupta 2016). SCRQ is a valuable resource for the firm and impacts SCP, SCMP and FP. Hence, RBV is used here, in forming conceptual and managerial implications of SCRQ for FP. Using the RBV, this study develops a conceptual framework that examines how SCRQ impacts SCP, SCMP and FP, and whether the implementation of SCMP and better SCP lead to better FP.

Supply chain relationship quality

Due to the increasing role played by the outsourcing of activities, organisations depend heavily on upstream and downstream supply chain partners. This requires enormous effort in terms of managing supply chain relations in many directions (Hsu et al. 2009). Consequently, supply chain relationship management has turned into a central area of expertise for all supply chain members and partners (Humphries and McComie 2010). Relationship management among partners is measured by relationship quality, which Crosby, Evans, and Cowles (1990) were amongst the first to deal, finding supportive empirical evidence for it. Skarmeas and Robson (2008) define relationship quality as a high-order concept resulting in less conflict and higher trust and commitment, leading to enhanced satisfaction with one's partners. Studies on relationship quality (e.g. Dorsch, Swanson, and Kelley 1998; Smith 1998; Johnson 1999; Hennig-Thurau and Hansen 2000; Hewett, Money, and Sharma 2002) have thereby emphasised and examined constructs such as trust, commitment, fairness and satisfaction.

Existing studies on relationship quality provide grounding for the interaction between the dimensions of supply chain relationships and SCRQ. SCRQ focuses on long-term and active relationships (Fynes, de Búrca, and Marshall 2004; Fynes, Voss, and de Búrca 2005; Clarke 2006; Su et al. 2008; Odongo et al. 2016). The studies on SCRQ emphasise its impact on SCP (e.g. Odongo et al. 2016; Shin, Thai, and Yuen 2018) and SCMP. However, empirical evidence of these linkages is still limited. While SCM is widely accepted as the management of upstream and downstream relationships with chain members (Christopher 2013), we take SCRQ as the main construct that influences SCP and SCMP and examine its impact on FP for the basis of this research.

Supply chain management processes (SCMP)

SCMP describe structured and measurable sets of processes that are designed to develop effective and efficient

Table 1. Supply chain management processes.

Supply chain management process	Process description
Customer Relationship Management	Developing and maintaining long-term relationships with important customers and/or customer groups with whom specific performance levels are established
Customer Service Management	Provision of a single key point of contact for customers in order to administer product service agreements
Demand Management	Synchronisation of customer requirements with supply capabilities in order to eliminate uncertainty in the supply chain
Order Fulfilment	Integration of a firm's production, transportation and distribution plans for achieving high order-fill rates
Manufacturing Flow Management	Obtaining, implementing and managing flexible manufacturing processes that can be adapted rapidly to changes in demand
Supplier Relationship Management	Developing and maintaining long-term relationships with important suppliers and/or supplier groups in order to leverage strategic and operational capabilities
Product Development & Commercialisation	Integration of upstream and downstream supply chain partners in the development and market introduction of new products
Returns Management	Cost-effective and secure return and disposal of goods

Source: Adopted from Lambert, Cooper, and Pagh (1998).

management of a supply chain (e.g. Davenport 1993; Cooper, Lambert, and Pagh 1997; Li et al. 2006). They are the linking bonds between supply chain partners (Croxton et al. 2001).

Table 1 displays eight SCMP whose implementation is seen as critical to a firm's achievement of high-level performance (see also Cooper, Lambert, and Pagh 1997; Croxton et al. 2001; Lambert et al. 2005; Li et al. 2006; Bowersox, Closs, and Cooper 2007; Robb, Xie, and Arthanari 2008).

The outlined processes include more activities than just the capability to share information and the willingness to connect with other supply chain partners, as Fawcett et al. (2007) presented in their work. The suggested key business processes include the upstream and downstream directions and not just the downstream activities suggested by Khan et al. (2009). All of the included processes refer to inter-organisational management aimed at enhancing the overall performance of the supply chain (e.g. Li et al. 2006).

SCMP, understood by Kim (2006) as technical, structural and logistical initiatives in terms of advanced manufacturing, information technology and management, formalisation of supply chain organisation or close location to suppliers and customers, positively influences the alignment of internal and external integration with supply chain partners.

