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CREATING SUPPLY CHAIN COMPETENCE THROUGH STRATEGIC INFORMATION SHARING AMONG FIRMS IN SOUTH AFRICA

Abstract:

The importance of sharing strategic information among supply chain member firms as a practice can never be over emphasised. However, this practice regularly involves a cost and can make firms to be hesitant to share their important information with their supply chain partners. The purpose of this study was to examine the role of strategic information sharing as a practice in the creation of supply chain competence among firms. A positivist approach that allowed a quantitative research method in data collection was used in this study. Data from a sample of 280 firm owners/managers from all the industries of South Africa's nine provinces was used for the final data analysis of this research. A principal component analysis was performed for factor reduction and dimensional groupings using SPSS 24 software. Multiple Regression analysis was performed using SPSS 24 software, and was used for hypotheses tests. The principal finding of this study reported a weak positive influence of strategic information sharing on supply chain competence. This implies that the sharing of important information, if done through the correct structures and technologies, has the ability to create a unique competitive edge for the entire supply chain through collective learning. However, firms need to consider factors such as balancing the bargaining power, aligning roles with incentives as well as developing strong trust before engaging in developing a supply chain competence using strategic information as a tool.

Keywords:

collective learning, supply chain competence, strategic information sharing, South Africa

INTRODUCTION

Strategic information creation and sharing is a key driver of supply chain management, which serves as the engine that allows the other supply chain drivers to work together with the goal of creating an integrated and coordinated supply chain (Chopra & Meindl 2013:482). According to Cox, Dick and Rutner (2012:50), supply chain partnering firms may share information ranging from inventory levels, product descriptions, pricing, shipment tracking and promotional calendars. Liu and Kumar (2003:533) in its support, implore supply chain partners to share with each other information objects such as inventory management, product information, order management, production management, service and support as well as a supply chain plan.

Strategic information sharing refers to communication or sharing of a firm's long term important and sensitive proprietary information between supply chain partners (Bayraktar, Koh, Gunasekaran, Sari & Tatoglu 2008:194). According to Chopra and Meindl (2013:482), the creation and sharing of strategic information is a key supply chain management driver, which serves as the glue that allows the other supply chain drivers to work together with the goal of creating an integrated and coordinated supply chain. It provides the foundation on which supply chain processes execute transactions and managers make decisions. Thus, without the sharing of strategic information, a manager cannot know what customers want, how much inventory is in stock and when more products should be produced or transported. More so, the effective sharing of strategic information can enhance efficiency in a supply chain's operations, thereby producing a higher overall supply chain profit (Mbanje&Lunga 2015:6).

Ideally, for a supply chain to be effective, supply chain information particularly of tacit and strategic nature should be shared by all member firms within the chain (Mbanje&Lunga 2015:104). Such information needs to be accessible in a timely manner and it should be up-to date as well as accurate, such that it provides a true picture of the current state of the supply chain; and enable the other supply chain member firms to make the right decisions. According to De Villiers, Nieman and Nieman (2017:78) the sharing of supply chain information should be the anchor of customer demand process and satisfaction to an extent that it forms an integral part of the entire supply chain.

Nevertheless, the practice of strategic information sharing regularly involves a cost and can make firms to be hesitant to share their important information. In fact, researchers have revealed that many supply chain member firms are hesitant to share their tacit and strategic information (Rashed, Azeem& Halim 2010:74; Prajogo&Olhager 2012:516; Ramanathan&Gunasekaran 2014:253). According to Chu and Lee (2006:1567), while firms agree that providing additional and strategic information to manufacturers would offer some savings to the manufacturers, many retailers were sceptical about the benefits for their firms in sharing information with

manufacturers. This can especially explain a situation where the risk and cost of sharing strategic information is solely a burden of the disclosing supply chain partner. This is also common where there is no mechanism defined prior to allocating some of the resultant additional profit as well as risks and costs to the disclosing supply chain partner (Chu & Lee 2006:1570). As such, partners in a supply chain might find the issue of sharing their strategic information with their partners under the above mentioned conditions as a costly practice without even considering the benefits (Rashed et al., 2010:62). Therefore, there is a need for a mechanism through which partners can consider the benefits, risks and costs of sharing information amongst each other, in order to create a supply chain competence. This paper sought to assess the effect of strategic information sharing on supply chain competence creation.

CONTEXT

Extant literature have revealed that many supply chain partnering firms are hesitant to share their strategic information (Chu & Lee, 2006:1570; Prajogo&Olhager 2012:516). Plausibly, as previously noted, the practice of strategic information sharing regularly involves risks and costs. As a result firms tend to resort to information hoarding and opportunistic behaviour among supply chain partners (Nogues 2014:27). According to Dittmann (2013:48) information hoarding make supply chain partners reluctant or unwilling to share their firm's strategic information and often occurs when a partner, after receiving information from the other supply chain partner, uses that information to the disadvantage of the disclosing partner. Yet, information hoarding can result in a bad reputation and declining profitability. Thus supply chain partners need to guard against information hoarding behaviour amongst each other (Dittmann 2013:48).

For the past decade (2007-2017), supply chain visibility has been identified by supply chain professionals as an area that needs improvement and could help promote the creation of supply chain competences in South Africa. In 2015, supply chain information and intelligence was ranked second as a challenge facing South African firms (Supply Chain Foresight Report 2015). According to the Supply Chain Foresight Report (2015:61) “ *converting supply chain information to business intelligence which firms can use to better anticipate and respond to their competitive and highly demanding environments, and make smarter business decisions*” that can create a competitive advantage for them is the real challenge facing South African firms. This clearly indicates that there is an area for improvement in terms of supply chain management implementation in South Africa with regards to strategic information sharing and supply chain competence creation.

Based on the World Bank Report (2018), South Africa is shown as the third best performer in the upper middle income countries category, following China and Thailand, respectively, in 2018. In other words, when considering the World Bank's logistics performance index of 2018, South Africa is the top performer in Africa for this year. However, South Africa's logistics performance has not been stable for the past

11 years (that is from 2007 to 2018); it has rather fluctuated between the 20th and 34th in rank as measured by the World Bank's logistics performance index. Precisely, in 2007, The South African logistics performance index was ranked the 24th out of 160, while in 2014, the worst logistics performance index was recorded for South Africa (ranked the 34th out of 160). Although the logistics performance index improved in 2016, this improvement was short-lived, since in 2018, the World Bank ranked South Africa the 29th out of 160 countries. With a logistics competence index for South Africa ranked the 33rd out of 160 participating countries in 2018, this justifies the need for a detailed study that examines the effect of strategic information sharing on supply chain competence creation. This study also sought to recommend ways to promote the creation of supply chain competences through the sharing of strategic information among South African firms.

