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Investigation of Barriers and Enablers of Supply Chain Management Practices Success: Case of Ethiopian Textile and Garment Factories

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Abstract

This study focused on the investigation of barriers and enablers of supply chain management practice's success. After extensive literature review the author formulated research framework and two hypotheses. The data for the study was collected from 45 focal factories (textile and garment), seven input supplier factories, and 12 customers' firms. The respondents were high level management of the mentioned firms such as CEOs, general managers, V/managers, operations/manufacturing managers, purchasing managers, logistics managers, materials managers, quality managers, marketing managers, and finance managers. 370 effective questionnaires were collected, having a response rate of 82.3%. Before proceeding to hypothesis test, instrument validation was carried out, then the proposed relationships were tested using structural equation modeling. The result indicated that SCM practice enablers enhance the success of SCM practices while, barriers of SCM practices have a negative on the success of SCM practices.

Keywords: Supply Chain, Supply Chain Management, Supply Chain Management Practices, Supply Chain Management Barriers and Enablers

Introduction

The increasing intensity of competition over the years since industrial revolution up to now resulted to the birth of several management theories leading practitioners, managers, academicians remain restless in searching one best way that help firms to gain competitive advantage over competing firms in the market place. Consequently, supply chain management (SCM), one of contemporary management theories, got its inception in the early 1980s. SCM is claimed to be multi discipliners (Feldmann & Müller, 2003), and the concept most dominantly took its root from purchasing and supply management, transportation and logistics management (Tan, Kannan, & Handfield, 1998).

Since then, organisations have recognised that SCM is the key in building sustainable competitive edge (Jones, 1998). There are many reasons for the popularity of the concept. Specific drivers may be traced to trends in global sourcing, an emphasis on time and quality-based competition, and their respective contributions to greater environmental uncertainty. This globalisation of supply has forced companies to look for more effective ways to coordinate the flow of materials into and out of the company (Mentzer, Dewitt, Keebler, & Min, 2001).

In fact, globalisation of business operations, advancement of information technology, and intensive competition and the increasingly demanding nature of customers (Rich & Hines, 1997) were the dominant driving force for the increased attention to SCM practices. Hence, the new competitive environment changes to more global coordination of supply chain, because, product life cycles shrink rapidly, new products get introduced rapidly, as customers continually demand higher quality, faster response, and greater reliability of products and services (D'Souza, 2002).

SCM practices are inevitable than ever before to respond to these dynamic changes, which insist on collaborations of cross-functional areas, working integrative across supply chain, sharing quality information among functional areas internally and among key supply chain partners, to build operational capability (Özdemir & Aslan, 2011), higher responsiveness to changes (Thatte, 2007), staying competitively (Li, Rao, Ragu-Nathan, & Ragu-Nathan, 2005; Ferry, Kevin, & Rodney, 2007; Özdemir & Aslan, 2011), higher organisational and supply chain performance

(Li *et al*., 2005, and many scholars). In this dynamic and turbulent business environment, as it has been said by many scholars (e.g. Christopher, 1992; Li *et al*., 2005; Vastag *et al*., 1994; Christopher & Peck, 2004; Academic Alliance Forum, 1999; Pelton *et al*., 1997; Lummus & Vokurka, 1999) as cited in Thatte (2007), competition among companies is no more feasible rather competition among supply chains, so it invites supply chain members to work holistically and integrally, to meet end customers' requirement profitably.

SCM practices bring benefits to greater extent for supply chain members, in terms of reducing inventory level, reducing cycle time, greater productivity, reduction in supply chain cost, improved market share, which in turn lead to competitive advantage, increased profits for all chain members (Elmuti, 2002; Tan, 2002; Fawcett *et al*., 2008; Li, Ragu-Nathan, Ragu-Nathan, & Subba Rao, 2006; Leonard & Cronan, 2002; Stank *et al*., 1999a; Sheridan, 1999).

As it defined by Kon *et al*. (2000), SCM practices are a set of activities undertaken in organisations to develop SCM effectiveness. However, a number of roadblocks are there on the road to SCM that hamper its effectiveness. Some of these roadblock as identified by Akkermans, Bogerd, and Vos (1999) are organisational structure and culture of company, functional silos, short term thinking, history of local optimisation, lack of top management awareness, antagonism between sales and logistics, short term focus among partners, lack of infrastructure, lack of shared goal and vision, fear to be punished for open information sharing. Fawcett *et al*. (2008) also discussed that the possible inhibiters to SCM practices are lack of member support, inadequate measurement and information systems, and organisational culture.

A large number of researchers' work has been done separately either on the role of SCM, SCM practices, collaboration, integration etc., and their impact on responsiveness, operational performance, and competitive advantage (e.g. Li *et al*, 2006; Lambert & Cooper 2000; Thatte *et al*., 2013,) or SCM practices, benefit, barriers and bridge (e.g. Fawcett *et al.,* 2008), virtuous and vicious cycle (e.g. Akkermans *et al*., 1999), challenges and enablers. Although these pieces of work greatly enhance the development of SCM as field of study which also brings scholars debate leads to closer and reduced ambiguity in its definitions, research rarely found that combine SCM practices impact on competitive advantage and organisation performance and factors that influence it (barriers and enablers) all together in single study.

Combining the effect of SCM practices on organisation (competitive advantage and organisation performance) and their influences (barriers and enablers) that affect effectiveness of SCM practices makes easier to understand various aspects of SCM for academician, researcher and practitioners. As a result, knowledge of roadblocks helps them to equip themselves to confront those roadblocks and knowledge of enablers also help them to own it early to seamlessly promote their SCM practices' effectiveness that enhances their ability to outperform their rivals and brings financial reward for the whole supply chain members. Even though the work combines the above area, this paper focuses on investigation of barriers and enablers of SCM practices success. Thus, the purpose of this article is to investigate the impact barriers that prevent supply chain members to get in to SCM practices easily and also to investigate the enabling forces that enhance their ability to capitalise the benefit of SCM practices seamlessly.

Though SCM practices had been studied well in different parts of the world since its emergence, there is very limited study conducted in Ethiopia, because SCM as a programme of study started recently (in 2008) in some universities of the country. Since managers of organisations in the country are mostly graduates of these universities, there is professional gap and lack of awareness. Therefore, this study intends to fill this awareness gap in Ethiopian manufacturing industry, especially focusing on textile and garment factories.

The researcher focused on this sector because textile and garment sector is believed to have a lion's share in the country's economic development, as the country has huge potential for growing and supplying raw materials like cotton, abounded trainable labour force, and its strategic location for export to western countries other than countries like China, Pakistan, and Bangladesh (Ballweg, n.d.). To benefit from these huge opportunities, the country has currently given special emphasis for the sector development and creating conducive ground for local and foreign direct investors (www.tidi.gov.et). The country also endowed different market scheme such as AGOA, EU etc. The country has also given primary emphasis for the sector in its GTP2, to take advantage of above mentioned potential. However, the sector did not benefit from these huge potential; this is due to different problems deeply rooted in the sector. This study will have a great role in showing the level of their SCM practices and forces that exert influence (barriers and enablers) on its effectiveness.

Research Questions

How do barriers of SCM practices inhibit the success of SCM practices of textile and garment factories?

How do enabling of SCM practices promote the success of SCM practices of textile and garment factories?

Review of Literature

Concept and Meaning of Supply Chain Management

In today's fierce competition, end customers have become the most powerful. They do not accept product, service or information which not meet their expectation. According to Christopher (2002), supply chain success and failure are determined by level of end customers' satisfaction. As Abdulla (2009) also discussed in his dissertation citing Chen and Paulraj (2004), Dyer, Cho, and Chu (1998), Ketchen and Hult (2007b), McCarter and Northcraft (2007), Miles and Snow (2007), these days due to fierce global competition, increasing outsourcing, and continued disintegration of the traditional vertical firm, the supply chains and the networks made up of multiple firms are becoming the units of competitive analysis. So, most companies these days focus on their core competences outsourcing other activities to their supply chain partners. Hammer (2006) discussed, in his dissertation, the significant reasons for increasing importance of SCM, mainly globalisation, change towards customer-driven markets, acknowledgment of dependencies, focus on core competencies, increasing cost competition, and advancement in information technology.

Having said these, it is interesting to bring definitions of supply chain, SCM, and SCM practices by different authors to make the material more interactive for the reader. Due to multi-disciplinary development of SCM concept, there is no generally accepted definition (Feldmann & Müller, 2003; Li *et al* 2006). We can say the difference is in wordings, but not a huge difference in concepts. Some of these definitions are discussed in the following section.

Supply Chain Definition

According to Christopher (1992), supply chain is a network of organisations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer. According to La, Bernard, and Masters (1994), supply chain is a set of firms that pass materials forward. Normally, several independent firms are involved in manufacturing a product and placing it in the hands of the end user. In a supply chain, raw material and component producers, product assemblers, wholesalers, retailer merchants, and transportation companies are members of a supply chain. It can reasonably be described as a set of companies that eventually make products and services available to customers, with the ultimate goal to create value for end customers and for the organisations in the supply chain network (Christopher, 1998; Walters & Lancaster, 1999).

Lambert, Stock, and Ellram (1998) defined supply chain as the alignment of firms that brings products or services to market. Mentzer *et al*. (2001) defined supply chain as a set of three or more entities (organisations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/ or information from source to customer. Mentzer *et al*. (2001) also stated that supply chain exists even if it is managed or not.

Canadian Supply Chain Sector Council (CSCSC) defined that supply chain universally encompasses the following three functions: supply of raw materials to the manufacturer, the manufacturing process, and the distribution of produced goods through a network of distributor and a retailer to final customer. Companies involved in various stages of this process are linked to each other through supply chain. (www.supplychaincanada.org). Now it is clear what supply chain means. Let us look at what SCM means to different authors.

Supply Chain Management

According to Jones and Riley (1985), SCM is an integrative philosophy to manage the total flow of a distribution channel from supplier to the ultimate user. Christopher (1992) defined SCM as managements of upstream and downstream relationships with suppliers and customers in order to deliver superior customer value at less cost to the supply chain as a whole. Lambert & Cooper (2000) defined that SCM is a management of multiple relationships across the supply chain. Mentzer *et al*. (2001) defined SCM as the systematic, strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long term performance of the individual companies and the supply chain as a whole. Simchi-Levi *et al*. (2008) defined supply

chain as a set approaches utilised to efficiently integrate suppliers, manufacturers, warehouses and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimise system wise costs while satisfying service level requirements. Council of SCM professionals (CSCMP) defined that SCM encompasses the planning and management of all activities involved in sourcing, procurement, conversion, and logistics management. It also includes coordination and collaboration with channel partners, which may be suppliers, intermediaries, third-party service providers, or customers. SCM integrates supply and demand management within and across companies. According to Mor, Sarbjit, Bhardwaj, and Singh (2015), SCM is an integrative philosophy that manages the total flow of distribution channels from suppliers to final consumer. They added that it is a set of activities that promotes an effective management of supplier partnerships, meeting customer demands, movement of goods and information sharing throughout the supply network of an industry.

Hammers (2006) summarised in his dissertation the definition of SCM given by different authors as shown in Table 1.

Table 1: Definition of SCM by Different Authors

Author (s)	Definition
Lambert *et al*. (1998), p.1	"SCM is the integration of business processes from end user through original suppliers that provides products, services, and information that add value for customers and other satkeholder."
Mentzer *et al*. (2001), p.18.	"SCM is the systematic, stratgic coordination of the traditional business function and the tactics across [these] business functions within a particular company and across businesses with the supply chain, for the purpose of imporving the long-term performance of the individual companies and the supply chain as a whole."
McCormack & Johnson (2001), p.34	"SCM is the process of developing decisions and taking actions to dircet actvities of people within the supply chain toward common objectives"
Varkaria (2002), p.496	"SCM is the art and science of creating and accentuating synergistic relationships among the tarding partners in supply and distribution channels with common shared objective of delivering products and services to the ' right customer', in the 'right quantity', and at the 'right time '."
Stadler (2002), p. 9	" SCM is the task of integrating organisational units along a supply chain and coordinating material, information, and financial flows in owder to fulfill (ultimate) customers demands with aim of improving competitiv ness of the supply chain as a whole."
Kuhn & Hellingrath (2002), p. 10	"SCM is the integrated, process-oriented planning and management of material, information and finacial flows along the entire value chain; form the customer to the supplier of raw material […]
Swaminathan & Tayur	"SCM is the efficient management of the end-to-end process, which satrts with the with design of the product or service and ends with time when it has been sold, consumed, and finally , discurded by the consumer. This complete process includes product design, procurment, planning and forecasting, production, distribution, fulfillment, after-sales support, and end-of-life disposal."
Simchi-Levi *et al*. (2003), p.2	"SCM is the process of planning, impleneting and controlling the efficient, cost effective flow and strorage of raw materials, in-process inventory, finished goods, and related information form point-of-origin to point-of-consumption for the pirpose of conforming to customer requirements."
Chen & Paulraj (2004), p.147	"SCM , as we envision, is a novel management philosophy that recognizes that individual business no longer compete as solely autonomus units, but ratheras supply chains. Therefore, it is an integral approch to the planning and cntrol of materoila s , services and information flows that adds value for customers through collaborative relationships amng supply chain members ."
Göpfert (2004), p.32	"SCM is a moder concept of company networks to exploit inter-company success potentials by means of R&D, design and steering of effective and efficient material, information and fincial flows."
Busch & Dangelmaier (2004)	" SCM is the inter-company coordination of material and information flows among the entire value creation process – form raw material over the indivdual processing steps to the end consumer-with the goal to optimize the entire process in terms of time and cost aspects."
CSCMO (2005)	"SCM encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all Logistics Management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers. In essence, SCM integrates supply and demand management within and across companies."
Christopher (2005), p.5	"SCM is the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole."

