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The Mediating Effect of Supply Chain Integration on the Relationship between Information Technology, Trust and Firm Performance: A Conceptual Framework

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Abstract

Supply chain Management has played a significant role in corporate efficiency and has attracted the attention of numerous academicians over the last few years. As the concept of becomes more widely accepted, supply chain integration (SCI) is gaining more attention among both practitioners and academics. The paper aims at understanding how SCI and its antecedents, impacts firm performance. For the literature review of the related academic articles for the previous studies has been taken by international journals in Logistics, Supply Chain Management and Operations Management. The study looked at some variables such as trust and information technology (IT) that might impact the SCI and finally improve firm performance. Therefore, it is crucial for managers to apply their firms IT and trust as lower-order organizational capabilities to improve SCI as a higher-order organizational capability. To aid the study, Resourced-Based View (RBV) theory has been developed as the framework for the present research. The paper also proposes the framework for future research in empirical investigation in manufacturing. This study bridges the gap by developing a framework for measuring SCI, which enables any organization to identify critical success factors for integrating their SC, measures the degree of integration qualitatively and quantitatively and suggest improvement measures.

Keywords: Competitive advantage; firm performance; Information Technology (IT); Supply Chain Integration (SCI); trust

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1.0 INTRODUCTION

Supply chain management (SCM) has strategic relevance as a source of competitive advantage (Fine, 1998; Christopher, 2005; Alfalla-Luque *et al.*, 2012). Managing SC effectively has become critical for the survival and growth of organizations (Alfalla-Luque and Medina-Lopez, 2009; Arana-Solares *et al.*, 2010). Ideally, the entire SC processes need to be designed, managed and coordinated as a unit (Cooper *et al.*, 1997; Bagchi *et al.*, 2005b). Accordingly, the integration of the SC is a key element in the SCM strategy (Cigolini and Rossi, 2008).

The SCI instrument encompasses three construct that involve; integration of a company with suppliers, integration of a company with customers and internal integration across the SC. Today's manufacturers must not merely bring about their own organizations but similarly should be involved in the management of the network of downstream and upstream firms (Handfield and Nichols, 1999; Hsuan Mikkola and Skjøtt-Larsen, 2004; Zhang *et al.*, 2010). Firms must know how to integrate both internally and externally; that is, with customers and suppliers. These integration efforts are crucial to lean initiatives where collaboration and coordination with both customers and suppliers is important and necessary (Shah *et al.*, 2002; Womack and Jones, 2010).

The theoretical lens of the firm's RBV, on which the current research relies, propels the generation of research hypotheses and helps in developing theoretical model. Few SCM studies have taken into account the size of the organization (Çalçıner, 2007). Little research, especially among SMEs, has been done to find the link between SCM and performance, as mentioned by Hsu *et al.* (2011) in their study. Evidence from previous researches endorses the idea that SMEs do not execute SCM in the right way; they do not use SCM strategies efficiently and do not choose SCM freely. As a matter of fact, there is a weak relationship between SCM and SMEs (Arend & Wisner, 2005; Gligor, 2013).

Antecedents that improve SCI potentiality have been evaluated in this paper and also trust as an IT antecedent to improve SCI has also been used here, both of which have not been done in previous studies (DeGroot, 2011; Liu *et al.*, 2013; Christopher, 2000, Christopher, 2010; Day, 1994; Tracey *et al.*, 2005). To improve SCI, IT and other capabilities are required. IT alone is not enough. An example is trust in supply chain relationships being an important factor for IT (Bagheri *et al.*, 2014; Bagheri *et al.*, 2013; Chen *et al.*, 2011; Chong *et al.*, 2009; Petersen *et al.*, 2005; Ramayah *et al.*, 2008; Sheu *et al.*, 2006).