LITERATURE REVIEW

SUPPLY CHAIN COMPETENCE

Supply chain management in accordance with Handfield and Nicholas (1999), cited in Spekman, Spear and Kamauff (2002:41), has grown to encompass a competitive reality. This is because competition has shifted from being between individual firms to being between supply chains. In other words firms prefer collaborating in their supply chains where each supply chain partner contributes value and combines with the partner their unique skills, capabilities as well as experience to achieve goals that they could not easily accomplish as individual firms (Spekman et al., 2002:41). The ability to leverage each supply chain partner's capabilities beyond tangible assets and explicit knowledge is the key strategic issue in each supply chain (Spekman et al., 2002:41).

Hall (1999) cited in Spekman et al. (2002:41) argues that within a supply chain there are more central (core) skills/assets that remain tacit and are less easily transferred among supply chain partners. The examples of such skills/assets are: the employee know-how, reputation and culture that are found in the structure of the firm. According to Spekman et al. (2002:41), these core skills/assets are not easily codified and often not immediately recognised, yet they provide a relative competitive advantage to the firm. Spekman et al. (2002:41) add that it is the ability of a firm to crack the code of these core skills/assets that makes the firm gain insight of its core competencies.

A competence, as defined by De Wit and Meyer (2010:113) using the Resource-based view, is an intangible resource that shows the fitness of a firm to perform in a particular field. In other words, a firm is said to have a competence if it has knowledge, capabilities and the attitude required to successfully operate in a specific area. Knowledge refers to all the rules (know-how, know-what, know-where and know-when) and insights (the know-why) that can be extracted from and help make sense of information (De Wit & Meyer 2010:114). This means that knowledge flows from and influences the interpretation of information. The knowledge that a firm can possess ranges from market insights, competitive intelligence, technological expertise as well

as an understanding of the political and economic developments (De Wit & Meyer 2010:114).

A capability is the organisation's potential for carrying out a specific activity or a set of activities (Ackdilli&Ayhan 2013:145). It refers to the quality of combining a number of skills, where a skill means the ability of a firm to carry out a narrow functional task or activity (De Wit & Meyer 2010:114). The examples of a firm's capabilities include narrower abilities such as market research, advertising and production skills, that if coordinated could generate a capability for a new product development. Attitude is the third element of a competence, which De Wit and Meyer (2010:114) refer to as the mindset prevalent within a firm. Also used interchangeably with attitude are the terms 'disposition and will', which are used to reveal how a firm perceives and relates to the world (Sandberg & Abrahamsson 2011:5).

Some attitudes may bring rapid change to the firm, while, others may be entrenched within the cultural structure of the firm. The attitudes entrenched to the firm's cultural structure particularly can be important resources of the firm (De Wit & Meyer 2010:114). The examples of a firm's attitude can include being quality driven, internationally oriented, innovation-minded and competitively aggressive. Therefore, a firm's core competencies, essential for its sustainable competitive advantage against its rivals, emanates from its ability to attach the firm's cultural structure (firm's attitude) to the most suitable physical carrier/person, capture capabilities in computer programs and codify the tacit knowledge provided. De Almeida, Lisboa, Augusto and Batista (2013:356) in support of this emphasise that the competitiveness of a firm in the long run derives from its ability to build more speedily and at a lower cost than its competitors the core competencies that spawn unanticipated, unique and inimitable products.

Core competencies have been defined by De Wit and Meyer (2010:356) as the collective learning in the organisation, especially how to coordinate diverse production skills and integrate multiple streams of technologies. In addition, core competencies refer to the communication, involvement and a deep commitment of many levels of people from all functions working across firm boundaries (Rosenzweig & Roth 2007:1312). According to De Wit and Meyer (2010:357), the skills that together constitute core competencies must coalesce around individuals whose efforts are not so narrowly focused that they cannot recognise the opportunities for blending their functional expertise with those of others in new and interesting ways.

Core competencies are the glue that bind existing businesses and can be enhanced when these existing firms apply and share them (Wieland & Wallenburg 2013:302). They are an engine for new business development as they guide the patterns of diversification as well as market entry and often lead to new product development (De Wit & Meyer 2010:357). Firms, however, need to nurture and protect their core competencies in order to capture all the benefits that a firm can derive from them. More importantly, these core competencies are the essential ingredient of the

relationships that unleash the unique and inimitable value creating abilities of a supply chain known as supply chain competencies (Wieland & Wallenburg 2013:302).

Supply chain competencies in this study refer to the collective learning of the entire supply chain; learning that emanates from the collaboration (be it conventional or technology-aided) relationships between the supply chain partners, which unleash unique and inimitable value creating abilities by combining the core competencies of the individual partners. Collective learning is the source of competitive advantage for the entire supply chain and it stems from the communication, involvement and a deep commitment of the supply chain partners working across their firms' boundaries (Akbar, Muzaffar & Rehman 2011:41). Such learning is facilitated by a supply chain as a system that forms learning entities and transforms itself through the collective learning of all its individual supply chain partners (Breite & Koskinen 2014:11). The idea is that a supply chain learns from its individual supply chain collaborating firms through their sharing and transferring of an individual firm's core competencies such as tacit knowledge. This will in turn improve the supply chain activities thereby improving the performance of the entire supply chain of those collaborating firms.

Supply chain collective learning as a supply chain competence enables the supply chain collaborating firms (partners) to collectively respond to market uncertainties and outperform their rivals in supply chain operations (Stratman & Roth 2002:609). However, to capture the above mentioned benefits, supply chain competence requires the ability of the entire supply chain to take full control of its operations regardless of the environmental turmoil (Spekman et al., 2002:44). It is imperative to note that the core supply chain competencies that result from collective learning of the partnering firms must create a sustainable competitive advantage for the entire supply chain.

A supply chain's competitive advantage is sustainable if it cannot be copied, substituted or eroded by the actions of the rival supply chains and is not made redundant by the developments in the environment (De Villiers et al, 2017:109). This implies that the sustainability of a supply chain's competitive advantage depends on its competitive defendability and environmental consonance. Supply chain competitive defendability refers to the intrinsic easiness or difficulty to defend a supply chain's competitive advantage (De Villiers et al., 2017:109; De Wit & Meyer 2010:115). In other words, a supply chain's competitive advantage is said to be defendable if the other competing supply chains or even individual competing firms find it difficult or rather next to impossible to imitate its products and activities or find alternative routes to attack (De Wit & Meyer 2010:115). Such kinds of supply chain defendability can only occur where the collaborating partners share their knowledge and use it for the benefit of the entire supply chain.