Source: Hammer, A., (2006) Disertation: *Enabling Successful* SCM–*Coordination, Collaboration, and Integration for Competitive Advantage*

What we can understand form the above definitions is that supply chain exists whether it is managed or not, i.e., it is a set (network) of independent organisations that are directly linked in moving materials from its inception to end user (consumer). The flow of materials in the pipeline to the end customer is not new; it has been existing since the industrial revolution or even before. What is contemporary or recent management philosophy is the management of supply chain. So, we can define SCM as the process of managing a set of independent, but interdependent network of organisations that are involved in passing materials, information and finance in the end-to-end chain to enhance the competitive advantage and performance of all organisations in the chain.

Supply Chain Management Practices

SCM practices involve a set of activities undertaken in an organisation to promote effective management of its supply chain (Li *et al.,* 2006). The literature is replete on the dimensions of SCM practices from variety of perspectives. Li *et al*. (2005) attempted to develop and validate a measurement for SCM practices. Their instrument has six empirically validated and reliable dimensions which include strategic supplier partnership, customer relationship, information sharing, information quality, internal lean practices, and postponement. The authors (Li *et al.,* 2006) also measured SCM practices using five of the above dimensions by eliminating internal lean practices.

Donlon (1996) highlighted that SCMP involves cycle-time compression, supplier partnership, outsourcing, continuous process flow, and information technology sharing. Alvarado and Kotzab (2001) viewed SCMP in terms of reducing duplication impacts through concentrating upon core competencies and utilising inter-organisational standards for example activity-based costing or electronic data interchange and eliminating unnecessary inventory level through postponing customisations towards the supply chain end. Koh *et al*. (2007) measure SCMP using just-in-time supply, close partnership with suppliers, strategic planning SC benchmarking, e-procurement, close partnership with customers, holding safety stock and sub-contracting, few suppliers, outsourcing and many suppliers.

Sundram, Ibrahim, and Govindaraju (2011) studied practices such as postponement strategy, information flow, strategic supplier partnership, customer relationship management, agreed vision and goal, information quality, risk, and award sharing. Cho, Lee, Ahn, and Hwang (2012) looked into eight service of SCM practices namely capacity and resource management, information and technology management, customer relationship management, demand management, service supply chain finance, service performance management, supplier relationship management, and order process management. Carter, KosmoL, and Whu (2017) define SCM practices in their recent study of supply chain practice view (SCPV), from the viewpoint of inert organisation as a set of activities that spans different formal organisations and that other supply chain dyads or networks can imitate. They claim that inter-organisational SCM practices differ from intra-organisational practices, i.e. inter-organisational SCM practices require mutual efforts from two or more organisations to be effective citing Terpend, Tyler, Krause and Handfield (2008) and Zimmermann and Foerstl (2014). They brought examples of such sets of activities, that inter-organisational SCM practices constitute. These are knowledge sharing with suppliers and customers, electronic data interchange, suppliers' development for sustainability, joint product development with key customers, and product return process.

These variability across authors to measure SCMP initiated us to conduct meta-analysis to arrive on most commonly used measures of SCMP. Hence out of 30 articles reviewed, five most commonly used measures are identified as strategic supplier partnership, customer relationship, IT management, level of information sharing, and quality of information sharing. However, for the purpose of this study, except IT management they were used as a measure of SCMP.

Strategic Supplier Partnership

Turbulent and volatile markets are becoming the norm as life-cycles shorten and global economic and competitive forces create additional uncertainty. The risk attached to lengthy and slow-moving logistics 'pipelines' have become unsustainable, forcing organisations to look again at how their supply chains are structured and managed. Chopera & Mendl (2002) discussed that companies' competitive strategy defines that set of customers' needs that it seeks to satisfy through its product and services. Some of these customers' needs are obtaining right products/services, at right time, at reasonable price, at right place with right quality product/service.

All the customers' needs require careful attention of managers in the supply chain to meet those customer needs profitably and competitively. A company has to work strategically to achieve competitive advantage. It may or

may not excel in every aspect of these customers' needs, it can rather perform competitively on a particular area. So, to win in every dimension of customers' needs, it should identify on which area it can do best (its core operations), its distinctive capabilities; in terms of human and physical resource to build its strategy and outsource other activities to those who do best. As Chopera and Mendl (2002) mentioned in their book, competitive strategy must be based on customer's priorities. To achieve this competitive strategy all the functional areas in supply chain have to work in collaboration to meet these customer priorities. However, lining all the functional areas toward achieving common strategy is not an easy task, let alone the whole supply chain in a single company. Various functional areas work with divergent way because of the tradeoff. As strategy expands its scope to outside the traditional firm boundary the tradeoff grows and puts complexity in working to achieve common strategy.

However, brilliant managers understand that there is no place for a single company achieving its strategy individually; as many scholars suggested (e.g. Chopera and Mendl, 2002, Christopher, 2000, Lambert *et al.,* 1998, Li *et al*. 2005, 2006) intercompany strategy fits essential today, because the competitive play ground has shifted from company versus company to supply chain versus supply chain i.e., there is a growing recognition that individual businesses no longer compete as stand-alone entities rather as supply chains.

What makes supply chain members to work in integrative and collaborative manner than ever before is the increasing product variety, decreased product life cycle, demanding customer, global competition, advancement of information technology. By process integration, it is meant collaborative working between buyers and suppliers, joint product development, common systems, and shared information. This form of co-operation in the supply chain is becoming ever more prevalent as companies focus on managing their core competencies and outsource all other activities. In this new world a greater reliance on suppliers and alliance partners becomes inevitable and, hence, a new style of relationship is essential (Christopher, 2000).

Hence, to achieve company's competitive strategy, strategic supplier partnership is inevitable than ever before. Strategic supplier partnership is defined as "the long term relationship between the organisation and its suppliers. It is designed to leverage the strategic and operational capabilities of individual participating organisations to help them achieve significant ongoing benefits" (Li *et al*., 2006). Tang (2006) identified four types of supplier relationships: vendor, preferred supplier, exclusive supplier, and partner. These four types differ from each other in terms of contracts, length of contracts, types of information exchange, pricing scheme, delivery schedule, etc. As firms expand their business globally, their supply chains would involve more global partners for different regional markets. Accordingly, a firm may follow different partnership strategies; consequently, it is quite common for a firm to source from multiple suppliers. In addition, some firms may source from multiple supplier so as to reduce the impact of various operational and disruption risks.

Supplier involvement and collaboration has been publicised as necessary to improve supply chain effectiveness and a firm's competitiveness (Chang *et al*., 2006; Samiee *et al*., 2006; Shin, Collier, & Wilson, 2000). The collaboration activity has an advantage of quality improvement; cost minimisation, new product development, and so on. These collaboration activities improve firm's responsiveness to the market (Chang *et al*., 2006). Narasimhan *et al*. (2004) posited that the supplier involvement can be an important source developing manufacturing flexibility and competitive advantage. Wathne and Heide (2004) argue that supplier involvement enhances manufacturer responsiveness to downstream customer changes. Zhang *et al*. (2003) suggested that better coordination of product design, production and delivery could improve flexibility and add value to customers. Stank *et al*. (2001) also explained that business leaders increasingly build competencies to integrate with suppliers and customers and find that these competencies lead them to supply chain excellence. Supplier involvement in product development allows firms to make better use of their suppliers' capabilities and technology to deliver competitive products.

Coordinating operational activities through joint planning with suppliers also results in inventory reduction, makes production process smooth, improve product quality, and lead time reductions. From the discussion thus far, it is understood that strategic supplier partnership in SCM can be a key competitive weapon to be competitive in the global marketplace.

Customer Relationship

Li *et al*. (2006) suggested that customer relationship is defined as the entire array of practices that are employed for the purpose of managing customer complaints, building long-term relationships with customers, and improving customer satisfaction. The ultimate objective of SCM practices is to deliver products to the satisfaction

of end customers. Close customer relationships allow companies to be more responsive to customer's needs by proactively seeking their requirements. The ability to build close relationship with customers will bring companies into a lasting competitive edge. Most researchers consider customer relationship management as an important component of supply chain management practices. As pointed out by Day *et al.* (2006), committed relationships are the most sustainable advantages because of their inherent barriers to competition since changes in technology and globalisation of products and services have resulted in more dynamic markets and greater uncertainty in customer demands. Customers have greater access to new products that are emerging at a faster pace (Cheung *et al*., 2010).

This has significant implications for organisational culture and operations, thereby influencing the value of relationships between buyers and sellers. Adopting customer value delivering operations requires organisations to learn about their markets and target customers (Flint, 2004). Flint further explains that the growth of mass customisation and personalised services is leading to an era in which relationship management with customers is becoming crucial for survival of organisations. A part of this relationship truly represents innovative ways of doing things and can be examples as well as benchmark practices for other firms. For example, the supply chain partnering efforts can provide simpler purchasing procedures and eliminate supplier searches while guaranteeing a fixed, or even decreasing, price for defined parts (direct and indirect materials). With this relationship, efficiency programmes can be developed to achieve cost reduction, quality improvement, process improvement, and improved product development (Richards *et.al*., 2008). Understanding these changes and acting accordingly lead an organisation to competitive advantage locally and even globally. Customer relationship management (CRM) is an important component of SCM (Noble, 1997; Tan *et al*., 1999) and involves building and maintaining long-term relationships with customers (Li *et al*., 2005). Ooi *et al.* (2011) and SimStalk and Hout (1990) stated that maintaining a good customer relationship will enable organisations to be more responsive to customers' needs, thus creating greater customer loyalty, repeat purchase and willingness to pay premium prices for higher quality products. Customer loyalty and customer satisfaction are the main goals of SCM. Maliki, Brahami, Dahaneb, and Sari (2016) discuss that customers become increasingly influential in terms of purchasing and negotiation power. Hence, they recommend companies to cooperate or coordinate with suppliers to maximise the productivity at the lowest cost while satisfying customer requirements.

Level of Information Sharing

Information sharing is defined as making relevant data and information available to one's supply chain members (Lee & Whang, 2000). Li *et al*. (2006) defined information sharing in the supply chain as the extent to which vital and proprietary information is communicated to the company's supply chain partner. Handfield, Barnhardt, and Powell (2004) define information visibility within the SC as the process of sharing critical data required to manage the flow of products, services, and information in real time between suppliers and customers. If information is available but cannot be accessed by the parties ablest to react to a given situation, its value degrades exponentially. Information is shared at strategic, tactical and operation level (Mentzer, 2004), and it is mostly pertinent to demand, forecast, inventory level, sales, consumer information, and capacity (Baihaqi, Beaumont, & Sohal, 2008; Yu, Ting, & Chen, 2010). Seidmann and Sundararajan (1998) identified four different levels of information sharing based on the impact it has on the parties that contract to share the information; ordering information, operational information, strategic information, and strategic and competitive information.

Information sharing generates significant benefits for supply chain partners. Yu, Yan, & Cheng (2001) explored that information sharing among supply chain partners can mitigate or eliminate the negative effect of bullwhip, centralise supply chain control, reduce inventory level and cost, and improve inventory decision making. Also, information sharing can reduce costs and increase customer service level (Yu *et al*., 2010). Information sharing between the buyer and vendor in the supply chain has been considered as useful strategies to remedy the bullwhip effect and to improve supply chain performance (Lee *et al*., 1997; Metters, 1997). Hence, effectively shared information has enabled firms to accelerate the speed of decision making on SCM activities (Yu *et al*., 2001; Williamson, Harrison, & Jordan, 2004; Cantor & Macdonald, 2009*)*.

