

Uncertain Supply Chain Management

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The impact of firm supply performance and lean processes on the relationship between supply chain management practices and competitive performance

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ABSTRACT

The primary objective of the present paper is to explore the link between supply logistic integration, competitive performance, lean process and supply performance. To achieve our research objectives, we develop a unique model, which conceptualizes the said relationship. Porter's value chain and the resource based views are used as theatrical lenses of the current study using Amos software package based on a data set of 220 Iraqi manufacturing firms. Structural equation modeling (SEM) is employed to analyze the dataset. The findings of the study show that there was a positive relationship between supply logistics and competitive performance (operational) and supply performance and lean processes were partially mediating this relationship. The study also shows the importance of managing both internal (production processes) and external processes (logistics and supply chain) of firms' operations in an integrated manner in which supply chain management acts through key internal processes to impact competitive performance. This is the first study, which uncovers what happens "in between" the incoming materials and the end outputs delivered by firms into the market. This "in between black box" is important in improving our understanding of how inbound supply activities are translated into outbound competitive performance outcomes.

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1. Introduction

Supply chain management practices (SCMP) circumscribe perspectives and practices that effectively help all suppliers, manufacturers, distributors, and consumers achieve their long-term performance objectives (Hugos, 2018). Vonderembse et al. (2006) explained three products centered supply chains which are standard products with minimal differentiation, innovative products with high differentiation and hybrid products with a moderate level of differentiation. They further argued that standard products in simple forms should be produced using lean supply chain, which emphasizes on continuous improvement and waste reduction, the innovative product with technologically complex should be produced by agile supply chain and hybrid products with many suppliers should be produced by the hybrid supply chain. Information sharing is the key for supply chain integration; where the information sharing organizations can be more responsive towards ever-changing consumer needs.

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SCM sets of actions carried by an organization to improve the flow of information and goods among all stakeholders. The up to date concept of SCM advocates partnership with a supplier, outsourcing, and reduction of cycle time, uninterrupted flow of information and continuous sharing of technology. In this study, SCM practices are managerial activities which are executed to improve organizational supply chain performance (Sufian & Habibullah, 2010). The global supply chain forum has declared supply chain a strategically integrated network rather than a simple chain relationship and defines it as SCMP which is the “integration of key business processes from end user through original suppliers that provides products, services and information that add value for customers and other stakeholders”. Choon Tan et al. (2002) also presented a similar definition and defined SCM as “an integrated approach of purchase and logistics management”. Shadur and Bamber (1994) defined SCM as “a function of customer delivery, inventory management, lean strategy and strategic integration”.

On time delivery is one of the most important determinants of delivery performance (Anand & Grover, 2015) and according to Gelders et al. (1994), delivery time is a measure of customer satisfaction and helps in conceptualizing the link between organizational operations and delivery channels. Botha et al. (2017) found a positive relationship between delivery performance and supply chain performance and explored order fill lead time, delivery to request date order fill lead time and delivery to commit date as an important measure of delivery performance which is central to supply chain performance.

Goods in transit also place great influence on delivery performance, higher goods in transit due to slow vehicles, delivery frequency, and location reduce inventory turnover and increase the level of tying up capital. Delivers flexibility and minimum flows in invoices are also determinants of delivery performance (Anand & Grover, 2015). During the recent days, delivery system has become more flexible than earlier, the introduction of strategies like cross doc and delivery performance measuring tools has made it subject of strategic management.

Customer satisfaction is at the heart of every supply chain strategy, no performance measurement is possible without taking into account the customer satisfaction (Gunasekaran & Kobu, 2007; Anand & Grover, 2015). Product design, delivery methods, and the feedbacks should be integrated with customer requirements.

Production flexibility is another determinant of a successful supply chain. A flexible supply chain is the one, which has the ability to respond ever-changing market demand, customer needs and can offer products with various specifications, i.e. features, options i.e. color size, etc. (Vanichchinchai, 2014; Vanichchinchai & Igel, 2011). As with increasing environmental uncertainty and diversity companies are using supply chain as a strategic tool to gain a competitive advantage, flexibility can be seen as the key dimension of the SCMP. More broadly, flexibility can be seen as the firms’ ability to adjust or respond to ever-changing environmental factors i.e. market demand and customer needs.