It has been revealed that SCMP actually contribute to FP (Tan 2002; Tan, Handfield, and Krause 1998); Martin and Patterson 2009; Hsu et al. 2009). Other studies that explore linkages between SCMP and FP (e.g. Brewer and Speh 2000; Stank, Keller, and Daugherty 2001; Chan, Ngai, and Moon 2017; Niranjan, Spulick, and Savitski 2018) highlight the need for more empirical evidence to enhance the knowledge of these linkages. SCMP positively impact SCP and FP through shared resources, upstream and downstream coordination and collaboration, by simultaneously increasing customer service levels through shorter order-cycle times, managing relationships with supply chain members and decreasing costs due to the elimination of duplication (Narasimhan and Das 2001; Clarke, 2006; Johnson and Templar 2011; Alfalla-Luque, Medina-Lopez, and Dey 2013).

Supply chain performance

We understand SCP, in this paper, as the result of the way that integrated supply chain processes, from the raw material stage to the final product's consumption, are utilised (see Beamon 1999). Cuthbertson and Piotrowicz (2008) point out that SCP is the result of the way supply chain partners understand each other, collaborate and integrate their activities. Taking Van Hoek's (1998) considerations into account, SCP is difficult to measure and requires a different approach than traditional performance measurement. Consequently, he suggests a multidimensional measurement approach including financial and non-financial measures in order to investigate the competitiveness of a firm's supply chain and its management. One outcome of positive relationship management refers to information sharing and order coordination, which will lead to service improvements at some supply chain stages, and to cost reductions at all supply chain levels, something that Zhao, Xie, and Zhang (2002) confirmed through simulation. Besides information sharing, Zailani and Rajagopal (2005) identified internal and external upstream supply chain integration as important drivers of improved SCP for manufacturing firms. However, they found that supply chain integration may be affected by country-specific characteristics. Green, Whitten, and Inman (2008) successfully tested the relationship between SCM strategy and those parts of SCP referring to delivery speed, dependability and flexibility, as well as responsiveness and order-fill capacity.

Sezen (2008) has further shown how the design of a supply chain affects the degree of information sharing, thus improving the utilisation of resources and flexibility performance. The positive effect of information sharing has been validated by Fawcett et al. (2007), who empirically show that a high compliance for information sharing and to increase connectivity amongst supply chain members, improves the interest in customer requests, on-time deliveries and customer satisfaction, while lowering inventory costs. Connectivity, being understood as linking with upstream and downstream partners, also reduces supply chain costs, including inbound, outbound, inventory holding and warehousing costs, as well as increasing the supply chain's reliability (see Won Lee, Kwon, and Severance 2007).

Focusing on the same SCP indicators as Sezen (2008), Khan et al. (2009) provide empirical justification for the influence of supply-chain-related distribution processes such as order commitment, distribution flexibility, inventory management, collaborative distribution and IT-enabled distribution on service-related SCP indicators including on-time delivery,

customer service, time to market, fewer returns and reduced manufacturing time.

Supply chain flexibility was focused by Fantazy, Kumar, and Kumar (2009), who showed how different supply chain flexibility strategies affect financial and non-financial SCP indicators. Cadden, Marshall, and Cao (2013) highlighted the role of cultural fit in enhancing performance, which thus becomes vital for globalised companies that operate in various countries with different cultures. Their results showed how cultural fit between supply chain partners improves SCP internally, as well as externally in relation to customers. When it comes to the role of supply chain partner relations and their impact on SCP, Chang, Tsai, and Hsu (2013) were able to show that SCP was impacted by information sharing and supply chain integration, but not that it was influenced by partner relationships.

Typically, two key measures or key performance indicators (KPI) are used to determine the success of supply chain activities (e.g. Beamon 1999; Gunasekaran, Patel, and McGaughey 2004; Chen and Paulraj 2004; Chae 2009):

a. inbound and outbound transportation, facilities, inventory carrying and operational costs;
b. service indicators, including lead time, fill rates, delivery reliability, delivery flexibility and stock-out probabilities.

However, there is a lack of common measures, and thus a lack of a general, applicable, systematic approach to SCP and its measurement (Beamon 1999; Cuthbertson and Piotrowicz 2008). This may be due to the lack of a commonly accepted definition of SCM, and different complexity levels in supply chains, which makes developing proper KPI that can be used for SCP difficult (Pohlen and Lambert 2001).

Nevertheless, Gunasekaran, Patel, and McGaughey (2004) propose a more sophisticated SCP metrics framework that includes financial and non-financial KPI for four main supply chain processes (plan, source, make/assemble and deliver) on a strategic, tactical and operative level.