Environmental consonance refers to a situation where the sustainability of a supply chain's competitive advantage is threatened or stimulated by the developments in the market (Shen 2014:6239). The environmental developments encompass the changes in consumer needs, wants, tastes and preferences, the changes in distribution channels, alterations in government regulations, introduction of new technologies and

the new competition entrants in the market (Shen 2014:6239). All such environmental developments can undermine the fit between a supply chain's competitive advantage and the environment, thereby weakening its position in the market. Supply chain collaborating firms therefore need to genuinely share and transfer their tacit knowledge with each other in order to learn collectively and sustain their supply chain competitive edge over their rivals.

STRATEGIC INFORMATION SHARING

Inventory management comprises information on replenishment order forecasts, inventory levels, the actual replenishment orders as well as goods' receipts. Product information includes product management profiles and design (Hove 2015). Order management requires information on the sales forecasts, catalogue or quotations, the actual sales orders as well as the order delivery and shipment notice. Production management information objects contain information on the master production plan, capacity plan, production orders and the bill of materials (Hove 2015). Service and support requires information on the technical service as well as support data and feedback from customers. The supply chain plan needs to be shared as it contains information that will guide all the collaborative supply chain processes in order to optimise the entire supply chain (Liu & Kumar 2003:533). Thus without such information being shared, a manager cannot know the market uncertainties such as what customers want or prefer. The manager also cannot know how much inventory is in stock and when more products should be produced or transported. In other words, strategic information sharing provides the foundation on which supply chain processes execute transactions and managers make decisions.

Information sharing has been defined by Shou, Yang, Zhang and Su (2013:2) as the extent to which a firm openly communicates important and sensitive information to its partners. Shin, Collier and Wilson (2000:167) refer to it as the sharing and transferring of information within or across the structure of the organisation, focusing on providing a context for efficient sharing of this valuable, intangible resource. In this study, strategic information sharing refers to communication or sharing of a firm's long term important and sensitive proprietary information between supply chain partners (Bayraktar et al., 2008:194).

There are various structures through which the strategic information can be shared. Information sharing structure refers to the description of the range of each supply chain partner's private information and the communication of that information with the other supply chain partners (Liu & Kumar 2003:525). Liu and Kumar (2003:525) identify three structures of information sharing which are sequential, reciprocal as well as being the hub-and-spokes. Sequential information sharing is a one way information flow structure in which the output of one supply chain partner's activity flows into the next partner's as its input. Consequently, such a flow and sharing of information links the collaborative processes between the neighbouring supply chain partners into a sequential chain.

An example would be that of Toyota and its suppliers that are closely located to the Toyota assembling plants. Information is shared in a sequential manner from Toyota's suppliers to Toyota's manufacturing and assembling firm. It is imperative to note that each pair of supply chain partners in this structure can establish their own practices and procedures for information sharing without the help of any universal standard. In such a structure, partnering firms can use electronic data interchange (EDI) or some other communication mechanisms (Liu & Kumar 2003:525).

Reciprocal information sharing is a more complex structure in which information flows in two directions among multiple supply chain partners. This bi-directional flow of information among multiple partners can cause some irregularities between the shared information of different supply chain partners. A suitable example will be that of Dell whose relationships are not hindered by geographical location, thus allowing it to share information with its multiple supply chain partners worldwide. However, there is a need to synchronise and integrate the strategic information, sharing interactive processes to enhance coordination, and reduce uncertainty and conflict, which may result among collaborating supply chain partners (Liu & Kumar 2003:525).

The Hub-and-spoke is a web based information sharing structure, which is based on a central hub that communicates with all supply chain partners. Normally, a web based electronic hub in this structure serves as a virtual marketplace for all supply chain partners, which facilitates a full range of business processes and interactions between these partners. The main functions of the e-hub include coordinating, storing, aggregating, and maintaining information about each supply chain partner, making decisions, as well as communicating such decisions to all the partners. A centralised hub enhances effective collaborative planning, forecasting, and replenishment (CPFR) (Liu & Kumar 2003:525).

Effective and efficient strategic information sharing is determined by the presence of three factors, which are trust among supply chain partners, contract and equally shared bargaining power among partners (Piderit, Flowerday & Von Solms 2011:4). Trust, as defined by Chopra and Meindl (2013:550), is the belief that each supply chain partner has an interest in the other's welfare such that they will not take any actions without considering the effect on the other partners. In other words, for information sharing to be effective, supply chain partners need to believe in each other's actions and their ability to look out for each other. A contract, in accordance with Piderit et al. (2011:8) is an agreement among supply chain partners in a specific market that specifies objectives, areas of decision domain, the level of information sharing, performance measures and transfer payments. Thus a contract is essential among supply chain partners as it reveals the levels of information that each partner is obliged to share with the other partners.

Bargaining power is another key success factor of information sharing in supply chains. According to Van Weele (2010:197), the bargaining power among the supply chain partners should be equally shared in order to avoid domination of one partner over the other. It is through equity in bargaining power that supply chain partners can

effectively share their strategic information with each other. Therefore, it is imperative that the supply chain partners ensure the presence of trust, contract and equally shared power in order to effectively share their strategic information with each other and derive benefits from it.

Strategic information sharing, if conducted effectively, can provide the supply chain partnering firms with a wide range of benefits. Simatupang and Sridharan (2001:18) report some of the benefits of information sharing in supply chains, which are: providing contractual clarity to partners, helping to deal with market uncertainties and facilitating supply chain coordination, as well as reducing opportunism among partners. Contractual clarity refers to the provision of relevant information for reviewing the resources needed to evaluate the contract and deciding on whether to modify, extend or terminate it (Simatupang&Sridharan 2001:8). In other words, information sharing provides clarity in terms of the contractual rights and responsibilities of the supply chain partners. It also optimises resource allocation required to measure overall performance and distribute benefits among partners using an appropriate incentive scheme (Simatupang&Sridharan 2001:8).

In addition, information sharing among supply chain partners can create a mutual competitive advantage through increasing customers' derived benefits (value) and reducing supply chain costs. More so, it helps lower inventory levels, improve product availability as well as shorten the product delivery lead times. Such benefits can best be explained by the Dell, an example of a computer manufacturing company. Dell has an online information sharing system through which it leverages its logistics capability to create excellent customer service. According to Simatupang and Sridharan (2001:1), Dell manages to satisfy its online customers as well as provide its suppliers with a customer order visibility. As such, its suppliers such as Akustka, Logitech, American Power Conversion and Microsoft Corporation among others are able to view the parts that Dell needs today and in the following week. As a result, these suppliers can reduce their inventory on hand and shorten their product delivery lead times.