High level of trust among supply chain partners is the basis for successful supply chain performance (Kwon & Suh, 2004). Trust has been pointed out as one of the major factors which help to achieve strategic alliance success (Krishnan *et al.*, 2006). Trust leads to greater honesty in SC (Chen *et al.*, 2011; Morgan & Hunt, 1994). It decreases the perceived risks related to opportunistic (Krishnan *et al.*, 2006; Moore, 1998). In supply chain partnerships trust facilitates information flow (Nyaga *et al.*, 2010), stability (Handfield & Bechtel, 2002) and performance (Zaheer *et al.*, 1998). The main reason for failed relationships between the partners is the absence of trust (Hsu *et al.*, 2008). Because of trust supply chain team members can rely on each other (McAllister, 1995).

Additionally, this study examines antecedent factors that can improve and enhance such capabilities that are lower-order capabilities (Liu *et al.*, 2013). On this basis of capabilities' hierarchy, which suggests that the capabilities of lower-order (IT and Trust) can assist an organization to formulate higher-order (SCI) one (Christopher, 2010; Rai *et al.*, 2006; Grant, 1996; Liu *et al.*, 2013). Hence, assuming the IT's importance (Chen & Paulraj, 2004; DeGroot, 2011; Li *et al.*, 2008; Wu *et al.*, 2006) as a SCC antecedent and trust as IT's antecedent (DeGroot, 2011) and SCI (Christopher, 2010, Rai *et al.*, 2006; Khan & Pillania, 2008; Kwon & Suh, 2005). Hierarchy of capabilities and SCC perspective have been taken into consideration in this study, a conceptual model has been proposed that explains that how trust and IT (antecedents) as capabilities of lower-order affect capabilities of higher-order, namely SCI (Rai *et al.*, 2006; Grant, 1996; Liu *et al.*, 2013). Internal and external (Suppliers and Customers) of supply chain of a firm has been focused in this study. Literature, conceptual framework and propositions are the next sections that are described below.

■ 2.0 LITERATURE REVIEW

2.1 Small and Medium Size Enterprises (SMEs)

SMEs form the largest group of manufacturing firms in a number of developing countries, which basically provides specialty in support services and manufacturing to large firms (Huin *et al.*, 2002; Ndubisi and Matanda, 2011). The segment of manufacturing SMEs keeps expanding, ultimately keep generating more jobs and rapid growth rates as oppose to big manufacturers (Hsu *et al.*, 2011). There is a significant contribution of SMEs in an economy. A lot of SMEs are attempting to integrate their business processes and strategies with other firms in the supply chain, as a result of the growth in the Internet and related communication technologies (Ehrlich, 2007). In the economies of most of the emerging nations, SMEs are playing a vital role from the perspective of economic growth and generating employment (Quayle, 2002; Bayraktar *et al.*, 2009; Chan *et al.*, 2012).

SMEs are now, on the other hand, increasingly taking part in the worldwide business network by joining in several interlinked supply chains (Thakkar *et al.*, 2008). SMEs are defined as 'Enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 million Euro, and/or an annual balance sheet total not exceeding 43 million Euro' (European Commission, 2005). SMEs as defined by USA includes small enterprises between 100-499 employees, very small enterprises with less than 20 employees, and medium enterprises between 20-99 employees (Thakkar *et al.*, 2009).

UK claims that there are no universal fixed definitions of SMEs. Australia defined SMEs in manufacturing and service as for a manufacturing concern less than 100 employees and service enterprises with less than 20 employees. China defined it as enterprises with less than 200 employees. French has a different definition of SMEs i.e. enterprises with employees between 10 to 400. Japan divided SMEs into three parts that consist of retail trade and services (asset capitalization less than 10 million yen or less than 50 employees), wholesale trade (asset capitalization less than 30 million yen or less than 50 employees), manufacturing (asset capitalization less than 100 million yen or less than 300 employees). Malaysia defined small industries as those establishments with a shareholders fund up to RM 500,000 or employing between 5 to 50 employees and medium industries with a shareholders fund between RM 500,000 to RM 205 million or employing between 50 to 75 employees 500,000 to RM 205 million (Thakkar *et al.*, 2009).