Brewer and Speh (2000) present a balanced scorecard approach for measuring SCP, thus following the calls of Van Hoek (1998) and Otto and Kotzab (2003) for a multidimensional measurement method.

It is dysfunctional to focus on internal SCP measures only when optimizing SCP, as this means doing so at the expense of other firms in the supply chain (Pohlen and Lambert 2001). SCP is impacted not only by internal but also by the upstream and downstream connectedness of supply chain partners (Hull 2005; Won Lee, Kwon, and Severance 2007). Also, financial measures such as inventory turnover and overall profitability do not provide direct insights into the performance of key business processes or the effectiveness of the supply chain in meeting customer needs (Pohlen and Lambert 2001).

SCP management has become a critical issue for organisations in terms of achieving and prolonging competitive advantage (Ramezankhani, Torabi, and Vahidi 2018). Hence, it is important that the linkages between variables that impact SCP, as well as those actions or decisions of supply chain members that affect SCP, are revealed (Martin and Patterson 2009). Zhao, Xie, and Zhang (2002) and Fawcett

et al. (2007) identify information sharing, coordination of ordering and connectivity between supply chain partners as such items. Taking this into account gives a better understanding of the examination of the causal linkage between SCMP and SCP that is required, leading to the identification of the direct and indirect effects on SCMP, and firms' capability to adopt them in order to improve SCP (see e.g. Kim 2007; Teller, Kotzab, and Grant 2012; Kotzab et al. 2015). Also, Wisner (2003) finds evidence of a positive impact of SCP on FP since, as SCP increases, the firm's capabilities to outperform its competitors increase (Um et al. 2017).

Firm performance

Firm competencies have been identified as drivers of competitive advantage and support the enhancement of FP (Hsu et al. 2009). Peteraf and Barney (2003) define FP as obtaining more economic value than the competitor in the firm's industry. FP attributes accomplishment to a firm's market, financial goals and objectives (Qrunfleh and Tarafdar 2014). This implies that the firm's profitability and market growth are indicators of FP (Huo 2012). Although FP is individually measured, it is evaluated according to a company's performance relative to its industry (Akter et al. 2016). Hence, FP is impacted by the firm's partners and supply chain members.

Previous studies on FP recommend the examination of the SCMP-FP relationship (Wisner 2003; Hsu et al. 2009) and highlight that SCP positively impacts FP (Vonderembse and Tracey 1999; Kim 2009; Qi, Zhao, and Sheu 2011; Qrunfleh and Tarafdar 2014). Relationship management between supply chain members is based on SCMP and this leads to FP (Tracey, Lim, and Vonderembse 2005). It is empirically supported that SCMP positively impacts SCM-related organisational performance (Lenny Koh et al. 2007). Therefore, this research concentrates on the impact SCRQ has on FP. Hence, the linkages between SCRQ, SCMP and SCP and their effects on FP are investigated.

The mediating role of SCMP and SCP

The central element of SCM is the management of tight inter-firm relationships, that are needed for strong SCP (Panayides and Lun 2009). Relationship orientation, that is, the existence of certain trust levels or commitment to engage in supply chain relationships, is a must-have in the successful management of supply chains (see e.g. Mentzer et al. 2001; Panayides and Lun 2009).

Hernández-Espallardo, Rodríguez-Orejuela and Sánchez-Pérez (2010) and Holimchayachotikul et al. (2014) identify inter-firm trust, investments in relationship-specific assets, and customer as well as supplier relationship management as important drivers of SCP. Humphries and McComie (2010) present well-managed relationships as enablers of enhanced performance. One reason for this may be found in the huge variety of relationships between supply chain partners, depending on the level of cooperation involved (see e.g. Gallear, Ghobadian, and Chen 2012). Having this in mind, the impact of relationships on SCP needs to be considered from

different perspectives, e.g. the degree to which a firm is engaged in an active, long-term working supply chain relationship, which Fynes, Voss, and de Búrca (2005) define as SCRQ (see also Su et al. 2008).