Nevertheless, the practice of strategic information sharing regularly involves risks and costs. Some of these include the stimulation of information hoarding and opportunistic behaviour among supply chain partners. Information hoarding is one of the major risks that make partners reluctant or unwilling to share their firm's strategic information (Nogues 2014:27). It occurs when a partner, after receiving information from the other supply chain partner, uses that information to the disadvantage of the information disclosing partner. Information hoarding can lead to a decline in the profitability of the informant partner due to a bad reputation. Partners in a supply chain need to guard against such a behaviour amongst each other (Dittmann 2013:48)

Opportunistic behaviour as asserted by Piderit et al. (2011:7) is one that emanates from a partner's self interest which makes the partner to seek maximisation of benefits while avoiding costs by all means. Information sharing can encourage opportunistic behaviour in supply chain partners before or after signing the contract. On the one hand, pre-contractual opportunism occurs in the form of adverse selection. This

involves a partner misrepresenting or concealing the truthful information about its resource capability and market conditions that need to be shared with other supply chain partners before signing the contract (Piderit et al., 2011:7). On the other hand, post-contractual opportunism occurs in the form of moral hazard. Moral hazard involves a partner providing misleading information about its performance status and lowers its service level efforts as well as minimising its level of resource allocation commitment to the supply chain activities (Piderit et al., 2011:7).

Previous studies have revealed that many supply chain partnering firms are hesitant to share strategic information (Chu & Lee 2006:1570; Prajogo&Olhager 2012:516). This is quite common, especially where the risk and cost of sharing strategic information is solely a burden of the disclosing supply chain partner. More so, this is also common where there is no mechanism defined prior to allocating some of the resultant additional profit as well as risks and costs to the disclosing supply chain partner (Chu & Lee 2006:1570). As such, partners in a supply chain might find the issue of sharing their strategic information with their partners under the above mentioned conditions as a costly practice without even considering the benefits. Therefore, there is a need for a mechanism through which partners can consider the benefits, risks and costs of sharing information amongst each other.

Simatupang and Sridharan (2001:18) suggest that partners can use productive behaviour-based incentives, such as paying for performance and equitable compensation. For instance, the pay for performance schemes such as transfer pricing, consignment and additional backlog penalties can be introduced to help supply chain partners to share inventory costs that may result from information sharing (Simatupang&Sridharan 2001:18). This will ensure effective sharing of strategic information among all the involved supply chain partners.

Strategic Information Sharing and Supply Chain Competence

Information sharing and communication is a fundamental contributing factor towards any form of learning. The supply chain management framework by Lambert and Cooper (2000) shows information flowing to all the supply chain member firms from across all the business processes. It reveals information flow through sharing and communication as a fundamental pillar for the integration of business processes in a supply chain. The framework also entails that firms in a supply chain can learn collectively and develop a sustainable supply chain competence through the effective flow of the accurate information among member firms.

The Relational View (RV) theory by Dyer and Sing (1998), as well as the Learning and Knowledge Perspective (LKP) theory by Kogut (1988) and Hamel (1991) are used to also explain the influence of strategic information sharing on supply chain competence. The RV theory assumes that a regular pattern of inter-firm interactions result in the creation of inter-organisational knowledge sharing routines that allow firms to transfer, recombine and or create new specialised knowledge (Dyer & Sing 1998). The knowledge routines allow collaborating firms in a supply chain to share

even tacit knowledge with each other. This knowledge cannot be accessed by any individual firm outside the collaboration relations even from the markets. The RV theory linked information sharing to organisational learning and relational rents. The theory requires collaborating firms in a supply chain to share their important information both expressly and tacitly with each other in order to learn collectively and ultimately generate relational rents.

The development of the LKP theory can be linked to the works of Kogut (1988) and Hamel (1991). The theory postulates that supply chain partners establish network or alliance relationships to exploit opportunities that reveal knowledge creation and organisational learning (Cao & Zhang 2010:21). Verwaal and Hesselms (2004:444) in support argue that firms can strengthen their competitive advantage through knowledge creation and organisational learning. The theory views collaboration in supply chains as an effective means of transferring knowledge and new technical skills across firms (Cao & Zhang 2010:17). This is mainly because collaboration in supply chains provides a conducive environment for learning (Verwaal & Hesselms 2004:445) and enhances partner-enabled knowledge creation in markets (Malhotra, Gasains & El-Sawy 2005:22). The argument is that collaboration in supply chains facilitates the sharing of tacit knowledge among supply chain member firms, and it might be difficult for individual firms to find and buy such knowledge in the market due to its tacit nature. This implies that firms can only access tacit knowledge of the other firms through relationships such as collaborations in supply chains, which creates an advantage only to the collaborating partners.

The LKP theory, regard information as an effect of supply chain collaborations, which facilitates even the sharing of tacit knowledge among partners. The theory holds that firms can learn either through exploitation or exploration. For instance, when collaborating firms exploit new areas of capability improvements, they can learn collectively through the discovery of new business growth opportunities as well as the creation of new business knowledge. Sharing of such knowledge with the other collaborating firms in their supply chain can help these firms to develop a competence for both the individual firms as well as the entire supply chain. Also when firms explore areas of their already existing capability improvements, they can learn collectively and create a sustainable supply chain competence.

Previous evidence from a study by Chow et al. (2008) examined the associations between supply chain components (supply chain practices, concerns and competences) and organisational performance in the United States of America and Taiwan. Their study classified supply chain competence into quality and service, operations and distribution as well as design effectiveness. An empirical survey on middle level managers was used to collect data. Structural equation modelling was performed to test the research hypotheses. The findings of the study showed that supply chain competencies have positive effects on organisational performance in both US and Taiwan. In addition, the results revealed that supply chain practices and competencies are significantly associated in both US and Taiwan.

Likewise, the current study classified supply chain competence in accordance with Chow et al. (2008:676) into: quality and service, operations and distribution as well as design effectiveness. Quality and service supply chain competence refers to the ability of the entire supply chain to: respond to key customer demands and needs in a timely manner, produce high quality products, deliver high quality services, work with key suppliers and have a better asset utilisation (Chow et al., 2008:676). Operations and distribution supply chain competence refers to the ability of the supply chain as a whole to manage its inventory, meet promised delivery dates, fill customer orders with improved accuracy, forecast sales with greater accuracy and issue advanced notice on shipping delays (Chow et al., 2008:676). Design effectiveness supply chain competence is the ability of the entire supply chain to design low pollution production processes, delivery processes and enhance the supply chain's position in social responsibility (Chow et al., 2008:676).