Many studies have advocated the importance of information sharing across the supply chain. Min and Mentzer (2004) viewed information sharing as part of supply chain integration. Li *et al*. (2006) and Li and Lin (2006) analysed the characteristics of information sharing from quantity and quality perspective. Also, their study found that information sharing as one of five SCM practices that generate a powerful effect on competitive advantage and organisational performance. Similarly, Zhou and Benton (2007) have explored the relationship

aspect by examining supply chain practice together with information sharing and supply chain performance. Uusipaavalniemi and Juga (2009) have discussed the essential contribution of information technology is the reduction in information lead-time and improvement in the timing of information sharing. Wong *et al*. (2005) pointed out that implementation of contemporary supply chain initiatives can be enhanced by sharing information with trading partners in complementary activities. According to Fawcett, Magnan, and McCarter (2008), transparent information sharing is the salient bridge to effective SCM, likewise the open flow of information between the upstream and downstream firms can sustain the competitive position of the firm (Humphreys, Lai, & Sculli, 2001a).

Quality of Information Sharing

Quality of information sharing includes aspects such as accuracy, timeliness, adequacy, and credibility of information exchanged (Moberg, Cutler, Gross, & Speh, 2002; Monczka, Petersen, Handfield, & Ragatz, 1998). While information sharing is important, the significance of its impact on SCM depends on what information is shared, when and how it is shared, and with whom (Chizzo, 1998; Holmberg, 2000). Thatte (2007) states that information sharing ensures competitive advantage when the right information is available for the right supply chain partners in the right place at the right time.

Literature is replete with example of the dysfunctional effects of inaccurate/ delayed information, as information moves along the supply chain. For instance, Lee *et al*. (1997) stated that distorted information from one end of a supply chain to the other can lead to tremendous inefficiencies like excessive inventory investment, poor customer service, lost revenues, misguided capacity plans, inactive transportation, and missed production schedules. Divergent interests and opportunistic behaviour of supply chain partners, and informational asymmetries across supply chain affect the quality of information (Feldmann & Müller, 2003). It has been suggested that organisations will deliberately distort information that can potentially reach not only their competitors, but also their own suppliers and customers (Mason-Jones & Towill, 1997). It appears that there is a built in reluctance within organisations to give away more than minimal information (Berry, Towill, & Wadsley, 1994), since information disclosure is perceived as a loss of power. Given these predispositions, ensuring the quality of the shared information becomes a critical aspect of effective SCM (Feldmann & Müller, 2003). Organisations need to view their information as a strategic asset and ensure that it flows with minimum delay and distortion.

Barriers to SCM practices Effectiveness

Globalisation, advancement of information technology, demanding customers, and intensive competition divert the independence of company to be collaborative and integrative with supply chain members to better respond to the market and changes competitively. The perceived benefit from SCM are increased inventory turnover, increased revenue, and cost reduction across the chain (Daugherty *et al*., 2005; Attaran, 2004; Ferdows *et al*., 2004; Leonard & Cronan, 2002; Fine, 2000), market responsiveness, added economic value, capital utilisation, decreased product time to market, and logistics cost reduction (Lee, 2004; Mentzer *et al*., 2001; Tyndall, 2000; Christopher and Ryals, 1999;) knowledge sharing (Wkbatkin, 1998). Revenue growth fueled by increased responsiveness occurring at lower costs using fewer assets translates into higher performance. In short, the objective of SCM practices is to achieve effective and efficient flows of products, services, information, money and decisions with the objective of providing maximum value to its customers (Bowersox *et al*., 2002, Frohlich & Westbrook, 2001; Naylor *et al*., 1999) and, to all members in the chain.

However, there are a number of barriers that impede the effectiveness of SCM practices. For instance, Fawcett *et al*. (2008) reviewed 34 articles concerning with internal and external benefits, barriers, and bridges to effective SCM and concluded that the resisting forces arise from both the nature of the organisation and the people comprising the organisation. They reviewed these barriers under two headings (inter-firm rivalry and managerial complexity) classified by Park and Ungson (2001). Inter-firm rivalry includes internal & external turf wars, poor SCM planning, lack of vision of SCM, lack of channel trust, executive commitment, and poor SC understanding. The review shows internal and external turf (by 16 authors), poor SCM planning (by 10 authors), and lack of channel (by 9 authors) frequently used. Managerial complexity also includes information system and technological incompatibility, inadequate measurement systems, and conflicting organisational structures and culture (e.g. Sheridan, 1999; Tyndall *et al*., 1998; Quinn, 1997a) cited in Fawcett *et al*. (2008). Under this umbrella, IS/IT system deficiencies (by 10 authors) and organisational culture (by 9 authors), that is information system deficiencies or inadequate information system has large negative impact on effective SCM practices.

Dubihlela and Omoruyi (2014), in their study, found that lack of economies of scale, poor organisational structure, and technological challenges are barriers to effective SCM. Katunzi (2011) found that silo mentality, lack of SC visibility, lack of trust, and lack of knowledge and activities causing bullwhip effect are obstacles of process integration along SC. Bakker *et al*. (2012) discussed culture, technology, finance, and organisations as SCM barriers. Bakker also discussed, in the studied companies, there is multiple independence and loosely coupled information system, which provide an inadequate and incomplete end-to end information sharing that largely affect effectiveness of SCM practices. Akkermans *et al*. (1999) found that organisational structure and culture of companies, functional silos, short term - thinking, history of local optimisation, lack of top management awareness, antagonism between sales and logistics, short term focus among partners, lack of infrastructure, lack of shared goal and vision, fear to be punished for open information sharing affect SCM. Of these discussions, in this study, Park and Ungson, (2001), Fawcett et al (2008) classification that is inert-firm rivalry and managerial complexity will be seen as barriers to effective SCM practices, because encompassing one.

Inter-Firm Rivalry

Inter-firm rivalry refers to misalignment of motives and behaviours among allying partners within the strategic supply chain (Park & Ungson, 2001). Fawcett *et al*. (2008) discussed barriers under this category as discussed above, viz. internal and external turf protection, poor collaboration among chain partners, and lack of partner's trust. In short, inter-firm rivalry is the tendency for allying partners to compete rather than willingly cooperating. In absence of willingness to cooperate, a supply chain will not be able to attain lower costs and higher returns on investment. Further, irregular collaborative meetings among chain partners hinder managers' opportunities to share with one another concerns, weaknesses, and best practices.

Managerial Complexity

According to Park and Ungson (2001), managerial complexity is misalignments in allying firms' processes, structures, and culture (as cited in Fawcett *et al*., 2008). They also discussed barriers that are categorised under the umbrella of managerial complexity. These are information system and technological incompatibility, inadequate measurement systems, and conflicting organisational structures and culture (e.g. Sheridan, 1999; Tyndall *et al*., 1998; Quinn, 1997a). Because many firms are comfortable using their systems for only their own tasks, it is not surprising to see inconsistent information and technology systems as a barrier. People are change averse and unwilling to share information for fear of exposing their weakness and secrets to others. If SCM is to be implemented across company borders, a revamp in attitude and thinking is necessary.

Enablers to SCM Practices Effectiveness

Effective SCM requires close collaboration with suppliers as well as internal coordination with engineering, procurement, logistics, customers, and marketing to coordinate activities and material flows across the supply chain. To be effective in SCM practices, it is responsibility of supply chain members to remove barriers and identify enablers that enhance the success of their SCM. Scholars (e.g. Handfield, Monczka, Giunipero, & Patterson, 2009) identified four key enablers to purchasing and SCM; these are information technology, human resource, organisational design, and measurement system. These four enablers support the pursuit of progressive approaches and strategies that begin to define purchasing and supply chain excellence. If organisations ignore these areas, they will see their ability to develop progressive practices and approaches fall short of competitors that have stressed these enabling areas (Handfield *et al*., 2009).

Out of these four enablers, information technology plays huge role in the success of SCM practices. It is very much implausible to practice an effective SCM without presence of information technologies. Hence, it is claimed to be the backbone of SCM practices (Wagner & Johansson, 2003; Gunasekaran and Ngai, 2004; Jaharkharia and Shankar, 2005). However, IT is not independent of people. Since it is the human ability to use and apply the technology for benefit, that is a prime component of technology itself (Zeleny, 1986). Based on the huge role IT and human resources, as discussed above, it will be used in this study as SCM practices enablers.

Information Technology

Russell & Taylor III (2011, p.431) discussed in their book that

"Information is the essential link between all supply chain processes and members. Computer and information technology allows real-time, online communications throughout the supply chain. Technologies that enable the efficient flow of products and services through the supply

chain are referred to as "enablers," and information technology has become the most important enabler of effective SCM."

Chopera and Mendl (2002) defined that information technology consists of hardware and software used throughout the supply chain to gather and analyse information. They explained that IT serves as eyes and ears of management in the supply chain, capturing and delivering the information necessary to make good decision. For example, using vendor managed inventory (VMI) the firm can reduce unnecessary inventory accumulation that comes due to distorted demand information flow that we call 'Bullwhip effect'.

There is also a wide range of researchers (e.g. Alkadi *et al*., 2003; Chandra *et al*., 2001; Robinson *et al*., 2005 as cited in Fawcett *et al*., 2005) who claim that information technology is enabling SCM. Rai, Patnayakuni, and Seth (2006) found that integrated IT infrastructures enable firms to develop the higher-order capability of supply chain process integration. Integrated IT infrastructures that are characterised by common data standards and integrated applications enable flows of information and coordination of activities across functional units, geographic regions, and value network partners (Broadbent *et al*., 1999, as cited in Rai *et al.,* 2006). Hence it enhances company's ability to automate the process of moving information electronically between suppliers and customers.

Paulraj, Chen, and Lado (2012) discussed the role of information technology citing the work such as permeating the supply chain at every point, transforming the way exchange-related activities are performed. Inter-organisational systems enable effective network development, facilitate collaborative planning, and enhance supply chain efficiency through the sharing of real-time information regarding product availability, inventory level, shipment status, and production requirements, among others (Kumar & van Dissel, 1996; Palmer and Griffith, 1998; Rodrigues *et al*., 2004).

A recent study reveals that investments in information technology make their greatest competitive contribution when they enable a supply chain's collaboration capability for effectively managing inventory using more complete, accurate, and timely information (Fawcett *et al*. 2011). Samadi and Kassou (2016), in their literature review, discussed the role of IT in information sharing, however, to take advantage this IT application it needs the top management support and IT knowledge also a critical role.

Russell & Taylor III (2011, p.431) and many other scholars also discussed some important IT supply chain enablers such EDI, Internet, barcode, radio frequency identification (RFID), enterprise resource planning (ERP) that includes various technologies (modules such as CRM, SCM, etc).

It is clear that IT has had a substantial impact on the development of SCM (Lee & Whang, 2000). Subramani (2004) defines the role of IT in a supply chain as reducing costs, providing decision making support, and improving customer service. Russell & Taylor III (2011, p.431) also discussed IT as cost/price reduction, shortening delivery time, improved customer service, and reduced intermediaries.

Human Resource

Whatever the technology and its level of advancement, it is not independent of people. Since it is the human ability to use and apply the technology for benefit, that is a prime component of technology itself (Zeleny*,* 1986*)*. Human resource remains a key enabler to the success of SCM practices. Handfiled *et al.* (2009) point out that human resource is the key enabler of SCM. He emphasised the importance of knowledge and skills of SCM, and discussed five top required knowledge for SC professionals such as supplier's relationship management, total cost analysis, purchasing strategy, supplier's analysis, and competitive market analysis. Combining a firm's information technology and people using that technology, are two dimensions that are critical resources to an organisation's functioning and survival (Fawcett *et al*., 2005).

In the activities of HRM, the following employee-related outcomes are needed for the successful supply chain management practices, as pointed out by. Bharthvajan (2014). These outcomes are intra-company outcomes and are listed as efficiency, speed of response, supply chain orientation, system thinking, service level-agreement, direct interaction with customers/ end users, internal customer orientation, multi-tasking, ability and agility, and commitment, cooperation and team spirit. It has been discussed by many HRM scholars that human resources are linked with core competencies, because especially in the modern business arena new ideas for innovation in all forms – including new products, new process, continuous improvement initiatives and so on-come harnessing this human creativity. (Brown, Blackmon, K., Cousins, P., & Maylor, 2001, p. 19). Creative ideas do not come from machines or 'technology'.