Ever-changing customer needs have become one of the biggest threats in today’s competitive business world. In a postmodern business era, because of seventy plus years of marketing, customers are now well aware of product features and related requirements. Technology has become a major threat; consumer needs are continually changing and they need products to satisfy their unique needs as well. If a firm fails in understanding or accessing, changing customer’s needs, then we should expect the competitors will win.

In the manufacturing sector, which offers both generic goods i.e. clothing and griffin goods i.e. fashion, changing customer need is a continuous threat, in such case firm needs to abruptly switch from current product to another one, either with a significant change in current product or with entirely a new product. This switch or more comprehensively the efficiency of this switch is entirely based on the flexibility of supply chain i.e. if a supply chain is flexible enough to cope this change than firm will be able to get a sustainable competitive advantage, otherwise it will lose its market share.

The studies carried out by Vanichchinchai et al. (2014) and Vanichchinchai and Igel (2011) focused on the relationship between total quality management SCMP and firm supply performance. The “Cost (CT), Flexibility (FL), Relationship (RL) and Responsiveness (RS)” were used as dimensions of a

success full supply chain. The findings suggest that total quality management (TQM) has a direct positive effect on firm supply performance as well as indirect through SCM. The primary data of the study carried out by Vanichchinchai and Igel. (2011) were gathered from 171 managers of automotive industry of Thailand and they found a significant relationship between all the components.

To achieve organizational goals i.e. total customer satisfaction, cost savings, and supply chain quality management can be achieved by successful implementation of supplier relationship management (SRM); which advocates an integrated network of all suppliers to achieve organizational goals. It further emphasizes on multiple strategic moves i.e. every supplier and customer is different and cannot be dealt with a single strategy. Actually, nowadays products and services being placed great influence on customer or supplier perception about and how the organization views them. To get an optimal yield, understanding and wisely responding to this triangulation is prerequisite (Gunasekaran & Kobu, 2007). The importance of SRM can be explained with the fact that, the poor coordination among suppliers has become one of the major issues in US food industry and is accounted for the waste of almost \$30 billion annually outsourcing constituent 50-60 percent of total product (Sambasivan et al., 2009). Actually with ever-changing customer demand and to manage and mitigate intense rivalry from existing and potential competitors, we need a responsive and flexible supply chain which is only possible with the successful installation of SRM program.

Sodhi and Son (2009) in their vintage paper examined Korean firms with two different perspectives of partnership one strategic partner performance and other operational partner performance and found trust, information sharing, joint relationship management asset specific relationship as important determinants of supply chain partner management, they further argued strategic partnership as an important factor of successful partnership and findings were also consistent with prior findings of Mentzer et al. (2000) and Lambert et al. (2005). Sodhi and Son (2009) apart from above mentioned strategic partnership includes trust promoting culture and leadership support. They concluded with a definition of strategic SCMP and defined it as a function of long-term relationships based on mutual trust and leadership support. The objective of SCMP is to ensure and secure the benefits of all parties involved in process and information sharing is used as a medium for it. This highlights the importance of information technology in SCM.

2. Literature review

There are many agreements on definitions of supply chain management. Kaufman (2002) declared SCM as “removal of communication barrier and eradication of redundancies as ultimate goals of SCM”. Later Choon et al. (2002) defined waste reduction, synchronized operation, delivery performance, quality management, and flexibility in production as SCM goals. Simchi-Levi et al. (2004) also confirmed Choon et al. (2002) and added customer satisfaction, time cost, warehousing and supplier relation as the SCM goals in literature.

Hence, in last decades SCM has emerged as an integrated approach, which includes waste reduction, synchronized operation, delivery performance, quality management, flexibility, customer satisfaction, time cost, warehousing and long-term supplier relation (Tolossa et al., 2013) to achieve competitive advantage (Wouters et al., 2009), enhance effectiveness (Janvier-James, 2012). Though supply chain, collaboration can be operationalized in many forms but according to Holweg et al. (2005), the most significant and important person is the one to speed up the demand and supply by bringing overall efficiency in the whole supply chain. But failed or ineffective operationalization of supply chain collaboration can bring cost inefficiency (Corbett & Tang, 1999).

Supply chain integration effectiveness can be measured by successful integration of all internal and external supply chain members into a supply chain network with shared strategic vision (Lummus & Vokurka, 1999). Merely integration is not enough, customer satisfaction, cost reduction, and sustainable product quality are more important. Sometimes SCM implementation results some failures (Handfield et al., 2005) and managers and researchers try to find the reasons (Power, 2005).