Another study by Ngai, Chau and Chan (2011) linked knowledge sharing to learning orientation, supply chain agility and strategic competitiveness. They argue that the 'efficient flow or sharing of information and materials helps firms to keep track of market needs and allows the firm to relocate resources in a responsive manner' (Ngai et al., 2011:237). In other words information sharing among collaborating firms enhances the ability of firms to learn and develop supply chain agility, which requires firms to promptly respond to unexpected changes. Supply chain agility will in turn create a supply chain competence for the entire supply chain. Previous studies that have linked strategic information sharing to supply chain competence are scant. This study attempts to provide such evidence on the link between strategic information sharing and supply chain competence.

The current study proposes that sharing of strategic information among e-collaborating firms in a supply chain can create operational and distribution, product and service as well as design effectiveness supply chain competences. It assumes that e-collaborating firms in a supply chain can learn collectively from sharing their strategic information through the reciprocal as well as the hub-and-spoke information structures. For instance, when e-collaborating firms share their information through a reciprocal structure, information flows in a bidirectional manner. If shared effectively, the information can help the e-collaborating firms to generate the operational and distribution as well as the product and service supply chain competences. In other words, bidirectional information sharing among e-collaborating firms enables them to accurately forecast demand, promptly fulfil customer orders, produce quality products and deliver quality services. However, if done inappropriately, bidirectional information sharing can cause irregularities between the shared information of different supply chain partners (Liu & Kumar 2003:525). As such, Liu and Kumar (2003:525) emphasise the need for collaborating firms to synchronise and integrate their strategic information sharing interactive processes so as to augment coordination as well as reduce uncertainty and conflict among member firms.

The hubs and spokes are web based structures for information sharing among collaborating firms (Chong et al., 2009:152). These structures, as noted earlier, require a virtual market (such as Carpentercare.com, Carpenterdirect.com and Visional technology) which facilitates a full range of business processes and interaction among collaborating firms. Liu and Kumar (2003:525) argue that a 'centralised e-hub enhances the ability of firms to accurately forecast customer demand, promptly fulfil customer orders and even produce quality products'. This means that strategic information sharing among e-collaborating firms through e-hub structures like Carpenterdirect.com enables firms to develop supply chain competences. Based on the above, the hypothesis of this study is that strategic information sharing among e-collaborating firms in a supply chain has a positive influence on supply chain competence. This is stated below as:

H0₁: Strategic information sharing has a negative influence on supply chain competence creation.

H₁: Strategic information sharing has a positive influence on supply chain competence creation.

METHODOLOGY

A quantitative research approach was employed in order to obtain the supply chain member firm managers' perceptions of the influence of strategic information sharing on supply chain competence. As such, this research makes use of a quantitative technique that generally involves the collection of primary data from a large number of supply chain member firms in South Africa. This was done with the intention of generalising the results to the wider population of South Africa. Quantitative primary research was conducted by employing a self-administered questionnaire in the gathering of primary data for the study. More so, a cross-sectional study was conducted due to time limitations, which restricted the use of longitudinal studies.

Target population

The supply chain member firms' managers and owners are the target population of this study and those firms which are members of the South African Production and Inventory Control Society (SAPICS) South Africa were considered. The current population of the SAPICS members is 1964 and comprised the target population of this study. For the purposes of this study, all 1964 supply chain/procurement managers who are members of the SAPICS South Africa constitute this study's sampling frame. This study employed a probability sample, mainly because of its representativeness of the target population, which enhances the generalisability of the results to a larger population (Berndt & Petzer, 2011:349). Thus, the 1964 supply chain/procurement managers on the SAPICS South Africa database was sampled using simple random sampling, which dictates that each population element has a known non-zero chance of being selected (Aaker, Kumar & Day 2004:764). Simple random sampling is easy to use and minimises selection bias. A sample size of 280

supply chain/procurement managers on the SAPICS database registered member firms was used.

Data Gathering Technique

Questionnaire protocol serves as the primary means for data collection from the supply chain member firm managers. The questionnaire was developed primarily on the basis of instruments used in other studies (operationalisation and item measurement section). Multi-item scaled questions (particularly Likert scales) were used to test the research hypotheses. Thus, most of the questions contained in the questionnaire were 5-point Likert scale questions.

The scope of this study covers all the nine provinces in South Africa since SAPICS members are in all the nine provinces. In addition, the scope covers all the nine official sectors (retailing, manufacturing, wholesaling, construction, tourism, agriculture, financial, mining and transport), since supply chains cut across all sectors. Self-administered questionnaires were used for data collection. However, given the distance involved between the nine provinces in South Africa, data was primarily collected during the SAPICS 36th Annual Conference held at Sun City from the 2nd to 4th of June 2014. The questionnaires also were converted into monk internet based surveys (which were available online for three months) to reduce costs. Telephonic follow-ups as well as emails were made to yield a higher response rate.

For the purposes of this study, the research measurements were adopted and operationalised primarily on the basis of previous works and consultation with field and academic experts. A review of the relevant literature resulted in two main constructs, and these are: strategic information sharing and supply chain competence. The study made some minor modifications to the adapted measures in order to suit the purpose and context of the current research.

Data Analysis

Data analysis is not an end in itself; its purpose is to produce information that helps address the problem at hand (Malhotra 1999:434). The research data gathered for this study was coded in short phrases and cleansed using Excel spread sheets to make it easier to enter into the analysing software for further analysis. Descriptive analysis for personal and company information of the supply chain member firm managers was performed using SPSS 24 software packages. To test the research hypotheses, a regression analysis was performed using SPSS 24.

FINDINGS

Demographics and Firm Profiles

Of the surveyed respondents, 65.7% of the respondents were males while 34.3% were females. The findings reveal that women still lag behind men in supply chain carriers. Most (79.3%) of the respondents (supply chain/logistics/procurement/purchasing managers and firm owners) are degree

holders, a few (11.1%) are diploma holders and 9.6% of the respondents have high school certificates. 73.2% of the surveyed firms employ more than 51 employees, while 10% employ between 21 to 50 employees. 7.1% of these firms employ at least five workers or less, while 5.4% employ between 6 to 10 workers. Only 4.3% of the sample employ between 11 to 20 workers in their firms. Furthermore, this study's findings show that a majority (73.2%) of the sample firms are larger firms while 26.8% are small and medium firms based on the number of workers they employ. The findings further indicate that 42.9% of the sample firms are in the manufacturing sector; 26.1% in logistics; 12.9% in retailing; 6.8% in mining; 5% in agriculture; 2.1% in the financial services; 1.8% in construction; 1.4% in tourism and 1.1% in marketing services.