Research framework and Hypothesis

Research Hypothesis

To execute the objective of the study, based on reviewed literature which is related to research framework, the following hypothesis are formulated.

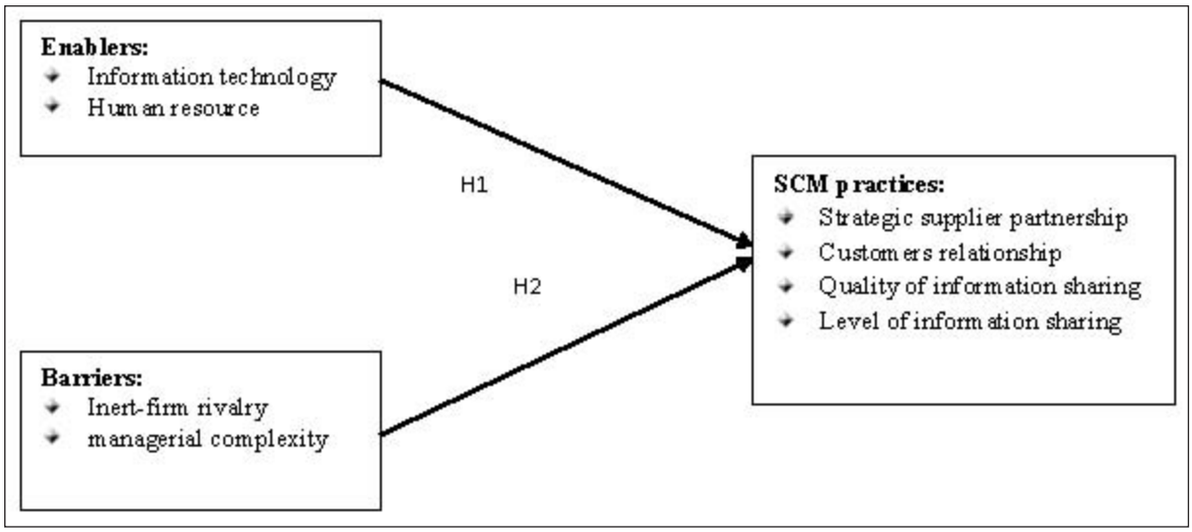

Fig. 1: Research Framework

Perceived SCM Enablers Vs SCM Practices

Scholars (e.g. Handfield *et al*., 2009) have identified four key enablers to purchasing and SCM, viz. information technology, human resource, organisational design, and measurement system. Ignoring these areas and putting firm's ability to develop progressive practices result in approaches falling short of competitors that have stressed these enabling areas (Handfield *et al*., 2009). Without presence of information technology, the achieving success in SCM practices would be very difficult. Hence, it is claimed to be the backbone of SCM practices (Wagner & Johansson, 2003; Gunasekaran & Ngai, 2004; Jaharkharia & Shankar, 2005). However, IT is not independent of people, because it is the human ability to use and apply the technology for benefit that is a prime component of technology itself (Zeleny, 1986), based on huge role of IT and human resource. As discussed above, it will be used in this study as SCM practices enablers. Therefore, it is hypothesized that;

Hypothesis 1: Enablers of SCM practices have positive effect on the success of SCM practices of the firm.

Perceived SCM Barriers Vs SCM Practices

As discussed in literature part, Fawcett *et al*. (2008) reviewed 34 articles concerned with internal and external benefits, barriers, and bridges to effective SCM. They concluded that the resisting forces arise both from the nature of the organisation and from the people comprising the organisation. They reviewed these barriers under two headings (inter-firm rivalry and managerial complexity) that was classified by Park and Ungson (2001). Other scholars (e.g Dubihlela & Omoruyi, 2014; Katunzi, 2011; Bakker *et al*., 2012; and Akkermans *et al*., 1999) discussed different variable such as organisational structures and cultures of companies, functional silos, short term thinking, history of local optimisation, lack of top management awareness, antagonism between sales and logistics, short term focus among partners, lack of infrastructure, lack of shared goal and vision, fear to be punished for open information sharing as barriers to the success of SCM practices. Based on these discussions it is hypothesized that;

Hypothesis 2: Barriers of SCM practices have negative effect on the success of SCM practices of the firm.

Research Methodology

Target Population and Sampling

This study was focused on survey of Ethiopian textile and garment factories, to get insight of factors that influence their supply chain practices positively and negatively. As discussed earlier, the country endowed huge opportunities

in the textile industry in various aspects, huge and abundant favourable cotton farm lands, plenty of trained work force, strategic place for global apparel market. However, till now the country is not benefited from this huge potential. In today's world of global competition, management of firms' supply chain is a weapon of survival and competition. Therefore, the target population of this study was Ethiopian textile and garment factories and their key first tire's supply chain that lies in Addis Ababa, nearby industry zones and Oromiya Liyu zone. From the data obtained from Textile Industry and Development Institute (TIDI), it is shown that 79 textile and garment factories out of 89 lie in the mentioned area (i.e. out of 28 textiles and 51 garment factories in the country, 11 and 41 factories are located in Addis Ababa respectively, while 17 & 10 factories are in Oromiya Liyu zone, respectively). Hence they represent the country's textile and garment factories.

The selection of focal factories was based on number of employees, hence, all factories that have 300 employees and more were included in the sample. As far as respondents are concerned in the selected factories, the researcher sought to choose respondents who are expected to have the best knowledge about the operation and management of the supply chain in their organisation.

Based on literature and recommendations from practitioners and the above-mentioned justification, it was decided to purposely choose managers at higher levels as respondents for the current study. Based on these premises, the respondents were CEOs, general managers, V/managers, operations/manufacturing managers, purchasing managers, logistics managers, materials managers, quality managers, marketing managers, and finance managers were surveyed.

As far as the first tire key suppliers and key customers of focal factories are concerned, the respondents were selected based on the level of their transactions (i.e. from purchase and sales data of the focal factory) or focal factory reference to their major suppliers and customers. Then, one of each highest ranking transacting suppliers and customers was selected, however, most of textile factories' first tire supplier and customers are outside the country and they were not subject to this survey. Then for the similar purpose mentioned above, operations/ manufacturing, purchasing, logistics, materials, quality, marketing, and finance managers were targeted.

Sample Size

In this study structural equation modeling was used. Its purpose has been discussed in method of data analysis section. However, in this section it is interesting to discuss what sample size is adequate for this model. Determining the sampling size for SEM is complex and there is large debate among scholars. As discussed by Westland, (2010), since 1990s researchers have alluded to an ad-hoc rule of thumb which supports ten observations per indicators in setting lower sample size; referring to Nunnally (1967) who suggested this rule. Bentler (1989) suggested five observation per indicator while Boomsam (1982) suggested indicator to latent ratio (r = P/k) where p is indicator and k is latent variable. Using simulation he suggested that r=2 and r=4 require 400 and 100 sample size, respectively and so on. He had summarised the rule as $n>50r^2$ -450r +1100 as cited in Westland (2010). SEM models can perform well, even with small samples (e.g., 50 to 100) (Dawn, 2010). As cited in Kline, (2011, p.12), Jackson (2003) suggested N:q rule, promoting minimum sample size in terms of the ratio of cases (*N*) to the number of model parameters that require statistical estimates (*q*) is 10:1. Daniel Soper's online calculation of sample size (http://www.danielsoper.com/statcalc3/) also takes in to account latent variable and observed variable in calculation of sample size. So, Daniel Soper's calculation method considers alpha, effect size, number of latent variable and observed variables and therefore it has strong theoretical base. Accordingly, in the research, of which this article is a part, there are 73 indicators (items) and 20 latent variables (15 sub–constructs and five main constructs). So, r= 73/20= 3.65. Based on Boomsam (1982), 190 respondents are adequate for the model, and as per Jackson's N:q rule, sample size of 150 is adequate for the model while Daniel Soper's method suggests 123 to be adequate. Taking in to account these three scholars, the suggested average sample size is 154. Many scholars suggest a sample size of greater than 300 SEM as a rule of thumb. Thus, considering this a sample size of 455 was targeted.

Data was collected using self-administered survey questionnaires. Quality of respondents and response rate are two important factors that influence the quality of an empirical study. Since this study has a SCM focus, the target respondents were, as discussed above, CEOs, general managers, V/managers, operations/ manufacturing managers, purchasing managers, logistics managers, materials managers, quality managers, marketing managers, and finance managers, as these

personnel were deemed to have the best knowledge in the supply chain area.

List of factories was obtained from one source: Ethiopian Textile Industry and Development institute (TIDI). As mentioned above, out of 89 factories, 20 textile factories, 25 garment factories, 3 ginning factories, one chemical supplier, 4 lint cotton suppliers, 10 whole sellers, and 2 distributers were covered in the study. That is, 45 factories were focal (textile and garment), eight factories were input suppliers (ginning, lint cotton and chemical) and 12 were customers (whole seller, and distributers). The final version of the questionnaire was administrated to 448 target respondents (total factor covered (45+7+12 = 64*7= 448).

Instrument Development and Data Collection Methods

Instruments that measure SCM practices were adopted from Li *et al.* (2005, 2006). Since these instruments have been tested in previous studies and are found to be valid and reliable, these were not tested again in the pilot study. Instead, they were revalidated in the large-scale analysis. The construct barriers and enablers to SCM practices have been newly developed in this research. In order to keep content validity and reliability, the instrument development was undertaken through four phases: (1) item generation, (2) pre-pilot study, (3) pilot study, and (4) large-scale data analysis, in line with previous studies (e.g. Li *et al*., 2005, 2006; Thatte 2007, and Thatte 2013)

Item generation was made based on construct definition and detail review of literature published on the area of barriers and enablers to SCM and its practices (e.g. Christopher, 2000; Fawcett, 2008; Bakker, 2012). Among the many SCM practices, the following enablers and barriers appeared on the mentioned literature:

- **Enabler:** Information technology and human resource.
- **Barrier:** Inter-firm rivalry and managerial complexity.

To improve content validity, pre-pilot study was carried out for the generated items by bringing it to academician and practitioners' evaluation. Before data collection process, the instrument was developed in to two versions: Amharic and English version. The Amharic version was developed and edited with language experts (two university instructors and PhD students). In both the versions, the objective of the instruments, confidentiality issue, instructions concerning how to fill the questionnaire, researcher's contact address, inconvenience to respondents, if any, respondents' interest in procuring copy of the research result, etc. were clearly discussed. Then the pilot study was conducted to check whether the instruments were able to measure the intended construct and its reliability. Further, the respondents were asked to provide feedback on representativeness, clarity, specificity, ease of understanding, and interpretation of the questions. The respondents were also requested to provide instructions on the length of the questionnaire. Based on the feedback, items were modified or discarded, and definitions were modified to ensure that the domain of the construct is covered and thus strengthen the content validity. After the pilot study, the actual data collection began through direct distribution of self-administered instruments to minimise the risk of non-response.

To ensure a reasonable response rate, the survey was distributed by the researcher himself to each selected respondent using their contact address that was received from ETIDI. The respondents were followed up through phone calls to remind them of the appointed date. The survey questionnaire should be communicative and easy to fill by the targeted respondents. Thus, the questionnaire had the following characteristics.

On the top of the questionnaire, the purpose and significance of the study, confidentiality of their responses, filling instructions, contact address of the researcher, whether the respondents felt any inconvenience in filling the questionnaires, and instruction on how respondents would respond were clearly communicated. The instrument had four sections: Section I measured demographic information of respondents and organisation, Section II measured SCM practices, containing five dimensions (supplier strategic partnership, customers relationships, level of information sharing, and information quality each of which had respective five cases), Section III mentioned barriers to SCM practices that had two dimensions, managerial complexity and inter-firm rivalry, and Section IV which covered SCM practices success enablers such as information technology and human resources (considered as sub-constructs). All the measurements are measured on a five-point Likert scale except section one of the questionnaires (respondents' and organisation's profile). One column for 'not applicable' was provided to not force the respondents to what they have no idea (i.e. strongly disagree, disagree, neutral, agree, strongly agree, and not applicable).