Based on the above literature review with respect to the definition of the SMEs in various countries of the world, this study suggest the SCM of SMEs in developing countries that companies need to be more integrate with partners to sense and respond to market changes.

2.2 Developed Conceptual Framework and Propositions

Further research will test several propositions using this conceptual framework. The suggested conceptual framework consists of four variables such as trust, IT, SCA and firm performance. Table 1 shows variables and dimensions that suggest for further research. Therefore, we set the following propositions for future research.

2.2.1 Relationship Between Trust and Firm Performance

Over three decades ago, Argyris (1964) proposed that trust is important for organizational performance. In recent years, this acknowledgment of the significance of trust in organizational affiliations has developed quickly which is demonstrated by a great number of publications on the topic relevant to both practitioner and academic audiences. In spite of this interest, difficulties in defining and operationalizing trust have hampered the empirical study of its relationship with performance. Argyris' theorizing and the quote by Deming above are intuitively appealing. Although some research has investigated how trust affects group performance and the performance of inter-organizational relationships (Zaheer *et al.*, 1998; Zaheer and Zaheer, 2006).

According to Zaheer and Zaheer (2006), trust has emerged as a central theme in international strategy research from the middle of 1990s. Researchers from a variety of disciplines and numerous time periods appeared to be agreed that trust is extremely useful to the organizations' operations (Dirks and Ferrin, 2001). In the past decades there has been a resurrection of interest in comprehending the consequences and sources of trust in economic exchanges. This attention has ensued in fresh exploration from a range of disciplinary perceptions which contain social psychology, organizational theory and strategy, business history and economics (Gulati and Sych, 2008).

According to many foreign studies, company's performance is affected by inter-organizational trust, thus it is a very important area for research. The aim of present research is to verify the affiliation amid performance and trust.

The benefits arising from harmonization among partners, according to Gattorna and Berger (2001) involve lower SC cost, improved delivery performance, superior prediction accuracy, inventory reduction, enhanced capacity, greater overall productivity and decrease in fulfillment cycle time. Wintrobe and Breton (1986) argued that an increase in trust throughout the organization does not necessarily predict a positive effect on performance, because in their article it is contended that the effect of trust on performance depends upon the distribution of the trust. This study, with a competitive advantage as the final objective, will remain unsatisfied if a relationship between final performance and trust is not verified. Therefore, the following proposition is formulated:

Proposition 1: Trust has a positive influence on the Firm Performance

2.2.2 Relationship between Trust and Supply Chain Integration

By means of process integration, shared information among SC partners is attained. 'Process integration' implicates cooperative functioning between suppliers and buyers, shared information and common systems, joint product development (Christopher, 2000a; Christopher, 2010). This comprehensive form of collaboration in the SC is turning out to be ever more dominant since companies emphasize on dealing their fundamental capabilities and outsource the remaining activities. More dependence on alliance partners and suppliers becomes unavoidable in this new world of integration; therefore, a different form of relationship is necessary. As it is often called, in the 'extended enterprise', a spirit of trust must prevail and there can be no limitations. The process integration brings and includes transparency of information, joint strategy determination, open-book accounting and even buyer-supplier teams (Agarwal *et al.*, 2007).

Based on trust among partners, effective supply chain is a vital component for effective SC implementation. In SC relationships, issues of trust can be considerably more essential since SC relationships usually include a greater amount of interdependency among enterprises (La Londe, 2002). This requirement i.e. sharing and releasing information is a daunting task, which entails a great deal of trust between and among the SC partners (Handfield, 2002). When information is available but cannot be pooled by the partners, its worth reduces exponentially. The trust, as claimed by Morgan and Hunt (1994) create results that encourage effectiveness, efficiency and productivity. It is stated that the lack of trust is the major tripping block to the achievement of strategic alliance creation, and consequently the trust is identified as a foundation of the strategic conglomerate. The achievement of service-to-profit AC model of Saturn is accredited to pooled information among SC partners (Dennis and Kambil, 2003). The research claimed that trust is a crucial achievement feature in succeeding SCI. Therefore, the following hypothesis is formulated:

Proposition 2: Trust has a positive influence on the SC integration.