SCRQ positively impacts the supply chain partners and the chain and leads to a greater implementation of SCMP and enhanced SCP (Kühne, Gellynck, and Weaver 2013). SCRQ includes elements of trust, cooperation, adaptation and communication that Kotzab et al. (2015) identify as internal and joint prerequisites of, or resources that aid, SCM. Fynes, de Búrca, and Marshall (2004), Fynes, de Búrca, and Mangan (2008) and Lages, Lages, and Lages (2005) all show how SCRQ is positively associated with SCP. These studies confirm and provide grounding for the linking effects SCMP and SCP have on the relationship between SCRQ and FP. Hence, SCRQ is considered as the main construct in SCM and hence FP.

Set of hypotheses

Based on the presented discussion on SCRQ, SCP, SCMP and FP we can derive the following set of hypotheses (see also Figure 1):

- H_1: The greater the implementation of SCMP (ξ_2) the higher the SCP (ξ_3).
- H_2: The higher the SCP (ξ_3) the higher the FP (η_1).
- H_3: The greater the implementation of SCMP (ξ_2) the higher the FP (η_1).
- H_{4a}: The better the SCRQ (ξ_1) the higher the FP (η_1).
- H_{4b}: The better the SCRQ (ξ_1) the higher the SCP (ξ_3).
- H_{4c}: The better the SCRQ (ξ_1) the greater the implementation of SCMP (ξ_2).
- H_{4m}: The effect of SCRQ (ξ_1) on FP (η_1) is mediated by the level of implementation of SCMP (ξ_2) and the SCP (ξ_3).

Methodology

Research instrument and design

In order to empirically test our conceptual model, we designed a self-administered questionnaire, for a survey that took place in Turkey. A stratified random sample was drawn from the 500 largest companies listed on the Istanbul stock exchange. While supply chain relationships in manufacturing enterprises have received a great deal of interest (Chen, Lin, and Huang 2006) and regional and global manufacturing supply chains cover entire supply chain tiers (Kucukvar et al. 2016), we considered manufacturing companies in our sample frame. In a first step, we identified 250 manufacturing companies, out of which 230 were randomly selected. Next, we approached the key informant within each of the selected companies, by targeting the senior manager mainly responsible for SCM within the company. We compiled data from a single respondent (the senior manager), while trying to minimise common method variance (Narasimhan, Swink, and Kim 2006). After sending the questionnaires to the senior managers, we followed up by telephone and email. A total of 161 usable responses, response rate of 70% of the targeted sample were received.

Construct measures

Our survey included 59 variables related to SCRQ (16 variables), FP (5 variables), SCMP (31 variables) and SCP (7 variables) and about the respondent themselves (5 variables; experience in the job, job title, age, gender and education). Another four items, rating the marketing activities of the company, were used to test the sample results for the absence of common method bias.

Table 2 shows the items and the sources from which the scales were derived.
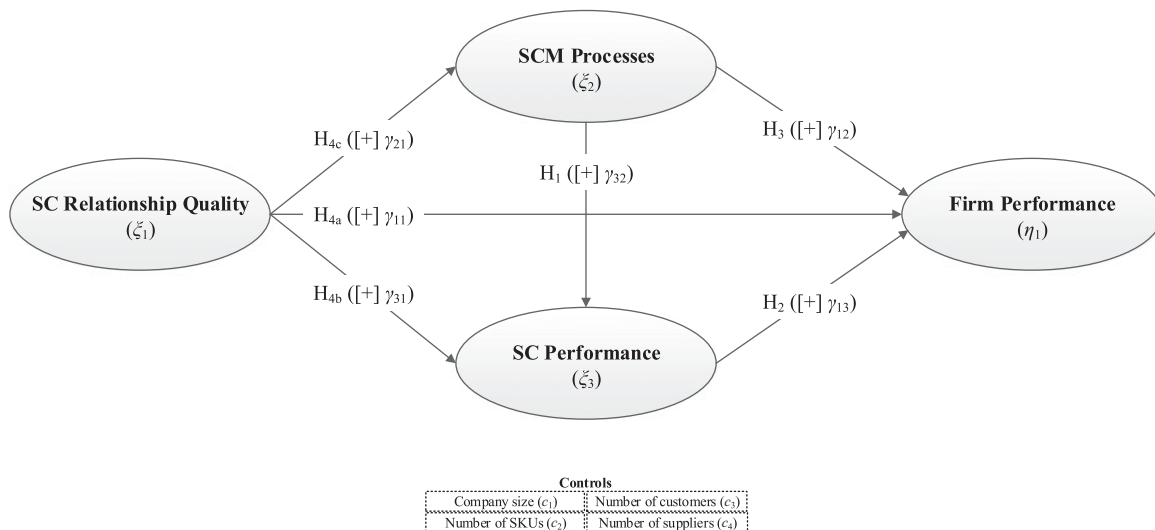

Figure 1. Conceptual model.