Method of Data Analysis

Structural equation model (using AMOS and SPSS version 23) was used in this study to analyse data and hypothesis testing. SEM is widely recognised as a powerful methodology for capturing and explicating complex multivariate relations in social science data that can examine a series of dependence relationships simultaneously (Joseph, Willam, Barry, & Rolph, 2010). Joseph *et al*. (2010) also discussed that it is most appropriate when the researcher has multiple constructs, each represented by several measured variables, and these constructs are distinguished based on whether they are exogenous or endogenous. Therefore, the standard SEM is composed of two parts – the measurement model (a sub-model in SEM that specifies the indicators of each construct and assesses the reliability of each construct for later use in estimating the causal relationships) and the structural model (the set of dependence relationships linking the model constructs). Since the model depicted in Fig. 1 is composed of these two parts (i.e. each construct with several dimensions; SCM practices, enablers and barriers to SCM practices, their own dimensions) structural equation model is the most appropriate (e.g. Joseph *et al*., 2010) as discussed above.

Data Analysis

Response Rate

As it was discussed in methodology part, the survey questionnaires were distributed to the mentioned high level management of mentioned factories and their supply chains. Out of the 448 distributed instruments, 370 complete and usable responses were obtained (collected), representing a response rate of approximately 82.6% which was very good to proceed.

Sample Characteristics of the Respondents and Organisations

This section will discuss sample characteristics in terms of the respondents (job title, job function, and years worked at the organisation), level of education, type of organisation, the responses are summarised in Table 2.

Table 2: Summary of Characteristics of Respondent and Types Organisation

No	Description	Percentage
1	**Level of education:**	
	✓ Secondary	12.7%
	✓ Diploma	12.4%
	✓ Degree	74.9%
2	**Field of study**	
	✓ Business management	12.9%
	✓ Accounting and finance	12.4%
	✓ Others	62.7%
3	**Role of respondent in the organisation**	
	✓ CEO/president	12.7%
	✓ Manager	24.9%
	✓ Other	62.4%
4	**Work experience**	
	✓ 1-5 years	35.9%
	✓ 6-10 years	37.3%
	✓ 11-15 years	14.1%
	✓ 16 and above years	12.7%
5	**Types of organisation**	
	✓ Garment factories	57.8%
	✓ Textile factories	30%
	✓ Whole sales of textile products	12.2%

The following can be deduced from Table 2:

- 74.9% level of degree education indicates that relatively respondents are in a better position to manage the organisations, hence responses received from such individuals are believed to be good and reliable.
- 38 % of the respondents (CEOs and managers) are high level executives and are mostly involved in strategic SCM practices. Thus, it implies a high reliability of the responses received, as these executives have a wider domain (job responsibility) and administrative knowledge.
- Since majority of the respondents are senior level executives (above 6 years of stay at organisation; 37.30% +14.1% + 12.70 = 64.1%) it can be said that the data is more reliable.
- As it was mentioned in the methodology section, most of the surveyed factories were focal factories, which means textile and garment factories. Since

most of these factories are operated by foreign investors, their first tire suppliers and customers are outside the country, for example Arvined Life Style P.L.C, importing inputs from India where mother company is and selling all of its output to other countries such as Europian and US market. The garment and textile factories constituted the majority of organisations, (57.8+30= 87.8%).

Structural Equation Modeling Methodology

Rational for using SEM methodology measurement and model validation criteria is discussed under this section, citing different scholars' reflections on each criterion.

As it has been said by many scholars and authors (e.g. Joseph *et al*., 2010; Kline, 2011), unlike the traditional statistical methods, SEM is widely recognised as a powerful methodology for capturing and explicating complex multivariate relations in social science data that can examine a series of dependence relationships simultaneously. Hence, SEM greatly expands the researchers' capability to study a set of interrelated relationships simultaneously. The first important step in SEM is to specify the two components: measurement model and structural model. SEM model specification must always be based on sound theory from existing literature. The need for theoretical justification in SEM is very important for the specification of dependence relationships, modifications to the proposed relationships, and many other aspects of model estimation (Hair *et al*., 1998; Kline, 2011). Once the measurement and structural models are specified, the researcher must choose a computer program for model estimation and evaluation. There is no single statistical test that best describes the strength of a model. Instead, researchers have developed a number of goodness-of-fit measures to assess the results from three perspectives: 1) overall fit, 2) comparative fit to a base model, and 3) model parsimony. AMOS provides several statistics that can be used to evaluate the hypothesised model and also suggests ways in which the model might be modified, given sufficient theoretical justification (Thatte, 2007)

Overall Fit Measures

The most fundamental measure of overall fit is the model chi-square statistic (X^2_M). It is traditional measure for evaluating overall model fit and 'assesses the magnitude of discrepancy between the sample and fitted covariance's matrices' (Hu & Bentler, 1999, p.2). Chi-square for just defined model generally equals to zero ($X^2_M = 0$), technically it is not defined for model with no degree of freedom (df). If model chi-square perfectly fits the data, each observed covariance fits to its counterpart implied by model. If the model is over identified ($df_m > 0$), X^2_M increases and the model is "badness of fit". A good model fit would provide an insignificant result at a 0.05 threshold (Barrett, 2007), thus the chi-square statistic is often referred to as either a 'badness of fit' (Kline, 2005) or a 'lack of fit' (Mulaik *et al*., 1989) measure. However, the $\chi 2$ measure is often affected by sample size, multivariate non-normality, correlation size, unique variance (Kline, 2011). Researchers sometimes use normed chi-square to minimise the effect of sample size, which is the ratio of chi-square to degree of freedom $\frac{df_M}{X^2_M}$. According to Kline, this too has some limitations X^2_M is only sensitive for incorrect model, df_M has nothing to do with sample size and no consensus on the maximum value of acceptable NC is made, (Kline, 2011, p. 204), however, researchers' recommendations range from as high as 5.0 (Wheaton *et al*, 1977) to as low as 2.0 (Tabachnick & Fidell, 2007) as cited in Hooper, Coughlan, and Mullen (2008). Various model fit criteria are available to analyse whether model is fit or not, provided under SEM analysis software such as AMOS, EQS, and are summarised in Table 3 with their acceptable cut off point.

Table 3: Model-Fit Criteria and Acceptable Fit Interpretation

Model fit Criteria	Acceptable level	Interpretation
Chi-square	Tabled ^{2} value	Compares obtained ^{2} value with tabled value for given.
GFI	0 (not fit) to 1 (perfect fit)	Value close to 0.90 or 0.95 reflect good fit
AGFI	0 (not fit) to 1 (perfect fit)	Value adjusted for with 0.90 above a good model fit.
RMSEA	0.05 to 0.08	0.05 - 0.08 indicate close fit
Tucker–Lewis Index (TLI)	0 (no fit) to 1 (perfect fit)	close to 0.90 or 0.95 reflects a good model fit
Normid fit index (NFI)	0 (no fit) to 1 (perfect fit)	Value close to 0.90 or 0.95 reflects a good model fit
Parsimony fi index (PNFI)	0 (no fit) to 1 (perfect fit)	Compares values in alternative models
Akaike information criterion (AIC)	0 (perfect fit) to positive value (poor fit)	Compares values in alternative models

Adopted from, Schumacher, Randall E. (2010) A beginner's guide to structural equation modeling 3rd ed.

Goodness-fit- index (GFI) represents the overall degree of fit (the squared residuals from prediction compared to the actual data). GFI is not adjusted for the degrees of freedom. Its value ranges value from 0 (poor fit) to 1 (perfect fit). Generally, a GFI value of greater than 0.90 is considered as acceptable (Segars, 1997; Hair *et al*., 1998). Another measure of overall fit is the root mean square error of approximation (RMSEA) which takes into account the error of approximation and is expressed per degree of freedom. This makes the index sensitive to the number of estimated parameters in the model. Values less than 0.05 indicate good fit, values as high as 0.08 represent reasonable errors of approximation in the population (Browne & Cudeck, 1993), values ranging from 0.08 to 0.10 indicate mediocre fit, and those greater than 0.10 indicate poor fit (MacCallum *et al*., 1996).

Comparative Fit Measures

This class of measures compares the proposed model to some baseline model (null model) – some realistic model that all other models should be expected to exceed. The null model, in most cases, is a single construct model with all indicators that perfectly measure the construct. One of the most popular measures is the normed fit index (NFI), which ranges from 0 (no fit at all) to 1 (perfect fit). A commonly recommended value is 0.90 or greater (Hair *et al*., 1998).

Parsimonious Fit Measures

The basic objective is to diagnose whether the model fit has been achieved by over-fitting the data with too many coefficients. The most widely used measure of parsimonious fit, provided by AMOS is the adjusted goodness-of-fit index (AGFI). It is an extension of GFI but adjusted by the ratio of degrees of freedom for the proposed model to the degrees of freedom for the null model. An AGFI value of 0.80 or greater is considered as acceptable (Segars & Grover, 1993).

Modification Indices

AMOS program provides modification indices that suggest possible ways of improving the model fit. However, it is important that any modifications performed must have sufficient theoretical justification before carrying out the modification.

Standardised Structural Coefficient

A standardised structural coefficient is also called the effect size in SEM. Effect size is a name given to a family of indices that measure the magnitude of a treatment effect. These values are displayed above their respective arrows on the arrow diagram specifying the model. The interpretation is similar to regression: if a standardised structural coefficient is 0.5, then the latent dependent will increase by 0.5 standard units for each unit increase in the latent independent. In AMOS, the standardised structural coefficients are labeled as standardised regression weights, which are similar to the coefficients used to test the strength of relationships. Unlike significance tests, these indices are independent of sample size. Effect size is commonly used to compliment structural equation modeling (SEM) because SEM is a large-sample technique. The effect size helps researchers to differentiate between statistical significance and practical significance, when the test of a relationship deals with a large-sample size. Thatte (2007) discussed interpretation of effect size in his paper in some detail and finally summarised as, the effect size of 0.371 or above is considered large, between 0.100 and 0.371 is considered medium, and 0.1 or below is considered small.

Large-scale Instrument Assessment Methodology

Instrument assessment is an important step in testing the research model. CFA (confirmatory factor analysis) using AMOS software is performed for the measurement models, which is then followed by the structural model displaying the hypothesized relationships. It was decided first to test the measurement model and then the structural model, to avoid any interactions between the measurement and the structural model, and as proposed by Anderson and Gerbing (1988). Validity of the measurement for the newly developed was done i.e. for SCM practice barriers and SCM practice enablers construct, and for construct, SCM practices are adopted from Li *et al*. (2005), and it had already been validated therein. However, the author reports the reliability of the constructs that have been adopted from prior literature (along with the reliability for the same as obtained in this study) after presenting the large-scale instrument validation results for the construct 'SCM barrier and enabler'. Convergent validity, discriminate validity, and reliability are important properties for the measurement to be reliable and valid. Hence, reliability estimation is performed after convergent and discriminate validity because in the absence of a valid construct, reliability may not be relevant (Koufteros, 1999).

Large-Scale Measurement Analysis

This section presents the large-scale instrument validation results for the construct SCM practices barriers (SCMPB) and SCM practice enablers (SCMPE). SCMP construct, as discussed in the previous sections, had been adopted and validated therein. So large scale measurement analysis is presented here for constructs (SCMPB and SCMPE) that were developed in this study. To bring these two constructs in to play, the researchers perform a numbers of steps starting from intensive literature review for the content validity of instruments whether they are in a position to measure what its intended to measure. On the basis of this justification, the authors reviewed large pool of literature and developed the instruments that were supposed to measure the above mentioned constructs. Then it was provided to academicians in the field and practitioners to get their constructive comments, suggestions, and reflections. Based on their constructive comments, deletion, modification and addition of the suggestions were done to the instruments which were finally provided to respondents as a pilot test. Based on their input the necessary adjustment was made before launching for data collection.

After data has been collected and organised, the authors proceeded to exploratory factor analysis (EFA) and CFA. As it is recommended by many scholars that exploratory factor analysis (EFA) is as a precursor to CFA when the researcher does not have a substantive theoretical model (Gerbing & Hamilton, 1996 as cited in Schumacher, 2010). Hence, before going to confirmatory factory analysis it is important to use EFA. By restricting extraction of factors for two constructs (i.e. for each of SCMPB and SCMPE), the extracted results and discussion of EFA and then CFA in first order and second order factor results are presented successively as here under.

Supply Chain Management Practices Barriers (SCMPB)

As a requirement for EFA, the sample adequacy criteria KMO > 0.70 is very good. It was above the requirement (0.708), sig. at 0. 000. Using maximum likelihood (ML) extraction method, EFA for SCMPB was extracted as shown in Table 4.

Table 4: Structure Matrix of EFA Output

Structure Matrix		
	Factor	
	MNGCP	INTFR
INTFR1		.858
INTFR2		
INTFR3		.995
INTFR4		1.000
INTFR5		.524
MNGCP1	.892	
MNGCP2	.840	
MNGCP3	.985	
MNGCP4	.920	
Extraction Method: Maximum Likelihood. Rotation Method: Oblimin with Kaiser Normalisation.		