2.2.3 Relationship Between Trust and Information Technology (IT)

Significance of this study can be seen because of the following reasons: Focus on how trust affects IT; identification of effects on trust of technical and social conditions; how these factors relate and their effects; emphasis on the significance of contextual and temporal factors to increase trust. According to McAllister (1995) "the expressive qualities of behavior in organizations should be given more systematic treatment" (p.53). This study acknowledged that trust is very important for successful IT and hence investigated the effect of trust in a methodical manner. This study adds to the existing literature by applying factors which increase trust. Besides helping projects succeed, this research also helps socially by picking up those factors which help to increase trust in IT. This socio technical view of systems development dwells on factors such as openness, identification, reliability, and competence that are critical to the team members' attributes and behavior (Tawiah, 2012).

Adopting IT can be riskier (Ulu & Smith, 2009). If the particulars of new technology are not clear, most of the times this will lead to people being insecure (Brashers, 2001). Individuals' trust is dependent on their perception of the quality of a technology. Hence, technology implementation can be thought of as a trusting process. Not everyone has the same reaction. This is because of some trust new products more while others trust less. In societies where trust is high, individuals are more likely to search for new information and adopt new innovations (Hofstede, 2006). According to researchers, taking risk (high level of trust) is directly proportional to the acceptance of new product (Nakata & Sivakumar, 2001) because high level of trust in a society leads to increased flow of information which helps to spread information about a new technology. On the basis of the foregoing, we propose the following proposition and Figure 1 shows the conceptual framework for this study.

Proposition 3: Trust has a positive influence on IT

2.2.4 Relationship Between IT and Firm Performance

Firms gradually devoting additional resources in their IT and SCCS departments in order to grow the internal expertise essential to take full advantage of cutting-edge technologies (Philip and Booth, 2001). Though, a greater amount of IT investment does not certainly suggest healthier use of firm resources. Massive expenditures in communication and information technology most of the occasions do not essentially bring about expected benefits for a firm (Barney *et al.*, 2001). However, by adopting advanced IT, it is possible that firms effectively improve productivity in their business processes and activities (Stank *et al.*, 1999).

In order for IT to turn into a firm-specific means and enhancing its appropriability as a result, the study claimed that it has to be implemented ahead of competitors or implanted within an organizational process (Barney *et al.*, 2001). Implementing advanced IT before their competitors, raises the likelihood that the owning firms obtain some unique advantages. A high level of IT innovation once

accumulated is expected to deliver added advantages that would not be accessible to late adopters. IT advancement, to be precise, is a mirror of strategic emphasize of a firm in accepting the most innovative technology so as to keep updated against competitors. IT becomes imperfectly mobile and unique across firms, in such a situation, and it can deliver the adopting firms with special aids via greater productivity against its rivals for as a minimum a certain time period (Bagheri *et al.*, 2012; Philip and Booth, 2001; Wu *et al.*, 2006). Hence, the following proposition is formulated:

Proposition 4: Information technology has a positive effect on firm performance.

2.2.5 Relationship Between Information Technology and Supply Chain Integration

It is a well-established idea that IT is a foundation of competitive advantage. The risks and coordination costs related to inter-organizational affairs have been decreased via information technologies. Information technology permits sellers and buyers to communicate directly over easy-to-use, data-rich information networks that decrease coordination overheads (Lewis and Talalayevsky, 2000). IT is the backbone of the SC business organization which is engaged to share, acquire and process information amongst SC associates for important decision making (Sanders and Premus, 2002). In supply chains, the information technologies and systems signify one of the important features that “link” the SC organizations into a coordinated and unified system (Handfield and Nichols, 1999). The utilization and introduction of integrated information systems for organizing the SC would improve quality in addition to decreasing the delivery costs and times and, also increase the competitive position of the company (Narasimhan and Das, 2001).