The results in this study also indicate that a majority (48.2%) of the sample firms own a combination of computers, smart phones and the Internet; while 29.3% own a combination of computers, smart phones, the Internet and satellite. In addition, the findings reveal that 8.2% of the sample firms own Internet; 5.7% own a combination of computers and smart phones; 3.9% own other forms of marketing and communication technologies, particularly, extranets; 2.1% own computers; 1.4% own a combination of computers and Internet, while, 1.1% own smart phones only. For firms with smart phones only, the implication is that they fail to capture the likely benefits posited by using computers, Internet and satellite in their collaborations with the major supply chain members. However, most of the sample firms (77.5%) own a combination of the four marketing and communication technologies (in particular computers, smart phones, Internet and satellite). Likewise, this implies that a majority of these sample firms are able to collaborate with their primary supply chain members in technology-enabled environments and share their important and strategic information effectively.

RELIABILITY

In this study, reliability of the research variables was tested using the Cronbach's alpha coefficients. The Cronbach's alpha coefficients were 0.87 and 0.91 for strategic information sharing and supply chain competence creation respectively. Thus, both of the Cronbach's alpha values for the two research variables used in this study were above the acceptable threshold value of 0.7 used in the study of Nunnally and Bernstein (1994:24). All in all, the measurement items used in this study were highly reliable.

THE PRINCIPAL COMPONENT ANALYSIS RESULTS

Principal component analysis is a factor reduction method that involves replacing large data sets by smaller data sets (Rotaru, Pop, Vatca&Cioban 2012:504). According to Yong and Pearce (2013:84), it is a factor reduction method used to reduce a large number of observed variables (measurement items) into a smaller number of principal factors or dimensions of the latent variables, through the extraction of maximum variances. As previously noted in chapter 5, this method was applied in this study to reduce the 24 questionnaire measurement items (observed variables) used for the two

latent research variables and confirm their dimensional groupings. Principal component analysis in this study was also performed to confirm the groupings of the measurement items for the five latent variables in the survey questionnaire (see Appendix A).

The maximum likelihood, Kaiser criterion (eigen values >1), an evaluation of the scree plots along with the varimax rotation methods were employed to extract the principal components or dimensions of the five latent variables in this study. More importantly, the primary condition for performing PCA, which requires a Kaiser-Meyer-Olkin (KMO) measure of sample adequacy to be at least 0.5 or more was met for all the five research latent variables. The KMO values were 0.865 for strategic information sharing and 0.884 for supply chain competence. These KMO values for sample adequacy were significant at less than 0.001 (that is 0.000). The satisfaction of KMO values of above 0.5 at higher significance levels necessitated the continuation of PCA for factor reduction. The Kaiser Normalisation criteria which requires that all the measurement items have an Eigen value greater than 1, was the next procedure followed. Tables 1, 2, 3 and 4 present the initial Eigen values for all the research latent variables.

Table 1: Eigen Values for Strategic Information Sharing									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.038	50.378	50.378	5.038	50.378	50.378	3.592	35.921	35.921
2	1.206	12.063	62.441	1.206	12.063	62.441	2.652	26.519	62.441
3	.924	9.237	71.677						
4	.635	6.345	78.023						
5	.539	5.389	83.411						
6	.458	4.578	87.990						
7	.400	4.001	91.990						
8	.353	3.534	95.524						
9	.235	2.350	97.875						
10	.213	2.125	100.000						
Extraction Method: Principal Component Analysis.									

Table 1 presents the Eigen values calculated in the SPSS software package and shows that only component one (1) and two (2) have the initial Eigen values greater than one. Component 1 with an initial Eigen value of 5.038 accounts for 50.38% of the strategic information sharing data set variance. Component 2 with an Eigen value of 1.206 explains 12.06% of the data set variance.

Table 2: Eigen Values for Supply Chain Competence									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.826	48.758	48.758	6.826	48.758	48.758	5.381	38.433	38.433
2	1.947	13.908	62.666	1.947	13.908	62.666	3.393	24.233	62.666
3	.933	6.666	69.332						
4	.848	6.059	75.391						
5	.660	4.711	80.102						
6	.565	4.035	84.137						
7	.424	3.031	87.168						
8	.397	2.836	90.004						
9	.349	2.496	92.500						
10	.305	2.182	94.682						
11	.279	1.990	96.673						
12	.199	1.420	98.093						
13	.141	1.010	99.103						
14	.126	.897	100.000						

Extraction Method: Principal Component Analysis.

As shown in Table 2 above, only two components (component 1 and 2) have the initial Eigen values exceeding one, the recommended and acceptable threshold value. Component 1 with an initial Eigen value of 6.826 explains 48.76% of the supply chain competence data set variance. Component 2 with an Eigen value of 1.947 accounts for 13.91% of the data set variance. The next sections discuss the grouping of the dimensions for the two latent variables together with the measurement items that highly load into each dimension.

After establishing the components with the initial Eigen values that exceed the recommended threshold of one, the next step is to select the measurement items that load above 0.5 into a principal component. The principal component analysis results that reveal these high factor loadings are shown as the component plots as well as the varimax rotated component matrix in the tables below. According to Cu, Charrette, Dieu, Hai and Toan (2009:68), varimax rotation is necessary in factor reduction because it makes it easier to clearly distinguish between the factor loadings of each measurement item using their principal components/dimensions. Table 3 tabulates the rotation component matrix of the strategic information sharing variable.

Table 3: Rotated Component Matrix for Strategic Information Sharing

	Component	
	1	2
SIS1		.796
SIS2	.512	.559
SIS3		.716
SIS4		.688
SIS5		.645
SIS6	.731	
SIS7	.832	
SIS8	.847	
SIS9	.811	
SIS10	.588	

Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization.^a; a. Rotation converged in 3 iterations.