The twenty-first century because of technologically advance production, globally spread mass media and well aware customers have witnessed an intense competition in response to intense competitive pressure in the business world, organizations are facing numerous challenges to attain sustainable competitive advantages. The ultimate goal of all kinds of organizations is to provide a high-quality product with shortened lead time and high responsiveness to its consumer (Vanichchinchai et al., 2014). Therefore production flexibility with improved agility level has become an important subject in an ever-changing market and many companies found outsourcing by decentralizing their production as a solution to this problem and the focus now is to create virtual enterprises. This shows how information technology is changing market determinants and management styles. But to meet customer's need and come up with the same quality from all outsourced, information sharing among all partners is of great importance.

In a survey about planning and implementation of SCM initiatives from managers of about 300 firms which were involved in supply chain related activities, the researchers found planning as strong determinant of managerial activities as 92 % of the managers were planning to implement about two supply chain initiatives. The explanation of the importance of information management in SCMP is incomplete without highlighting the emerging paradigm of supply chain design and management. This emerging paradigm emphasizes on inclusion of advanced information technologies for communication and data interchange, the complexity of SCM function is also a reason for this concept.

It is clear from world-leading firms like Walmart that SCMP and a subsequent concept of supply chain performance have become one of the most successful competitive strategies (Estampe et al., 2013; Vanichchinchai et al., 2014; Vanichchinchai and Igel, 2011). SCMP emphasizes on value addition at each and every step of product development, it further asks for efficient utilization of resources by each and every person involved in each and every step of production. This value addition process connects all the suppliers and users in a chain type structure that's why it is known as SCMP.

Thomas and Griffin (1996) highlighted the development of SCM as concepts and advocates SCM as concept of operational of activities i.e. purchasing, distribution, warehousing, procurement and other supply chain activities are at the most developed stage. SCM as a function of operational activities i.e. searching for quality goods, purchasing the goods processing the goods, storing the goods and distribution of goods. But SCM at the strategic level is one of the emerging concepts of operation management and emphasizes on customer satisfaction via providing a quality product through effective SCMP.

Supply chain strategy is defined as a set of goals and objectives of firms and its supplier to overcome competitive market by adding value to business operations (Green et al., 2008). Demand assessment which includes nature of demand and demand for casting is the first and the most important step in developing supply chain strategy. According to Sindi and Roe (2017), production flexibility becomes strong by the introduction of the new products in the market and it is low in the companies with wide product range in comparison with companies with fewer products in the product range

A performing supply chain is the one which can offer products with various specifications, complex supply chain and successful in implementing the lean supply chain concept with low cost with minimum lead time. Qi et al. (2011) worked on the relationship between supply chain strategy and firm performance and explored a positive relationship with arguments that supply chain strategy enhances supply chain responsive and increases production flexibility which in turn affects performance. Qi et al. (2011) indicated some consistency with Melnyk et al. (2010) and Hines (2004) as they also declared supply chain responsiveness a major determinant of performance.

To achieve supply chain goals, employment of the most appropriate courses of actions is prerequisite and it should be consistent with firm's long-term strategies. Leading firms like Toyota and Walmart use this method to achieve their supply chain goals. But it does not always work, for instance firms like Barilla Spa and Hewlett-Packard were badly affected by this method in the past. Hsu et al. (2009)

solved this issue with an argument that these practices should be consistent with supply chain strategies and goals.

The key SCMP principle can be concluded as; it receives input from suppliers, done value addition and delivers it to the consumer. For building and maintaining sustainable competitive advantages SCMP or more broadly an effective SCMP is of extreme importance. Guasekaran et al. (2004) and Sufian and Habibullah (2010) found that management of key elements of information could play a significant impact on firm supply performance. Byrd and Davidson (2003) argued that knowledge and information technology had a significant impact on firm supply performance and with the implementation and adoption of information technology firm can boost the performance of its supply chain.

To measure supply chain performance, two models have been used predominantly by different people in supply chain literature

(1) Cost: may include inventory costs and operating costs

(2) Combination of cost and customer responsiveness. This includes inventory costs and operating costs, flexibility, relationship, activity time and customer responsiveness, and flexibility. These components have been used as supply chain performance measures either singly or jointly. Vanichchinchai and Igel (2011) argued cost (CT), flexibility (FL), relationship (RL) and responsiveness (RS) as dimensions of a successful supply chain.