Table 2. Construct measures.

Supply chain relationship quality[a]	Exchange of information in this relationship takes place frequently and informally, and not only according to a pre-specified agreement.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	In this relationship, any information that might help the other party will be provided to them.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	Both parties in the relationship will provide proprietary information if it could help the other party.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	Both parties keep each other informed about events or changes that may affect the other party.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	We cooperate extensively with the related supply chain member with respect to product design.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	We cooperate extensively with the related supply chain member with respect to process design.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	We cooperate extensively with the related supply chain member with respect to forecasting and production planning.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	We cooperate extensively with the related supply chain member with respect to quality practices.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	Gearing up to deal with this customer requires highly specialized tools and equipment.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	Our production system has been tailored to meet the requirements of the related supply chain member.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	We have made significant investments in tooling and equipment that are dedicated to our relationship with the related supply chain member.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	Our production system has been tailored to produce the items supplied to the related supply chain member.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	Based on your past and present experience, how would you characterize the level of trust your firm has in its working relationships with the supply chain members?	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	We feel that supply chain members can be counted on to help us.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	We feel that we can trust supply chain members completely.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
	Our supply chain members have a high level of integrity.	Fynes, Voss, and de Búrca (2005) and Fynes, de Búrca, and Mangan (2008)
Supply chain management processes[a]	Is your company capable of processing orders according to agreements with customers in terms of quantities and times?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of installing customer service teams that work with customers to identify and eliminate sources of demand variability?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of integrating key accounts in the development and implementation of marketing programmes?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of periodically evaluating the importance of relationships with its customers?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of integrating its manufacturing, distribution and transportation plans to achieve high order-fill rates?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of meeting your customers' promised delivery dates?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of meeting customer requirements by developing alliances with its supply chain partners?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of forecasting future customer demand?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of using "key" customer data to reduce uncertainty?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of synchronising demand and production rates to manage inventories?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of sharing accurate, relevant and timely information with its supply chain partners to improve forecasting results?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of sharing production and delivery schedules with supply chain partners?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of adapting production capacity according to customer demand?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of coordinating its demand plans with its production plans in order to develop strategies for customers?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of sharing the production schedules with its supply chain partners?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of providing its customers with real-time information about the current status of their orders?	Lambert, Cooper, and Pagh (1998)

	Is your company capable of assisting customers with special order requests?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of providing accurate responses to customer requests?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of responding quickly to customer requests?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of integrating supply chain partners into the product development process?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of coordinating with its customer relationship management to identify changing customer requirements regarding products?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of consulting its supply chain partners in deciding which new products to develop?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of dealing with returned goods?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of dealing with the packaging of returned goods?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of collecting returned products for refurbishment or disposal?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of producing products in such a way that return rates are minimized?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of building up multiple cooperations with important, strategic suppliers?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of providing fast information exchange tools to quickly transfer material requirements?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of regularly solving problems jointly with its suppliers?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of helping its suppliers to improve their product quality?	Lambert, Cooper, and Pagh (1998)
	Is your company capable of including its suppliers in its supply-chain-planning and goal-setting activities?	Lambert, Cooper, and Pagh (1998)
Supply chain performance	Delivery cycle times	Kroes and Ghosh (2010)
	Manufacturing cycle time	Swafford, Ghosh, and Murthy (2006) and Kroes and Ghosh (2010)
	Missing/wrong/damaged/defective products shipped	Supply Chain Council (2005) and Kroes and Ghosh (2010)
	On-time delivery performance	Lee (2004) and Kroes and Ghosh (2010)
	Ability to react to changing market conditions	Lin et al. (2010) and Shatat and Mohamed Udin (2012)
	Delivery flexibility	Lin et al. (2010)
	Delivery reliability	Panayides and Lun (2009)
Firm performance	Market share growth	Tan, Handfield, and Krause (1998), Kim (2009) and Martin and Patterson (2009)
	Overall customer service levels	Tan, Handfield, and Krause (1998) and Wisner (2003)
	Overall product quality	Tan, Handfield, and Krause (1998) and Wisner (2003)
	Sales growth	Kim (2009)
	Overall competitive position	Tan, Handfield, and Krause (1998) and Qrunfleh and Tarafdar (2014)

Source: Fynes, Voss, and de Búrca (2005), Fynes, de Búrca, and Mangan (2008), Kim (2009), Kroes and Ghosh (2010), Lambert, Cooper, and Pagh (1998), Lee (2004), Lin et al. (2010), Martin and Patterson (2009), Qrunfleh and Tarafdar (2014), Shatat and Mohamed Udin (2012), Supply Chain Council (2005), Swafford, Ghosh, and Murthy (2006), Panayides and Lun (2009), Tan, Handfield, and Krause (1998) and Wisner (2003).
[a]Second-order constructs.