Table 3 presents the varimax rotation results for the principal dimensions along with the measurement items that highly load into these dimensions of strategic information sharing. As shown in Table 3 above, two principal dimensions of strategic information sharing were extracted, which are strategic information sharing with suppliers and customers. Five measurement items (SIS 6 to SIS 10) highly loaded into the first component with factor loadings of between 0.588 and 0.847. All the five measurement items related highly to the dimension of sharing strategic information with customers. The second component constitutes four measurement items (SIS 1, 3, 4 and 5) with factor loadings of between 0.645 and 0.796. All the four measurement items highly loads into the dimension of sharing strategic information with suppliers. Measurement item SIS 2, which appeared on both component 1 and 2 was deleted because it showed multicollinearity problems by loading above 0.35 in the two components. Table 4 below presents the rotated component matrix results for the supply chain competence variable.

Table 4: A Rotated Component Matrix for Supply Chain Competence

	Component	
	1	2
SCC1		.786
SCC2		.638
SCC3		.702
SCC4		.663
SCC5	.540	
SCC6		.589
SCC7		.731
SCC8	.814	
SCC9	.823	

SCC10	.814	
SCC11	.861	
SCC12	.858	
SCC13	.850	
SCC14	.811	
Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization. ^a ; a. Rotation converged in 3 iterations.		

Table 4 shows that a varimax rotation converged in three iterations and extracted two meaningful dimensions of supply chain competence. These two dimensional groupings of the measurement items of supply chain competence are less than the predicted three in the original groupings provided in the questionnaire (see Appendix A). The first component consists of eight measurement items (SCC5, SCC8 to SCC14) with higher factor loading, ranging from 0.540 and 0.861. All these measurement items highly load into the design, operational and distributional effectiveness dimension. The second component comprised six measurement items (SCC1 to SCC4 and SCC6 to SCC7) with factor loadings of between 0.589 to 0.786. All these six measurement items are highly related with the quality and service dimension.

REGRESSION ANALYSIS

A regression analysis was performed to test the hypothesised influence of strategic information sharing on supply chain competence. The main aim of regression analysis was to avoid making wrong conclusions regarding the claims of the invalidated H_1 .

- H_1 : *Strategic information sharing has a positive influence on supply chain competence.*

The next section provides a discussion of the regression analysis results.

Table 5: Regression Analysis Hypotheses Testing Results

Model		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant) supply chain competence	1.102	0.128		8.639	.000
	Strategic information sharing	0.721	0.035	.758	20.755	.000

The linear regression model is presented as: $SCC = 1.102 + 0.721(SIS)$

Where SCC is the predicted supply chain competence and SIS is strategic information sharing. The regression coefficient associated with strategic information sharing is 0.721; which means that each unit increase in strategic information shared is associated with a 0.721 unit increase of supply chain competence. The association

between strategic information sharing and supply chain competence is also statistically significant with a p-value (= 0.001) which is less than 0.05. In other words firms in a supply chain can positively and significantly learn collectively so, and create a supply chain competence through sharing of their strategic information with other supply chain member firms.

From Table 5, supply chain competence is the dependent variable predicted by strategic information sharing. Table 5 shows a positive beta coefficient (0.758) for the relationship between strategic information sharing and supply chain competence. This beta coefficient is above the recommended threshold value of 0.5. The p-value is exactly 0.001 with a t-value of 20.755, which is above the acceptable value of 2.00. These findings suggest that strategic information sharing has a strong positive and significant influence on supply chain competence creation. Thus, based on these results, H_{1} is also validated and supported and the null hypothesis, H_{01} , claiming a negative influence of strategic information sharing on supply chain competence is rejected.

The statistically significant and strong positive influence confirms the findings of Liu and Kumar (2003:525) who suggested that a centralised e-hub as an information sharing platform enhances the ability of firms to accurately forecast customer demand, promptly fulfil customer orders and even produce quality products (supply chain competences). The findings are also in agreement with the work of Choi and Ko (2012:557) who found that inter-firm supply chain practices can facilitate information sharing among partners.

The assumption commonly made is that collaborating firms do share their important information within their supply chain. While this is true for some firms, a majority of these firms own basic technologies (such as computers, smart phones and Internet), which support the basic information sharing structures such as the sequential and reciprocal information sharing structures. With these structures problems relating to coordination, information hoarding as well as opportunistic behaviour among the collaborating partners frequently occur. This in turn prevents the collaborating firms from learning collectively as a supply chain and fail to create a distinct supply chain competence.

These findings reveal strategic information sharing as having a direct influence on supply chain competence. In other words, strategic information sharing is a major determinant of supply chain competence although other factors such as balancing the bargaining power, establishing incentive and risk sharing mechanisms, supply chain e-collaboration and organizational learning might be key in developing a distinct supply chain competence. Though supply chain management was adopted relatively late in South Africa compared to other countries, the findings in this study showed a strongly positive influence of strategic information sharing on supply chain competence. Perhaps most of the surveyed South African firms have gone beyond trying to gain understanding of the essence and benefits of supply chain e-collaborations and

strategic information sharing and are now moving towards fully committing their funds in them.

These findings suggest that the sharing of strategic information among supply chain partners can enhance their ability to learn collectively and develop a supply chain competence; though there are still other factors other than information sharing that are key in the creation of a supply chain competence. In other words, the sharing of strategic information among e-collaborating firms through e-hub structures like Carpenterdirect.com can enable firms to develop supply chain competences with the help of other factors. Given that to the best knowledge of the researcher, there are few studies that have directly linked strategic information sharing and supply chain competence; these findings also make significant contributions to the supply chain management body of literature in this regard. Since the influence is strongly positive and highly significant, the claims of H_1 are validated in this study. **Therefore, this study validates and supports the claim that strategic information sharing has a positive influence on supply chain competence (H_1); and rejects the null hypothesis H_0 which claims a negative influence of strategic information sharing on supply chain competence.**

CONCLUSION AND IMPLICATIONS

A strong positive influence of strategic information sharing on supply chain competence was reported. As such this study concludes that effective sharing of strategic information among supply chain partners can be used as a tool to facilitate the creation of a supply chain competence. This implies that the sharing of important information, if done through the correct structures and technologies, has the ability to create a unique competitive edge for the entire supply chain through collective learning. However, the collaborating firms need to consider factors such as balancing the bargaining power, aligning roles with incentives as well as developing strong trust before engaging in developing a supply chain competence. More so, it is imperative for these firm owners/managers to understand the two broad categories of supply chain competence, namely: quality and service, as well as design, operational and distributional effectiveness. This will help them know the type of information structures to develop given each dimension of supply chain competence. For instance, with the hub-and-spokes information sharing structures, firms can store, coordinate as well as communicate information and decisions; and develop both the quality and service competence; along with the design, operational and distributional effectiveness competence.