From Table 4, it can be seen that except item number 2 that measures inter-firm rivalry (INTFR), all the remaining items are highly loaded on their respective factors which is a good initial ground to say that inter-firm rivalry and managerial complexity (MNGCP) can be measured by these instruments. After having this starting point, the result of CFA was presented as follows.

From the initial CFA path diagram for INTFR, all items (item 1-----item 5, loadings are 0.85, 0.32, 0.97, 0.98, and 0.53 respectively) that measure sub-construct (inter-firm rivalry) are acceptable except item 2 (INTFR2) which was deleted in EFA. The model fit indices were ($\frac{x^2}{df}$ = 10, GFI = 0.96, AGFI = 0.85, CFI = 0.97, and RMSEA = 0.157). So, based on fit indices criterion, the model is not fit. Especially were not in the recommend range.

As discussed above, CFA is an iterative process until acceptable model obtained, therefore further model modification was carried out based on modification indices (MI). Hence, based on the modification indices and loading weight of items, item 2 (INTFR2) was dropped from sub-construct inter-firm rivalry. The concept of item 2, non-aligned strategic and operating philosophies between chains members, was already captured by item 1, "lack of top management support for SCM". Therefore, removal of these items does not affect the validity of the content. Finally, e1 and e2 were allowed to co-vary by connecting double-headed arrow. The new model and its

model fit indices ($\frac{x^2}{df}$ = 1.31, GFI = 0.99, AGFI = 0.98, CFI = 0.96, and RMSEA = 0.029) were very good, and the model is fit.

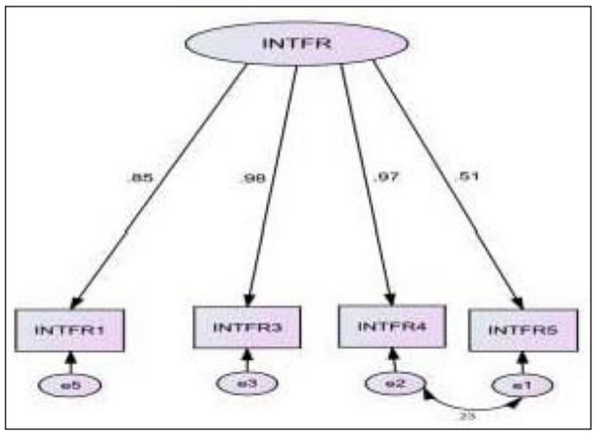

Fig. 2: Final Measurement Model for Inter-Firm Rivalry

The initial model fit indices for sub-construct managerial coplexity (MNGCP) consist of Chi-square/df = 14.66, GFI = 0.96, AGFI = 0.81, CFI = 98, and RMSEA = 0.19. The initial measurement model for MNGCP is based on the ideal model fit requirement; the model is unreasonable fit; therefore, further model modification was carried. Based on the modification indices, the new model fit indices were X^2/df = 4.8, GFI = 0.99, AGFI = 0.93, CFI 0.99, and RMSEA = 0.1. Except RMSEA all other indices were best fit and RMSEA in the acceptable range, therefor, the model is fit.

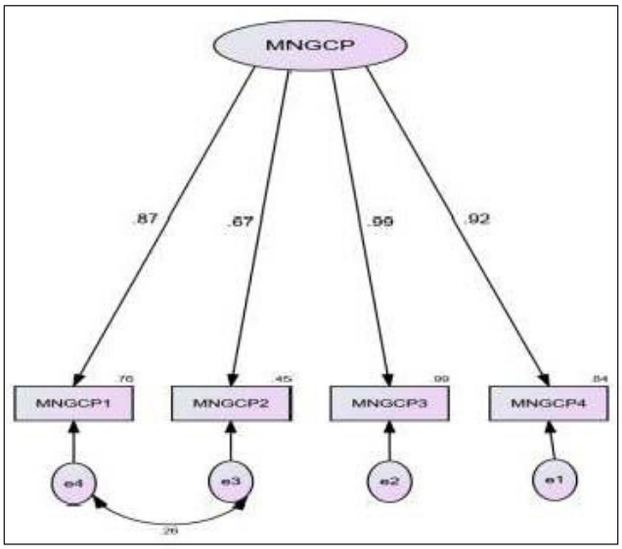

Fig. 3: Final Measurement Model for Inter Firm Rivalry

In addition to the above discussion, EFA and CFA coefficients are relatively the same. So, item is expected to be most of the time not perfect fit. The model shown below has high convergent validity and discriminate validity to measure the mentioned sub-constructs.

Table 5: Comparisons between EFA loading and CFA loading for sub-construct of SCMPB

	EFA factor loading		CFA loading	
	MNGCP	**INTFR**	**MNGCP**	**INTFR**
INTFR1		.858		0.85
INTFR2				
INTFR3		.995		0.98
INTFR4		1.000		0.97
INTFR5		.524		0.51
MNGCP1	.892		0.87	
MNGCP2	.840		0.67	
MNGCP3	.985		0.99	
MNGCP4	.920		0.92	

Reliability: It is concerned with the ability of a measure (score) to be consistent, commonly referred to as internal consistency, consistency over time, and consistency using similar measures, to denote different types of measurement error associated with observed variable scores. Cronbach's alpha was used to measure the reliability of the hypothesized individual sub-constructs INTFR, and MNGCP. A commonly used value for acceptable reliability is 0.70 (Hair *et al*., 1998). More reliable measures give greater confidence that the individual indicators are all consistent in their measurements, and therefore, the model is repeatable. The Cronbach's α scores for INTFR, before dropping item2 is 0.838 and after dropping it, alpha score become 0.872, in both case beyond the acceptance cut off, as for the MNGCP 0.924, so the instrument has high internal consistency and the author has strong evidence on convergent validity and reliability of the instrument.

Supply Chain Management Practices Enablers

For the same reason mentioned above, EFA output KMO value is 0.75. Using maximum likelihood (ML) extraction method, EFA for SCMPE was extracted as it was shown in Table 6.

Table 6: Exploratory Factory Analysis Result

Pattern Matrix[a]		
	Factor	
	HR	IT
IT1		.951
IT2		.865
IT3		.926
HR1	.894	
HR2	.755	
HR3	.969	
HR4	.921	
HR5	.684	

Extraction Method: Maximum Likelihood.
Rotation Method: Oblimin with Kaiser Normalisation.
a. Rotation converged in 2 iterations.

As we can see from Table 6, all items that measure human resource (HR) and information technology (IT) are highly loaded on their respective factors, which is a good initial ground to say that inter HR and IT can be measured by these instruments. After having this starting point, the result of CFA was presented as follows for both HR and IT sub-constructs in the same fashion with SCMPB sub-constructs.

i. Information Technology (IT)

As shown in Table 6, IT is measured using three items. The initial CFA model fit indices and standard coefficient are (X^2/df = 0, GFI = 1, CFI = 1, and RMSEA = 0.84) and (item 1 = 0.84, item 2 = 0.93, and item 3 = 0.88) respectively. Thus, all are very good fit, except RMSEA which is bad fit, hence the overall model is acceptable. Concerning RMSEA, Breivik and Olsson (2001) suggested after their Monte Carlo study that the RMSEA tends to impose a harsher penalty on smaller models with relatively few variables or factors, because smaller models may have relatively few degrees of freedom, but larger models may have more "room" for higher df_M values. Browne and Cudeck (1993), on their rule of thumb, suggest RMSEA < 0.05 may indicate "good fit." But Kline (2011, p. 206) criticized that this threshold is a rule of thumb that may not be generalized across all studies.

As shown in Fig. 4, all items that measure sub-construct (IT) have very high loadings which is an evident for the convergent validity of the measurement. Consistency in results of CFA and EFA is another evidence of measurement validity to measure. Based on this reason, RMSEA is not regarded as a criterion for model fit evaluation here. So, the model goodness fit is achieved with excellent GFI without further modification.

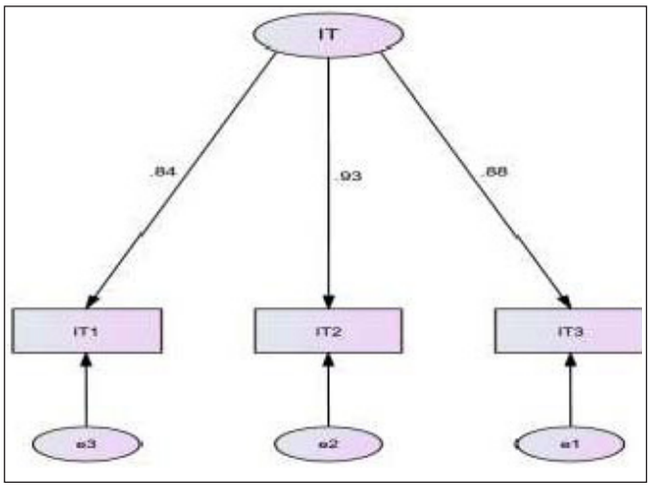

Fig. 4: Final Measurement Model for Information Technology

ii. Human Resource Sub-Construct

HR sub-construct was measured using five items, as shown in Table 6. The initial CFA model fit indices and standard coefficient are (X^2/df = 63.79, GFI = 0.79, AGFI = 0.360, CFI = 0.829, and RMSEA = 0.413.) and (item 1 = 0.83, item 2 = 0.76, item 3 = 0.96, item 4 = 0.93, and item 5 = 0.88) respectively. Thus, based on the model fit indices criteria, the model fails to fit the data, therefore further model modification was carried out. Based on the modification indices, error covariance between e2 and e5 and between e2 and e3 by connecting double-headed arrow was made. The new model fit indices were improved to (X^2/df = 5.87, GFI = 0.98, AGFI = 0.91, CFI = 0.99, and RMSEA = 0.1). Except RMSEA all of model fit indices are best fit and for the same reasons given above RMSEA favour a large model, hence the model fit is achieved.

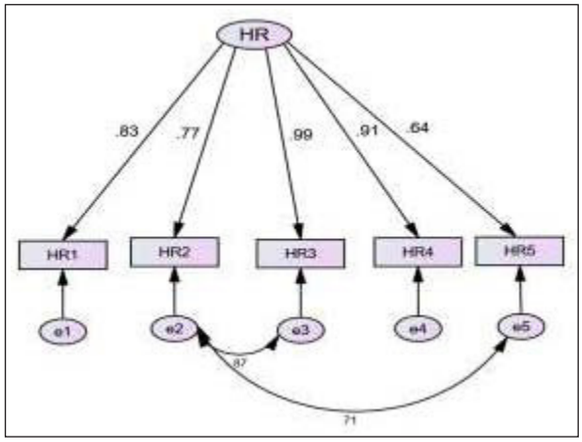

Fig. 5: Final Measurement Model for Human Resource

In addition to the above discussion, EFA and CFA factor loadings are relatively the same. This consistency of value is also an additional evidence of the items that design to measure their respective HR and IT sub-constructs.

Table 7: Comparisons between EFA Loading and CFA Loading for Sub Construct of SCMPE

	EFA factor loading		CFA loading	
	HR	**IT**	**HR**	**IT**
IT1		.951		0.95
IT2		.865		0.87
IT3		.926		0.92
HR1	.894		0.89	
HR2	.755		0.78	
HR3	.969		0.99	
HR4	.921		0.91	
HR5	.684		0.64	

Reliability

Cronbach's alpha was used to measure the reliability of the hypothesized individual sub-constructs IT and HR. A commonly used value for acceptable reliability is 0.70 (Hair *et al*., 1998). More reliable measures give greater confidence that the individual indicators are all consistent in their measurements, and therefore, the model is repeatable. The Cronbach's α score for IT is 0.905, and for the HR 0.923, so the instrument has high internal consistency and the author has strong evidence on convergent validity and reliability of the instrument.

SCM Practices - Reliability Analysis

The construct 'SCM practices' has been adopted from Li *et al*. (2005, 2006). The reliabilities (Cronbach's α) of the sub-constructs - strategic supplier partnership (SSP), customer relationship (CR), level of information sharing (IS), and level of information quality(IQ) - that form the construct 'SCM practices' as obtained from Li *et al*. (2005, 2006) were reported alongside their reliability that were obtained in this study. So, the reliabilities obtained in this study and past reliability i.e. adopted instrument reliability, were SSP (0.89, 0.86), CR (0.98, 0.84), IS (0.99, 0.86), and IQ (0.77, 0.86) respectively. In both the cases the reliabilities were above 0.77, depicting a good measure of reliability for the 'SCM practices' sub-construct. The next section shall validate the second order construct 'SCMPE and SCMPB' since it is newly developed in this research.