Analysis

Variance-based structural equation modelling

Partial least squares (PLS) variance-based structural equation modelling (VBSEM) (Fornell and Bookstein 1982) was used due to the small sample size. Our research aims to enhance knowledge on the supply chain paradigm, where the field is changing. VBSEM is more applicable to studies whose aims relate to prediction and changing phenomena (Chin and Newsted 1999). Based on the small sample size and aim to extend knowledge on SCM, PLS was preferred. However, VBSEM does not feature global fit measures as covariance-based SEM does (e.g. Henseler and Sarstedt 2013; Carrión et al. 2016). Instead, Hair et al. (1998) propose other indicators of global fit for that analysis approach, i.e. the coefficients of determination (r^2) and the significance of path coefficients.

In our case, the r^2 values are acceptable, being between 0.256 and 0.356, and four out of six coefficients are significant and of a medium to large size (see Table 4).

Control variables

We take into account four control variables that may impact the proposed relationships/interactions/impacts in our conceptual model: company size (c_1), product range - number of stock keeping units (c_2), number of customers (c_3) and number of suppliers (c_4). The presence of the first control variable is supported by Wook Kim (2006), who states that company size impacts SCMP and FP. In terms of the second control, product range is important to the implementation of SCMP (Li et al. 2006). The idea that the number of customers has an impact on SCMP and SCM-related issues is identified by

Bozarth et al. (2009). As for the last control, it has been shown that the number of suppliers influences SCMP and SCM-related issues (Lenny Koh et al. 2007).

Second-order constructs

Based on the discussion of the conceptual model, SCRQ is considered the main construct, providing grounding for SCMP. SCM is possible through effective relationship management practices between supply chain members (Mentzer et al. 2001; Christopher 2013). Hence, SCRQ leads to certain supply chain dimensions and acts as an antecedent for various linkages. On the other hand, SCMP refer to the degree of involvement of the individual organisation in the management of its supply chain and requires inter-organisational management. The key business processes include upstream and downstream relationship management (Lambert, Cooper, and Pagh 1998). All of the SCMP included refer to inter-organisational management aimed at enhancing the overall performance of the supply chain (Li et al. 2006; Won Lee, Kwon, and Severance 2007).

Higher-order modelling is recommended when the aim is to represent hierarchical constructs (Koufteros, Babbar, and Kaighobadi 2009). In reflective constructs, changes in the variable directly cause changes in the hypothesised linkages (Hair et al. 1998). SCRQ and SCMP are treated as second-order constructs. SCRQ is composed of four dimensions (communication, cooperation, adaptation and trust) and SCMP include eight dimensions (customer relationship management, order fulfilment process, demand management and sales operations planning, manufacturing flow management, customer service management, product development and commercialisation, return management and relationship management). Hence, we treat SCRQ and SCMP as reflective second-order constructs so as to enhance our knowledge of the linkages between these constructs and performance levels (SCP and FP). Researchers may consider second-order models as a form of aggregation. Aggregation helps represent the relationships between variables (Koufteros, Babbar, and Kaighobadi 2009).

Pre-test and pilot study

In the pre-test and pilot study stage, first, three academic experts reviewed the items. Following this, the reviewed items were translated into Turkish by one academic expert, and then back-translated into English by another academic expert. The back-translated version of the questionnaire was also reviewed by three native academicians. Following this, six supply chain professionals with at least five years of experience in the field were asked to provide feedback for the suitability of the research constructs. Based on the feedback from the academicians and professionals, uncertain items were adjusted to provide a clearer expression.

Non-response bias

We checked the responses of early and late respondents in the sample for potential non-response bias by splitting the sample into these two groups Lambert and Harrington (1990). A T-test was used on the responses to reveal any statistically significant differences. There were no significant differences between the groups and implying non-response bias did not exist (Wisner 2003).