The study also has strong implications on policy formulation by policy makers. In South Africa, government and quasi-government institutions formulate policies and strategies to improve the learning abilities and performance of entire supply chains in order to increase their economic contribution. Worldwide, supply chains are seen as the real drivers of competition, which achieve economic growth in terms of increasing the Gross Domestic Product (GDP) and solving the ever-increasing unemployment

problem. This study provides a strong foundation to policy makers to formulate relevant policies.

The government and quasi-government organisations are interested in ensuring the growth and success of both large and small firms, mainly because they contribute immensely to the country's GDP, employment and poverty alleviation. These two types of policymakers need a sound understanding of strategic information sharing and its influence on supply chain competence. This will help government and quasi-government agents formulate strategies and policies that can improve the supply chain performance of these firms and their supply chain's economic contribution.

The current study provides some empirical evidence for the government to consider when formulating supply chain management policies and strategies that are relevant and applicable to the South African context. The validation or invalidation of linear relationship between the two research variables can assist policy makers in formulating effective supply chain management policies and strategies. This will in turn mitigate the effects of the supply chain risks centred on technology use and the sharing of information especially when considering the creation of a supply chain competence.

STRATEGIES TO CREATE SUPPLY CHAIN COMPETENCE THROUGH SHARING OF STRATEGIC INFORMATION

- Effective and efficient strategic information sharing is determined by the presence of three factors, which are trust among supply chain partners, contract and equally shared bargaining power among partners (Piderit, Flowerday & Von Solms 2011:4). Trust, as defined by Chopra and Meindl (2013:550), is the belief that each supply chain partner has an interest in the other's welfare such that they will not take any actions without considering the effect on the other partners. In other words, for information sharing to be effective, supply chain partners need to believe in each other's actions and their ability to look out for each other. A contract, in accordance with Piderit et al. (2011:8) is an agreement among supply chain partners in a specific market that specifies objectives, areas of decision domain, the level of information sharing, performance measures and transfer payments. A contract is essential among supply chain partners as it reveals the levels of information that each partner is obliged to share with the other partners.

Equity in bargaining power is another key success factor of information sharing in supply chains. According to Van Weele (2010:197), the bargaining power among the supply chain partners should be equally shared in order to avoid domination of one partner over the other. It is through equity in bargaining power that supply chain partners can effectively share their strategic information with each other. Therefore, it is imperative that the supply chain partners ensure the presence of trust, contract and equally shared power in order to effectively share their strategic information with each other and derive benefits from it in a manner that creates a supply chain competence.

- Use of a mechanism through which partners can consider the benefits, risks and costs of sharing information amongst each other in a way that facilitates supply chain competence creation: -Previous studies have revealed that many supply chain partnering firms are hesitant to share strategic information (Chu & Lee 2006:1570; Prajogo&Olhager 2012:516). This is quite common, especially where the risk and cost of sharing strategic information is solely a burden of the disclosing supply chain partner. More so, this is also common where there is no mechanism defined prior to allocating some of the resultant additional profit as well as risks and costs to the disclosing supply chain partner (Chu & Lee 2006:1570). As such, partners in a supply chain might find the issue of sharing their strategic information with their partners under the above mentioned conditions as a costly practice without even considering the benefits. Therefore, there is a need for a mechanism through which partners can consider the benefits, risks and costs of sharing information amongst each other.

Simatupang and Sridharan (2001:18) suggest that partners can use productive behaviour-based incentives, such as paying for performance and equitable compensation. For instance, the pay for performance schemes such as transfer pricing, consignment and additional backlog penalties can be introduced to help supply chain partners to share inventory costs that may result from information sharing (Simatupang&Sridharan 2001:18). This will ensure effective sharing of strategic information among all the involved supply chain partners which can also be converted into a supply chain competence.

Limitations and Suggestions for Further Studies

This study did not examine the key success factors. As such further studies can focus on key success factors that can facilitate the creation of supply chain competence through information sharing. More so, further studies can also conduct the same study in other countries for comparison purposes.

APPENDICES

APPENDIX A

STRATEGIC INFORMATION SHARING MEASURES

SPSS Analysis Code	Strategic Information Sharing with Suppliers
SIS1	Technology-enabled supply chain collaborations make our company to provide our suppliers with the demandforecast information.
SIS2	Our company and our suppliers share their capacityplanning information because of the technology enabled supply chain collaborations.
SIS 3	Our company can easily monitor the status of itsorders due to the technology enabled supply chain collaborations.

SIS 4	Our company can easily find information about the suppliers' products and prices because of the supply chain e-collaborations.
SIS5	Supply chain e-collaborations make our company to share its production plans with suppliers.
	Strategic Information Sharing with Customers
SIS 6	Our customers provide us with the demand forecast information because of e-collaboration in our supply chain
SIS7	Our customers share their production plans with us because of e-collaboration in our supply chain.
SIS8	Our customers can easily monitor the status of their orders due to e-collaboration in our supply chain.
SIS 8	Our firm and its customers share their capacity planning information with the help of technology used in our supply chain collaborations.
SIS 9	E-collaboration in our supply chain makes our customers to share their long term plans with us.

SUPPLY CHAIN COMPETENCE MEASURES

SPSS Analysis Code	Quality and Service
SCC 1	Our company has the ability to fill orders with improved accuracy because of sharing of strategic information between supply chain members
SCC2	Our company has the ability to forecast sales with greater accuracy because of the shared information among supply chain members.
SCC 3	Our company has the ability to issue advanced notices on shipping delays due to the culture of sharing strategic information within our supply chain collaborations.
SCC4	Strategic information sharing makes our company to have the ability to respond to a request in a timely manner.
SCC5	E-collaboration in our supply chain gives our company the ability to produce high quality products.; the ability to deliver high-quality services
SCC6	E-collaboration in our supply chain gives our company the ability to deliver high-quality services.
SCC7	E-collaboration and information sharing enables our company to respond to the needs of key customers.
SCC8	E-collaborations with key suppliers and sharing information with them gives our company the ability to work with our key suppliers.
	Operations and distribution
SCC8	E-collaborations in our supply chain give our company the ability to manage supply chain inventory.
SCC9	Sharing strategic information in our supply chain gives our company the ability to meet a promised delivery date.
SCC10	Sharing strategic information in our supply chain gives our company the ability to enhance our supply chain's position in terms of integrity

	Design Effectiveness
SCC11	E-collaborations in our supply chain give our company the ability to design low-pollution production process.
SCC12	E-collaborations and sharing of strategic information in our supply chain gives our company the ability to design low-pollution delivering process.
SCC13	E-collaborations and sharing of strategic information in our supply chain has the ability to enhance our supply chain's position in terms of social responsibility.

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