Cost control is one of the basic measures of firm performance and every firm is striving to provide quality products at the lowest possible cost. Cost efficiency especially inventory cost is one of the most important determinants of supply chain performance. Inventory cost holds a significant portion of the firm total cost. The cost, which includes manufacturing cost, outsourcing cost and delivering cost has become one of the major competitive force in today's competitive market (Tatsis et al., 2006).

In all businesses and especially in manufacturing sector, inventory cost is of great importance and firms introduce new ways and design new strategies to reduce inventory cost. Walmart world leading firm has achieved this position by innovating an inventory management technique, known as cross doc; which reduces storage cost and enables firms to offer products at a lowest possible price. The smooth flow of information and material across the supply chain is a strategic decision and financial performance of any supply chain cannot be measured without taking into account the total logistics cost. The decision to a tradeoff between shipping expense and time cost is of acute importance as most of the time an expensive but speedy shipping saves enough from storage and other inventory costs and reduces the cost to a competitive level (Gunasekaran & Kobu, 2001). Shipment from longer distances is a continuous threat to cost management decisions, as it makes inventory level volatile resulting from very high or low level of inventory which ultimately leads us to high administrative and opportunity cost.

Current assets other than cash i.e. receivables, inventories are known as supply chain assets (Gopal & Thakkar, 2012). Optimal utilization of assets in a market with ever-increasing inflation and changing liquidity has become the major challenge for management. Meanwhile, total cash flow time is highly affected by asset cost with the turnover. This can be named as cash conversion cycle i.e. time between the purchase of raw material and collection of cash from the customer (Sambasivan et al., 2009). When the time of this cycle is determined, it can be related with the profit to get an estimation of return on investment. It measures the managerial performance too. In the sequel of this return on investment, it will be highly affected by policies formulated by logistic management e.g. sales will be increased with good customer services which in turn will increase profits and ultimately will lead us to a higher return on investment. The financial health of supply chain can be checked with detailed insights into the impact of ROI in logistics and other areas of the organization.

The introduction of new products in the market is slower from companies with wide product range in comparison with companies with fewer products in product range (Mapes et al. 1997). A performing supply chain is the one which can offer products with various specifications with a complex supply

chain. Therefore, if a firm is successful in providing products with various specifications then we can claim it a performing supply chain.

Vanichchinchai et al. (2014) defines partnership as a function of knowledge sharing, working for improvised benefits, development of the long-term relationship, product development and shared goals among trade partners. Recently Nyaga et al. (2010) explained the role of partnership management in SCMP and found integrated efforts, information sharing, joint relationship efforts, dedicated investments, and relationship outcomes as attributes of partnership management. Actually, nowadays products and services have placed great influence on customer or supplier perception on how the organization views them. To get an optimal yield, understanding and wisely responding to this is prerequisite (Gunasekaran & Kobu, 2007). The importance of SRM can be explained with the fact that, the poor coordination among suppliers has become one of the major issues in US food industry and is accounted for the waste of almost \$30 billion annually as outsourcing constituent 50-60 percent of total product (Sambasivan et al., 2009). Actually with ever-changing customer demand and to manage and mitigate intense rivalry from existing and potential competitors, we need a responsive and flexible supply chain which is only possible with the successful installation of SRM program.

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3. Methodology

3.1. Sample and Data Collection

It is a quantitative study and the data is collected by using questionnaires adopted from the previous studies as referred and 5-point Likert scale (1 for strongly agree to 5 for strongly disagree) is used in these questionnaires for the purpose of data collection. A mix of mail survey and face to face survey is used. As the manufacturing sector of Iraq is our target sample so, the primary data has been collected from the listed manufacturing firms with Iraq commerce ministry. The response rate is 55 percent.