Validation of Second-order Construct

The validation of second order construct was performed only for the newly developed constructs: SCM practice barriers and SCM practice enablers, since SCM practices have already been validated therein. Model fit indices that used in first order were also used in the second order analysis and the standardised coefficient for each sub construct. If all of them are statistically significant, a second-order construct can be considered.

Validation of Second-order Construct SCMPB

From the initial output of AMOS for SCMPB model, the model fit indices were chi-square/df. (12.14), GFI (0.87), AGFI (0.759), and RMSEA (0.174) and the model not fit well. Thus, it requires looking in to MI, whether some improvement can be made. Based on MI suggestion as it was shown in the final graph for first order for sub-construct of SCMPB, by allowing e7 & e8 to co-vary by connecting double-headed arrow, the model fit indices are improved to X^2/df (8.43), GFI (0.92), AGFI (0.84), and RMSEA (0.14). Therefore, except for RMSEA all measures are good fit the criteria, so, second order construct (SCMPB) is considered.

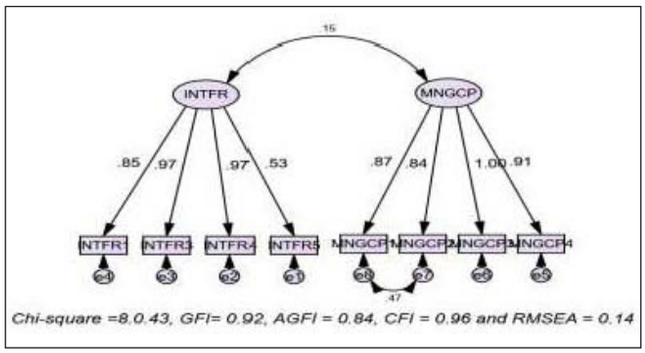

Fig. 6: Final First Order Model for Supply Chain Management Practice Barriers

Now we can measure the contribution of each sub-construct to the construct (SCMPB) using the model fit indices and standard coefficients pointing from SCMPB to each sub-constructs. Reading form AMOS output model fit indices it is the same with that of sub-construct discussed above, that is the model is good fit. However the contribution of INTFR to SCMPB is better (0.56) than that of MNGCP to SCMPB which is (0.26) as indicated in Fig. 7.

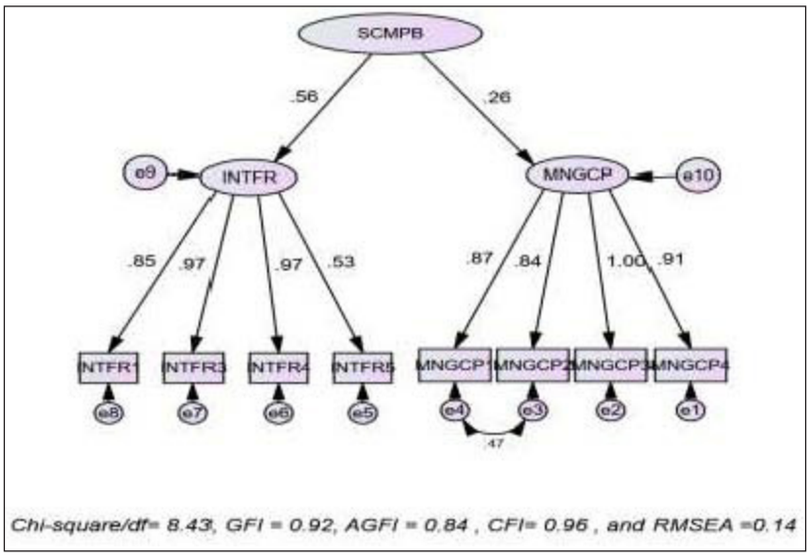

Fig. 7: Measures of SCMP Barriers

Validation of Second-order Construct SCMPE

Reading from AMOS model fit indices, and the initial result for first order sub-construct of SCMPE indicate [X^2/df. (18.99), GFI (0.840), AGFI (0.698), and RMSEA (0.221)]. Based on model fit indices criterion, the model fit is not achieved. As it is obvious that CFA is an iterative process, further evaluation is required. Based on MI reading suggestion, e1 and e4, and e3 and e4 are allowed to co-vary by connecting double-headed arrow. Based on this suggestion, the new model fit indices are improved to X^2/df (3.49), GFI (0.96), AGFI (0.92), and RMSEA (0.08). Since all the model fit indices criteria have been met smartly, so, second order construct (SCMPE) is considered.

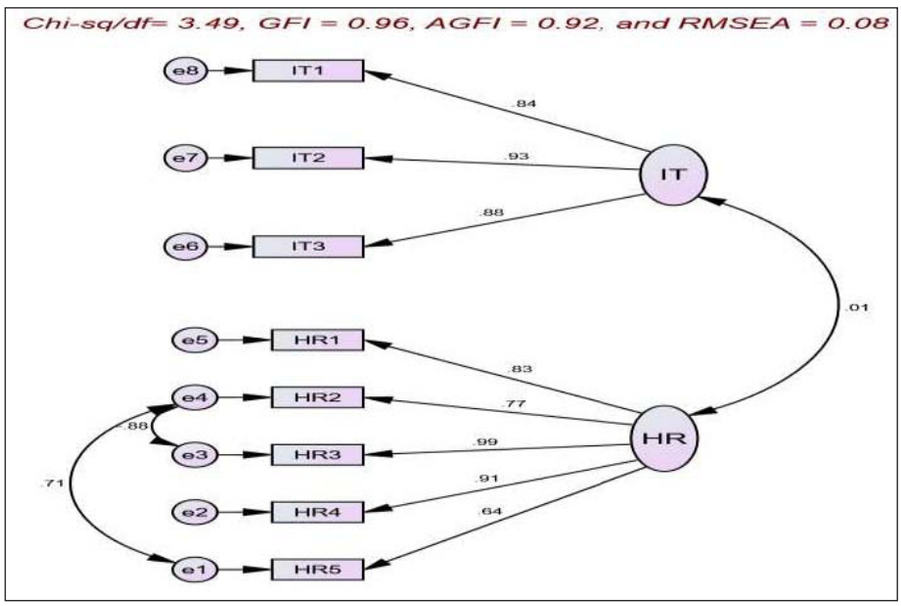

Fig. 8: Final First Order Model for Supply Chain Management Practice Barriers

Now we can measure the contribution of each sub-construct to the construct (SCMPE) using the model fit indices and standard coefficients pointing from SCMPE to each sub-constructs. Reading from AMOS output, model fit indices were the same as that of sub-construct discussed above (IT and HR). That is, the model is very good fit, however the contribution of HR to SCMPE is 0.09 which was very insignificant and IT contribution to SCMPE was 0.15 which is relatively better measure of SCMPE as indicated in the Fig. 9.

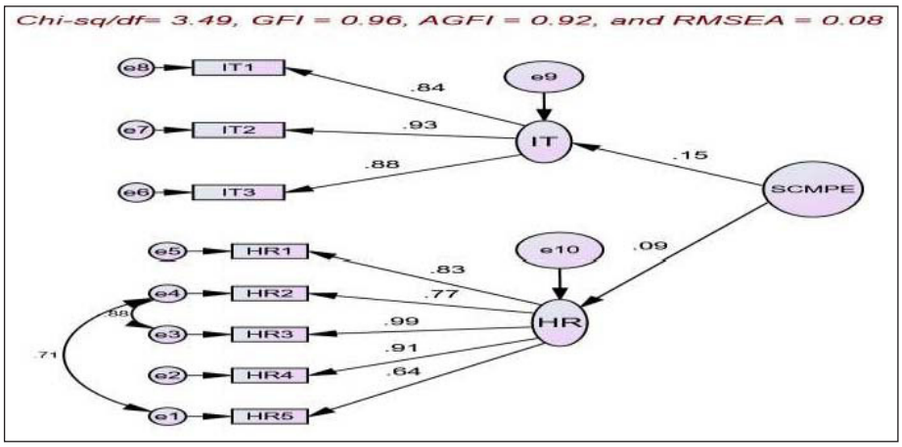

Fig. 9: Measures of SCMP Barriers

Construct-Level Correlation Analysis

In order for the measurement to be generalised, predictive validity or criterion related validity must be performed by comparing the second order factor models with one or more external variables (criterion) known or believed to measure the attribute.

Criterion related validity is characterised by prediction to an outside criterion and by checking the measurement instrument, either now or future, against some outcome or measure (Kerlinger, 1986 cited in Thatte, 2007). In this study, the criterion used to test the predictive validity is dependent variable (endogenous latent variable).

To check for the preliminary statistical validity (predictive validity) of the two formulated hypotheses, based on the researcher's framework, the Pearson correlation was used. Each construct was represented by a composite score, i.e. by taking the average scores of all items in a specific construct (i.e. the summated average of all items for a sub- construct as the score for the sub-construct and further the summated average of all sub-constructs that make up higher order construct was considered as a summated score for higher order construct). For example, SCMP was measured by four sub-constructs (SSP, CR, IS, and IQ), the summated average score for these sub-construct was obtained by summated average score of items that measure respective sub-constructs. The average sub-constructs (SSP, CR, IS, and IQ) score is considered as the score for SCMP, in the same way for all constructs. The result of Table 8 shows that SCMP enablers have significant correlation to SCMP, at 0.05 (two-tail), however, SCMP barriers has no significant relationships with SCMP. To further analysis for the hypothesized relationship of interest, hypothesis testing using structural equation modeling (using AMOS version 23) was discussed under the next topic.

Table 8: Construct Level Correlation Analysis

Hypothesis	Independent variables	Dependent variable	Pearson correlation
H1	SCMP enablers	SCMP	0.27
H2	SCMP barriers	SCMP	-0.08*
Correlation is significant at the 0.01 level (2-tailed). *Not significant List wise N = 370			

As we can understand from the construct level correlation in Table 8, SCM practice enablers have 0.27 correlation coefficient, with SCM practice (dependent) at 0.01(two tail) is significant. SCM practice barriers have -0.08 correlation coefficient, with SCMP (dependent) is insignificant. But SCM practice barriers have negative correlation. From hypothesis postulated, the author premised that SCMP barriers have negative effect on the SCM practice, so this result shows what was premised. However, as discussed earlier, this correlation result may not show predictive power of each independent (exogenous) variable on dependent (endogenous) variables, so further analysis and hypothesis testing will be conducted in the next consecutive sections using structural equation modeling.

Casual Model and Hypothesis Testing

As stated above, structural equation modeling using AMOS 23 version was used to test the hypothesis. Till now the measurement of each construct has already been validated through detail validity and reliability analysis. In the section that follows, the authors focus on testing model formulated side-by-side the hypothesis. The significance of each path in the proposed structural model was tested and the overall goodness-of-fit for the entire structural equation model is discussed in next section.

Proposed Structural Model

The proposed structural model depicted in the research framework section earlier (Fig. 1) is considered to be tested here. There are three variables in the model: SCM practices barriers (SCMPB), SCM practice enablers (SCMPE), and SCM practices (SCMP). SCMPE and SCMPB were regarded as independent (exogenous) and antecedent to the SCMP (endogenous variable for the construct mentioned).

Structural Model Testing Results

The hypothesized relationships to be tested were based on research framework and the structural model as specified in Fig. 1. The model fit properties were evaluated using the fit statistics discussed in section 'Structural Equation Modeling Methodology'. The summated average score computed in construct correlation analysis is used here as an input to the structural equation modeling process.

Initial Structural Modeling Results

Fig. 10 shows the path analysis resulting from the initial AMOS structural modeling relationships. The path analysis model shown is computed based on summated average score of each indicator which was considered previously as sub-construct, i.e. IT and HR for construct SCMPE; MNGCP and INTFR for construct SCMPB; SSP, CR, IS, and IQ for construct SCMP. The validity of the path model fit was tested using the model fitting indices that were used in the instrument validation section, such as , GFI, AGFI , CFI and RMSE. Based on all these fitting measures, the initial path model interestingly excellent fit the data (i.e. 0.140, GFI = 0.999, AGFI = 0.99, CFI = 1, and RMSE = 0.000).