IT, nowadays, has infiltrated the SC at each point, converting exchange-related linkages and activities among those undertakings (Palmer and Griffith, 1998). IT has immense potential to enable coordination and integration among SC associates via the distribution of information on production schedules and demand forecasts that command activities of the SC (Karoway, 1997).

The supply chain of a company splits it into a series of primary activities, together with support activities, which are: after sales service, marketing and sales, out- bound logistics, operations and inbound logistics. Some are external and some are internal to the organization, among these activities, and all with the main objective of generating value to the end-consumer (Handfield and Nichols, 1999). Through integration of activities, this objective is accomplished among connected organizations and owing to the removal of resource waste and operational duplication should result in reduced costs (Stank *et al.*, 2001). It requires involving in integration that is both external and internal to the organization in order to attain this reduction.

SCI needs to be attained through organization borders, customers, carrier partners and connecting external suppliers, as indicated by many researchers. Improved logistics-related communication describes higher levels of integration along with, the superior synchronization of logistics activities of the firm with those of its customers and suppliers and very unclear organizational divergence amid the logistics activities of the business and those of its customers and suppliers (Stock *et al.*, 2000). Effective integration involves smooth stream of timely and accurate information across these SC companions. One of the essential weapons of leading edge organizations nowadays is the capability to bring about the information flow. IT holds the strength to organize the information stream and to offer associations that support collaboration and communication along with the SC (Brandyberry *et al.*, 1999). IT’s implementation in SCM can coordinate and integrate the flow of finances, materials and information amongst end-consumers, retailers, wholesalers, manufacturers and suppliers. IT here functions as a crucial enabler of SCI via the sharing, capture and organization of key information concerning significant business processes, both outside and within the boundaries of an organization (Vickery *et al.*, 2010; Kelle and Akbulut, 2005).

This claim that IT enhances SCI is additionally reinforced by the transaction cost economics. Transaction cost economists possess that coordination and cooperation among firms is confined by the transaction cost of organizing the communication (Stroeken, 2000). Market transaction productivity decreases with the increase in transaction costs that might result in greater market rates. The factors of transaction costs are opportunistic behavior, bounded rationality, uncertainty, asset specificity and transaction frequency. As IT has the influence to deliver reliable, timely and accurate information, it offers managers with a low cost and convenient substitute to old-style head-on communication, the one which reduces the transaction frequency and information uncertainty. IT has similarly demonstrated as a critical mode of reducing both coordination costs, which involve transaction risk, i.e. the risk of being exploited in the affiliation and the direct cost of integrated judgments (Clemons *et al.*, 1993). This study proposes the following proposition on the basis of the foregoing discussion and Table 1 shows the construct and sub-constructs.

Proposition 5: Information technology has a positive effect on supply chain integration.

Table 1 Construct and sub-constructs of framework

Variables	Dimensions
Trust	<ul style="list-style-type: none"> • Dependability/Reliability • Honesty • Competence • Friendliness/Benevolence
Information Technology (IT)	<ul style="list-style-type: none"> • Data Consistency • Cross-Functional Application Integration
Supply Chain Integration (SCI)	<ul style="list-style-type: none"> • Information Flow Integration • Physical Flow Integration • Financial Flow Integration
Firm Performance	<ul style="list-style-type: none"> • Financial Performance • Organizational Performance / non-financial performance

2.2.6 Relationship Between Supply Chain Integration and Firm Performance

Financial flow integration, according to Rai et al. (2006), is described as the degree to which alteration of economic resources amid a principal firm and its SC companions is determined by workflow measures. This comprises all actions necessary to enable the movement of funds across SC, involving internal transfers, invoicing customers and paying suppliers (Johnson and Mena, 2008). This indicates that the successful flow of funds across the SC enhances cash-to-cash cycle or cash conversion cycle via extended days-in-payables, shortened days-in-inventory and reduced days-in-receivables (Tsai, 2008). The financial flow optimization (Comelli et al., 2008) ultimately will make plausible the improvement in working on SC and shareholder satisfaction. Efficient and effective administration of financial flow integration as such is critical to enhance the performance of supply chain (Wong et al., 2009).