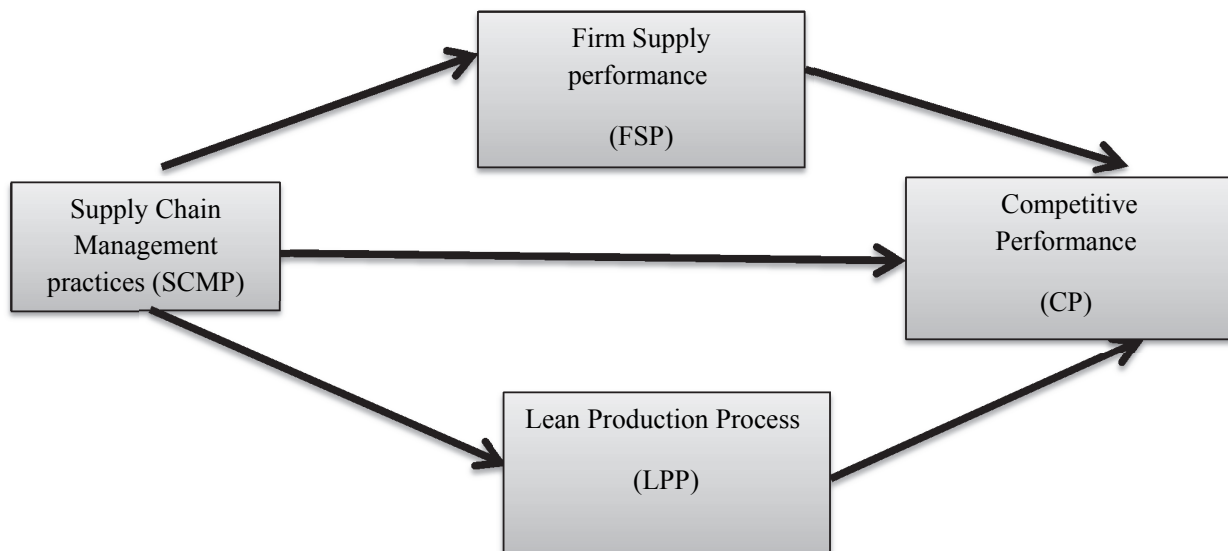


Fig. 1. The proposed study

3.2 Results

The current study has used the structural equation modeling (SEM) to reveal the data results. Furthermore, many studies have used the SEM to validate their results (Imran et al., 2017, 2018a,b). However, the study has followed the criterion of construct validity and undergone model fit and factor analysis. Consequently, the items with factor loading less than 0.60 are dropped from the final analysis. The model fit values of our model CFI (0.96), TLI (0.97) and RMSEA (0.03) indicating our model a good model. Composite reliability of all models is more than 0.90 and $MSV < AVE$, and $ASV < AVE$ which shows a strong validity

Table 1

The results of CR, AVE, MSV, ASV

	CR	AVE	MSV	ASV	TQMP	FSP	SCMP	OLC
SCMP	0.954	0.513	0.346	0.289	0.709			
FSP	0.945	0.509	0.346	0.276	0.580	0.727		
LPP	0.954	0.528	0.237	0.208	0.457	0.476	0.712	
CP	0.967	0.641	0.333	0.259	0.568	0.515	0.435	0.794

Bootstrapping procedure has been used to test the proposed causal model. All the suggested paths have shown consistency with the proposed relationships and they are statistically significant. Overall all results have shown a great deal of agreement with our predicted or hypothesized relations.

Table 2

Direct effect

Hypothesized Results	Estimates	CR
CP ← SCMP	0.528	7.90
FSP ← SCMP	0.388	4.863
LPP ← SCMP	0.491	5.655
CP ← LPP	0.364	6.142
CP ← FSP	0.565	7.425

Note: All values are significant at $p > 0.001$

The results of Table 2 indicate that the supply chain management practices had significant impact on the lean production process, firm supply performance and competitive performance. Meanwhile, the firm supply performance and lean production performance also had significant impact on competitive performance. The results have shown a great deal of agreement with our proposed hypothesis.

Table 3

Indirect Effect

Hypothesized Results	Estimates
SCMP → LPP → CP	0.237***
SCMP → FSP → CP	0.145***

***All values are significant at $p > 0.001$

The results shown in Table 3 highlight that the lean production process and firms supply were partially mediating between supply chain management practices and competitive performance. The results syndicate that despite the presence of lean production process and firm supply performance the supply chain management practices had still significant impact on competitive performance.

4. Conclusion

The primary objective of the current study was to investigate the impact of SCMP on the competitive performance of Iraqi manufacturing firms. In addition to that, we have also made an attempt to study

the mediating impact of FSP and lean production process in the relationship between SCMP and FSP. The results of the study have revealed that the SCMP had a significant and positive impact on CP. Whereas the FSP and LPP have appeared as partial mediator. The results have indicated that in Iraqi firm SCMP plays a significant role in gaining competitive advantages whereas lean production process and firm supply performance come at the second stage. The scope of the study was limited to a manufacturing firm in Iraq. However, the results of the study cannot be generalized for the whole Iraqi firms. Therefore, a separate study is recorded to explore the impact of the sector specific characteristics on the current issue. In author knowledge this among the pioneering studies on this issue

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