Reliability and validity measures

Internal consistency is verified using Cronbach's alpha and composite reliability, with values above 0.70 being considered satisfactory for all factors (Fornell and Larcker 1981; Loewenthal 2004). The average variance extracted (AVE) values of all the constructs are greater than 0.5, indicating convergent validity (Bagozzi and Yi 1988). For discriminant validity, the correlation coefficient of the two dimensions should be less than the square root of the AVE (Fornell and Larcker 1981). The results in Table 3 ensure the internal consistency, convergent and discriminant validity.

Results

A summary of the results for the hypothesised impacts is presented in Table 4, which includes the coefficients and t values. The SCMP are found to have a positive and significant impact on SCP ($b = 0.633$, $p < .001$) and hence H1 is supported. SCP has a positive and significant impact on FP

Table 3. Reliability and validity measures.

Latent constructs	ρ/α	ξ_1	ξ_2	ξ_3	η_1
SC relationship quality (ξ_1)	.888/.828	(.667)			
SCM processes (ξ_2)	.957/.949	.401	(.736)		
SC performance (ξ_3)	.893/.856	.253	.487	(.558)	
Firm performance (η_1)	.884/.838	.152	.483	.466	(.605)

ρ, composite reliability; α, Cronbach's alpha; average variance extracted (AVE) values are presented on the diagonal; squared correlation matrix for latent constructs shown below the diagonal.

Table 4. Model estimation results.

Structural effect	Coefficient	t-value$^{(p\text{-value})}$
H$_1$ ([+] γ_{32}): SCM processes (ξ_2) $\rightarrow$ SC performance (ξ_3)	.633	10.14***
H$_2$ ([+] γ_{13}): SC performance (ξ_3) $\rightarrow$ Firm performance (η_1)	.399	5.49***
H$_3$ ([+] γ_{12}): SCM processes (ξ_2) $\rightarrow$ Firm performance (η_1)	.495	5.73***
H$_{4a}$ ([+] γ_{11}): SC Relationship quality (ξ_1) $\rightarrow$ Firm performance (η_1)	$-.124$	1.61^{ns}
H$_{4b}$ ([+] γ_{31}): SC Relationship quality (ξ_1) $\rightarrow$ SC performance (ξ_3)	.102	1.28^{ns}
H$_{4c}$ ([+] γ_{21}): SC Relationship quality (ξ_1) $\rightarrow$ SCM processes (ξ_2)	.633	10.78***
Mediating effect		
H$_{4m}$: SC relationship quality (ξ_1) $\rightarrow \xi_2 \rightarrow \xi_3 \rightarrow$ Firm performance (η_1)	.514	8.03***

Notions: r^2-values: SCM processes (ξ_2), .401; SC performance (ξ_3), .493; Firm performance (η_1), 569.
***, significant ($p < .001$); ns, not significant ($p > .05$).

($b = 0.399$, $p < .001$), and thus H2 is also supported. Hypothesis H3 (positive impact of SCMP on FP) is supported, while H4a (positive impact of SCRQ on FP) and H4b (positive impact of SCRQ on SCP) are not supported. SCRQ does not impact either SCP or FP. However, H4c (positive impact of SCRQ on SCM) is supported. H4m is supported, suggesting that SCMP and SCP mediate the relationship between SCRQ and FP ($b = 0.514$, $p < .001$). The results show that SCRQ is the main antecedent of FP, but this is made possible through SCMP and SCP. SCRQ impacts the SCMP of the firm but this does not affect SCP and FP. This means that, while SCRQ has a positive independent impact on the SCMP that impact does not carry through to SCP and FP. Hence, increasing FP and SCP is not possible solely by improving SCRQ. SCRQ has an impact on FP when SCMP and SCP play a joint role. SCRQ is a valuable resource for the firm but needs effective SCMP and SCP to impact FP positively. The RBV postulates that capabilities are the abilities to utilise resources for the objectives of the firm (Laosirihongthong, Prajogo, and Adebanjo 2014). Hence, valuable resources are not sufficient unless they are supported with capabilities. Therefore, performance will be increased when resources and capabilities are utilised simultaneously (Combs and Ketchen 1999). The findings provide empirical evidence of this while, as a valuable resource, SCRQ can enhance FP only when the capabilities of SCMP and SCP exist. On the other hand, when SCMP are effectively managed, this will lead to higher SCP (Beamon 1999; Cuthbertson and Piotrowicz 2008) and FP (Wisner 2003; Hsu et al. 2009; Chan, Ngai, and Moon 2017). SCP is the result of the way integrated supply chain processes are utilised, and this is also validated. Likewise, SCP has a positive impact on FP (Kim 2007; Kotzab et al. 2015). When capabilities exist in a firm, they can determine performance.