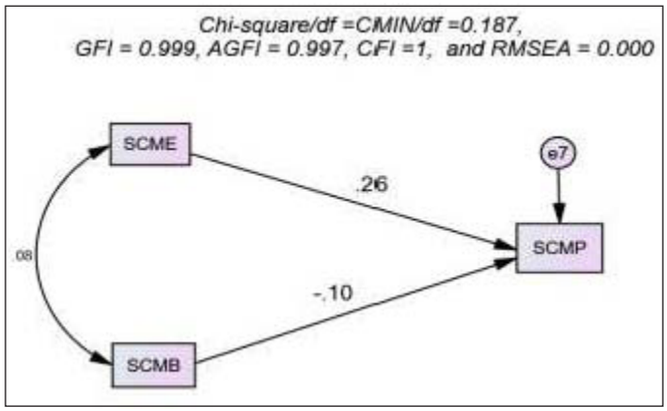

Fig. 10: Path Model for the Hypothesized Relationships

With the help of the path model shown in Fig. 10 and Table 9, both hypothesized relationships were found to be statistically significant. Hypothesis 1 is statistically significant at 0.001 and hypothesis 2 significant at 0.05 levels (two tailed).

Table 9: Regression Weights: (Group number 1 - Default Model)

Hypothesis		Estimate	S.E.	C.R.	P	Label
H4	SCMPE --> SCMP	.23	.04	5.23	***	
H5	SCMPB --> SCMP	-.13	.02	-5.966	0.043*	

*** Significant at 0.001 level (two tailed)
*-significant at 0.05 level (two tailed)

Discussion of Structural Modeling and Hypothesis Testing Results

The previous sections reported the structural modeling and hypothesis testing results on the proposed model. To summarizes, both hypothesizes were significant. The initial AMOS structural model displayed excellent fit to the data. However, statistical significance and model fit are not ultimate objectives of the academic research. They are just the means that facilitate and make the road easy for the researchers to achieve the end, which is better understanding of the subject under investigation and discovery of new relationships. Hence, the results from this research can be used by both academicians in

further exploring and testing the casual linkages in supply chain practices study and practitioners for guiding the implementation of SCM practices. The ability to minimise inhibiters that hamper SCM practices and capitalising the enablers help an organisation in the supply chain network individually and for the chain members in general to achieve competitive advantage and high level of organisational performance. As a result, the practical and theoretical implications of the results of each hypothesis are discussed as follows:

Hypothesis 4: Enablers of SCM practices have positive effect on the success of SCM practices of the firm.

As we can see from Table 9, hypothesis 1, which argues that enablers of SCMP have a positive effect on the success of SCM practices, is statistically significant (standard coefficient = 0.26, p =0.04 and z = 5.23). Thus, hypothesis is supported. SCMP enablers were measured using two dimensions, human resources and information technology.

1. Human Resources

Human resource is an important and key asset of the organisations that creates and breaks. This asset cannot be replaced by technology. Technology is not creative but created, so human resource is above all the innovated technology, with which global business is changing over time. In this research, human research dimension was measured using nine items initially, such as IT hardware and software professionals, supply chain management experts and professionals, supportive top managers for supply chain management practices, well-trained and skilled employees in the area of supply chain management, motivated and positive attitude employees, pro-change employees, team welcomed and willing to idea sharing attitude employees, customer respecting and collaborative employees, and cross-experience managers. In the data organising and screening stage, items responded as "not applicable" by almost all organisations were eliminated from analysis, because it may not be representative, it may be the point of researchers' bias if it was included in the analysis. Based on this justification, three items were removed: IT hardware and software professionals, supply chain management experts and professionals, and well-trained and skilled employees in the area of supply chain management. On the other hand, items with almost the same responses and high content relationships were transformed as one item, that is, motivated and positive attitude employees with team welcomed and willing to idea sharing attitude employees. So, now, measurement validation, EFA and CFA and hypothesis testing was carried out with five item.

Table 10: Items Developed to Measure Human Resources Sub-Construct

1 = strong facilitator , 2 = somewhat facilitator, 3= neutral, 4=not facilitator, 5= not facilitator at all, 6 = not applicable						
Human Resources	1	2	3	4	5	6
Supportive top managers for supply chain management practices						
Pro changes employees						
Team welcomed , willing to idea sharing attitude employees						
Customer respecting and collaborative employees						
Cross-experience managers						

Even though our argument was confirmed, that is SCMP enablers has a positive effect on the success of SCM practices, which is a general truth having scholars' and practitioners' support, the very critical component that helps an organisation to be successful in their supply chain management practices was absent, that is, supply chain and IT professional can play a pivotal role. For example, information sharing and quality of information sharing need IT experts because secured, timely information sharing, managing data base, operating on different IT hardware (infrastructures) and software such ERP, EDI, SCM systems, CRM, VMI, MRP etc. may not be easy for non-IT professionals. Extending our example, strategic supplier partnership and customer relationships, which is sub-construct of SCM practices also need supply chain professionals, experts or employees who are well-trained and have experience on supply chain area. Getting along with supply chain partners along the supply chain may not be possible for individual who has no such knowledge or experience.

2. Information Technology

Russell & Taylor III (2011, p.431) discussed in their book that "information is the essential link between all supply chain processes and members. Computer and information technology allows real-time, online communications throughout the supply chain. Technologies that enable the efficient flow of products and services through the supply chain are referred to as "enablers," and information technology has become the most important enabler of effective supply chain management." Fawcett *et al*. (2011) discussed the role of IT as enablers of supply chain collaboration capability for effectively managing inventory using more complete, accurate, and timely information.

According to scholars in the field (e.g. Chopera and Mendl, 2000; Russell & Taylor III. 2011, p.431; Fawcett *et al*. 2011; Simchi-Levi, 2004; Kollberg & Dreyer, 2006), discussed some important IT supply chain enablers such as EDI, Internet, barcode, radio frequency identification (RFID), enterprise resource planning (ERP) that include various technologies (modules such as CRM, SCM, etc.).

This study's results resembled with literature discussed above. IT is one sub-constructs of SCMP enablers construct that have significant effect on the SCM practices. SSP, CR, IS, and IQ are sub-constructs used to measure SCM practice constructs. Let us discuss each of these sub-constructs in relation to IT. Chopera and Mendl (2002) explain that IT serves as eyes and ears of management in the supply chain, capturing and delivering the information necessary to make good decision. How well it is explained! Without ears and eyes, how ineffective one becomes. Similarly, IT is a basic sense organ of supply chain. Without it, strategic supplier partnership, i.e. coordination, collaboration, real-time information sharing, customer relationships, strategic alliance, point of sales data sharing, inventory information, demand information, channel administration, product movement etc. cannot be achieved. In absence of information, managers are deaf and blind. The decision that they make, while they are in the scarcity of information, in turn leads their business to worst situation. As organisations invest more in their IT resources, their capacity and capability to reach end-to-end supply chain becomes higher and higher. Simchi-Levi (2004) discussed that the objective of IT in the SCM is to provide information availability and visibility, enable a single point of contact for data, allow decisions based on total supply chain information, and enable collaboration with partners. IT in SCM enables great opportunities, ranging from direct operational benefits to the creation of strategic advantage. It changes industry structure and even the rules of competition. A number of articles were published on the role of IT in today's business environment. In this study too, a numbers of previous studies referenced on the role of IT in SCM. The three basic reasons mostly discussed, for why supply chain issue gets attention from all fronts are globalisation of business, advancement of information technology, and demanding customers. These elements have a great role to play in enabling the success of SCM practices.

In this study, sub-construct (IT) was measured using three items as it is discussed in measurement validation section. However, initially developed items to measure this dimensions were 12, as shown in Table 11. In data screening stage, most of the items shown in the table were responded as "not applicable" indicating the statement is not totally representing the respondent's organisation, based on five-point scale and one column left with not applicable represented by number 6. For example, IT technology that used to share business, propriety information between trading partners such as electronic data interchange (EDI), vendor managed inventory (VDI), SCM software, CR software, enterprise resource planning (ERP), point of sale (POS) was not applicable for organisations. The items that measure such technology were responded by respondents as not applicable for their respective organisation. So the analysis was done only on three items, namely mobile devices, social media technologies such as Facebook, Twitter, Skype etc., and use of web technologies. Still the above mentioned items play a great role in reaching customers, suppliers, and sharing of information with them. That is, they are in a position to enhance the SCM practices (strategic suppliers' partnerships and customers' relationships, information sharing, maintain quality of information shared). Having such facilities, mobile devices, social media, websites may not indicate that the organisation is using such technology to facilitate their supply chain practices, because everyone can use these technologies for their day to day activities at personal level. Thus, even though, the result is significant and the argument was confirmed, the factories were far in using such technologies. So, it is difficult to say that the studied organisations are facilitating their SCM practices using latest information technology. That is, they were with ill eye and ear, i.e. they are far to reap the benefit of supply chain management. In order to be cured or be a competitive supply chain and high performing network of organisations, they have to invest more in IT technology.

Table 11: Items Developed to Measure Information Technology Sub-construct

1= strong facilitator , 2 = somewhat facilitator, 3= neutral, 4=not facilitator, 5= not facilitator at all 6 = not applicable						
Information Technology	1	2	3	4	5	6
Uses of EDI in trading with our key supplier and customer used						
Uses of Vendor managed inventories with our supplier used						
Implementations of ERP/SCM software used						
Uses customer relationship software						
Implementation RFID technology in managing inventory level						
Availability of Internet connectivity infrastructure used						

Barcode reader technologies						
Mobile devices						
Point of sales data sharing technologies						
Social media technologies such as Facebook, Twitter, Skype etc.						
GPS technologies						
Use web technologies						

Hypothesis 2: Barriers of SCM practices have negative effect on the success of SCM practices of the firm.

As shown in Table 9 and the structural equation model results, hypothesis 2, which argues that barriers of SCM practices have negative effect on the success of SCM practices of the firm, was found to be statistically significant. The standard coefficient is -0.10 which is statistically significant at $p < 0.05$ ($z = -2.02$). The standard coefficient result and sign of the coefficient confirmed the argument that was mentioned above. This means one more barrier happens to exist in organisations; its supply chain practices go down (deteriorate) by 0.10 (or 10%). In other words, the higher the level of SCMP barriers of a firm, the lower the level of SCM practices of a firm. The study conducted by Akkermans *et al*., (1999), using policy Delphi - study with approximately 30 companies' manager experts in supply chain, found that many of the roadblocks were deeply embedded in the organisational structures and cultures of companies, such as functional silos, short term thinking, lacking top management awareness, antagonism between sales and logistics, history of local optimisation, lack of common goal, depicted on the vicious cycle. They argued that many roadblocks are systematic one operating, they reinforce each other and themselves creating vicious cycle that worsen the SCM practices over time between trading partners. Looking information sharing as penalty rather than adding value to the whole supply chain, because every partner is running to maximise their share, this attitude leads not to have strategic suppliers partnerships and customers relationships, more over the quality of information sharing negatively affected. Hence, our finding confirms to the study conducted by Akkermans *et al*. (1999), i.e. higher barriers of SCM practices increasingly inhibit the success of SCM practices.

Summary of Hypothesis Testing

Based on the above discussion the following summary was presented:

Table 12: Summary Hypothesis Test

Hypothesis		Unstandardised coefficient	Standardised coefficient	S.E.	C.R.	P	Supported
H4	SCMPE --> SCMP	.23	0.26	.04	5.23	***	Yes
H5	SCMPB --> SCMP	-.06	0.10	.02	-5.966	0.043*	Yes

Summary of the Results

The overall result indicates that, higher level of SCMP enablers (i.e. supportive top managers for supply chain management practices, pro changes employees, pro-change customers, respecting and collaborative employees, cross-experience managers) will lead to higher level of SCM practices (better strategic alliance with suppliers and customers, willingness to share strategic information across supply chain members, timely and adequately). The result also shows that the availability of SCMP inhibitors (i.e. short term thinking, local optimisation, functional silo, lack of management support to supply chain implementation, lack of supply chain professionals, etc.) will affect negatively a firm SCM practices success.

Contribution of the Study to the Literature

This study provides inferences for the current context of supply chain management practices and factors that influence its success either positively or negatively. In the previous studies, instruments that measure barriers and enablers of SCM practices were not developed, as per author knowledge, while this study filled this gap. So, the new instrument shall provide better guideline for researchers in the SCM area and hence, it can be viewed as a strategic management tools and springing point for researchers in the area.

Recommendation for future researcher

The instrument developed in this study should be validated in large organisations with their respective end-to end supply chain, and with versatile respondents. Since this study focused on high level managers and mostly with focal factories, it skipped employees on operational level who may contribute to the study. And it also did not reach end-to-end chain, so that the real SCM practices can be pointed out. Thus, the authors recommend further researchers to fill this limitation.

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