Physical flow integration as described by Rai et al. (2006) is the degree to which a principal firm engages global enhancement with its SC associates to bring about the flow of finished goods and materials to the point of destination (final customer), from the point of beginning (ultimate supplier). Consequently, suppliers can be integrated with the core practices of their customers in an attempt to reduce costs and improve quality (Koufteros et al., 2005). By means of better supplier management, decrease in production cost and successful just-in-time inventory management, physical flow integration increases the throughput of manufacturing (principal firm) (Levy et al., 1995). This allows firms to gain improved customer services and order winning competencies in the long run (Quesada et al., 2008). Physical flow integration as such makes an important contribution to the firms' performance (Zailani and Rajagopal, 2005) and ultimately to the entire SC members (Zelbst et al., 2009).

The degree to which information is pooled between SC partners and a focal firm is demarcated as information flow integration (Rai et al., 2006). Information sharing inside business units, according to Lee et al. (2007), across SC companions for example other strategic alliances and suppliers is necessary to achieve three key connections: customer linkage, supplier linkage and internal linkage. This integration in particular via efficient and effective information flow will ultimately take the firm and entire SC to improved performance (Pålsson and Johansson, 2009). Past studies (Gunasekaran and Ngai, 2004; Du, 2007) stated constructive associations between the level of information flow performance and integration. Enhancing the level of information and integration sharing (Trkman et al., 2007; Sezen, 2008) amongst the associates of a SC as such has turned into a requisite for refining the SC efficiency. Therefore, this study intends to investigate the following:

Proposition 6: Supply chain integration of an organization has a positive influence on firm performance.

3.0 RESEARCH PROPOSITIONS

This study aimed at investigating the role of SCI, between trust, IT and firm performance. The literature review suggested that trust influence on firm performance directly and indirectly and also IT directly and indirectly effect on firm performance. This study highlighted the role of SCI as mediating variable between IT and firm performance (see Figure 1). Therefore, the following propositions suggested by this study for future research to investigate that were identified from the literature review.

- P1: Trust has a positive influence on the Firm Performance
- P2: Trust has a positive influence on the SC integration.
- P3: Trust has a positive influence on IT
- P4: Information technology has a positive effect on firm performance.
- P5: Information technology has a positive effect on supply chain integration.
- P6: Supply chain integration of an organization has a positive influence on firm performance.

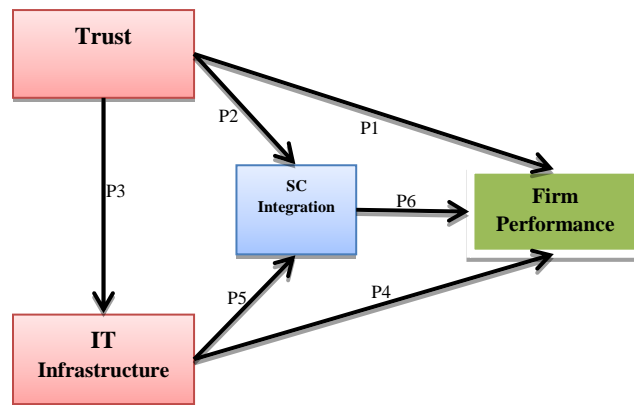


Figure 1 The conceptual framework of the study

■4.0 CONCLUSION AND RECOMMENDATION FOR FUTURE RESEARCH

The firm should evaluate its resources, organizational priorities, and current supply chain capabilities and constraints. It should then select the best strategy to integration with downstream and upstream. The paper also suggest the framework for future research to empirical investigate in manufacturing and also for more suggestion for future research can use another capabilities as an higher-order capabilities such as supply chain agility for improve firm performance with mediating role of supply chain agility between SCI and firm performance. The proposed SCI framework has practical implications also. It offers managers to reveal the variables and the level of integrating to SC partners. Additionally, it helps measure effectiveness of SCI and means for improvement. Using the conceptual framework and taking into account their sector, companies could establish the current SCI level.

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