Discussion

The goal of this paper was threefold: first, to discuss and deliberate how SCRQ impacts SCP and SCMP; second, to investigate the interaction between SCMP and SCP and third, to determine the impact of SCRQ on FP through the mediation of SCMP and SCP in manufacturing companies. It has been revealed that SCRQ acts as the main antecedent of SCMP, and that SCMP impact SCP. Moreover, SCMP and SCP have been found to mediate the impact of SCRQ on FP. Our empirical results can provide manufacturing supply chains with insights into how they might manage their relationships with supply chain members, by focusing on SCMP and monitoring SCP. Furthermore, we aimed to demonstrate that improvements in SCRQ, SCMP and SCP would enhance FP. In line with the literature, we provide evidence of this impact, i.e. that an improvement in the performance of the supply chain results in corresponding improvement in the performance of the firm and, as a result, the performance of the entire chain (Li et al. 2006; Won Lee, Kwon, and Severance 2007).

Although the current literature provides conceptualization of the interaction between SCRQ, SCMP, SCP and FP, there is currently too little known about the role of SCMP and SCP in mediating the influence SCRQ has on FP. The literature has so far investigated the linkages separately. This study contributes to the literature by providing a holistic perspective on FP through empirical evidence. Hence, understanding of FP is extended. The impact of SCRQ on FP is possible through the joint contribution of SCMP and SCP. In order to improve FP, SCRQ is necessary but not sufficient. Particularly in manufacturing supply chains, an improvement in FP is possible by working with supply chain members when SCM is effective and SCP as desired.

There are few studies in the supply chain literature that uses SCMP and SCP as mediator variables. Drawing on the RBV, this study examines the impact of SCRQ on SCM, SCP and FP. Consistent with the theory, effective leverage of a resource such as SCRQ can lead to, not only efficient and effective SCM but also high performance of both the firm and the supply chain.

The results provide managerial implications regarding the drivers of SCM. Based on findings, we recommend supply chain professionals guidelines in enhancing FP. Thus, it is important that supply chain professionals continue to work closely with all supply chain members, focus on SCMP, and monitor the SCP of the individual organisations in comparison to competitors. The existence of effective SCRQ management, as well as SCMP and SCP, will result in improved FP, and thus support the competitive position of the company. A notable finding is that SCM is dyadic, so that intensified interest in SCM by any individual organisation will necessarily improve SCMP, SCP and FP. Therefore, the findings confirm the key role SCM plays in FP.

Our results show that SCRQ does not impact SCP. Although SCRQ is an important construct for SCP, it is essential that it interacts with SCMP. Thus, supply chain decision makers should concentrate on relationship management with supply chain members and also take a holistic view of SCMP. Additionally, SCRQ does not directly impact FP, but rather, the impact is mediated by the level of implementation of SCMP, and the level of SCP. Maintaining long-term relationships is widely recognised as a core capability in SCM. Therefore, supply chain decision makers should build high-quality relationships with supply chain members so as to obtain a competitive advantage. It is therefore essential that these decision makers seek ways to improve these relationships, closely monitor SCMP and consider FP relative to that of competitors.

Conclusion, outlook and limitations

As with all empirical research, some limitations should be addressed. The first refers to the survey respondents who were all Turkish managers. This provides insights from a single emerging country. Future research could be extended to different countries. The study focused on one type of respondent, the senior supply chain manager, and thus exclusively on managers with a certain level of experience. Further studies could be conducted with less senior managers and professionals, to compare the findings. Rather than focusing on manufacturing companies, in future studies,

companies in different sectors could be included in the sample frame. The study provides quantitative results only, and therefore lacks the comprehensive insight that can be derived through interviews and focus group studies. Further research should extend the current study, which reflects the views of senior managers in large organisations, to include those from SMEs, in order to further test the hypothesised linkages. Finally, we used SCMP and SCP as mediator variables to gain greater insight into the interaction between SCRQ and FP; however, different variables could enlighten our knowledge of the field.

Disclosure statement

No potential conflict of interest was reported by the authors.

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