

## Revisit Supply Chain Management: Evolution, Definition and Benefits

<sup>1</sup>Thoo Ai Chin, <sup>2</sup>Huam Hon Tat, <sup>1</sup>Zuraidah Sulaiman, <sup>1</sup>Choi Sang Long and <sup>1</sup>Wee Sin Yi

<sup>1</sup>Faculty of Management, Universiti Teknologi Malaysia, Skudai, 81310 Johor, Malaysia

<sup>2</sup>Faculty of Business, Management and Social Sciences, Quest International University Perak,  
30250 Ipoh, Perak Darul Ridzuan, Malaysia

**Abstract:** Now a days, changes to business models such as lowering production costs, delivering ever-increasing customer value, higher product quality, flexibility and superior and the pervasive impact of information technology are increasingly creating massive challenges for businesses to survive. These challenges stress the importance of managing cross-boundary relationships between business partners. Therefore, many companies have begun to identify that today competition occurs between supply chain networks rather than individual firms. For gaining a competitive advantage, Supply Chain Management (SCM) is an effective tool for manufacturing to survive. The purpose of this study is to revisit the SCM evolution, definition and benefits of SCM. The SCM field has evolved rapidly. Previously, SCM focused on internal integration but now focuses on supplier, customer and information integration to reach optimal levels of performance. Besides, the lack of an overarching SCM definition may affect the development and adoption of SCM theory. Without a single consensus SCM definition, researchers are unable to further develop the theory and practice. Therefore, an encompassing and inclusive definition of SCM is of paramount importance to help scholars and practitioners such as supply chain executives to develop sound SCM strategies. Though there is a great deal of literature obtainable on the potential benefits of SCM, however, Malaysian manufacturing firms underestimate the potential benefits of SCM. Therefore, this review provides insight to researchers and practitioners to have better understanding towards implementation of an effective and efficient SCM.

**Key words:** Supply chain management, SCM evolution, SCM definition, SCM benefits, manufacturing firm

### INTRODUCTION

In the past decades, there has been a massive surge of interest in SCM (Lummus and Vokurka, 1999; Burgess *et al.*, 2006; Zhou and Benton, 2007; Fawcett *et al.*, 2008) due to its innovative approach to business (Tracey *et al.*, 2004; Fawcett *et al.*, 2008) and competitive advantage (Koh *et al.*, 2007). SCM is a philosophy that extends traditional internal activities by embracing an inter-enterprise scope, bringing trading partners together with a common goal of optimization and efficiency (Harwick, 1997). The popularity of SCM concept can be seen from the remarkable rise in conferences, academic research and publications, professional development programs and courses in university (Burgess *et al.*, 2006) since the 1980's (Stock and Boyer, 2009). Many fields are devoted to the proliferation of SCM literature, including logistics and transportation, supply and purchasing, operations management, organisational theory, strategic management and marketing, hoping to fully understand the tenets of SCM (Chen and Paulraj, 2004).

SCM is a holistic approach to demand, sourcing and procurement, production and logistics process

(Chou *et al.*, 2008; Chopra and Meindl, 2007). The supply chain network incorporates various sub-systems, activities, relationships and operations (Chandra and Kumar, 2000) and is connected through the forwards and reverse flow of information, materials, services and finances (Handfield and Nichols, 1999; Stock and Boyer, 2009) in order to enhance the organisational and overall supply chain performance (Li, 2002) and likewise to bring high value to customer requests in terms of quality, cost, speed and flexibility (Tachizawa and Thomsen, 2007; Chou *et al.*, 2008; Ketchen *et al.*, 2008). As SCM is undergoing a major transformation (Melnyk *et al.*, 2009) and evolving rapidly, the modern SCM concept in the new economy incorporates strategic differentiation, value enhancement, operational efficiency improvement, cost reduction (Bidgoli, 2010), supply chain integration and collaboration, operational excellence and virtual supply chains (Chou *et al.*, 2008).

### MATERIALS AND METHODS

**SCM evolution:** Concepts and ideas of SCM started to build momentum in the 1950s when the philosophy of

the manufacturers was to minimise production cost (Huque and Islam, 2007); manufacturing companies paid significant attention to mass production that could lead to higher volume and lower unit production cost. According to Tan (2001, 2002), the product flexibility was low since manufacturers relied heavily on in-house capacity and technology; less emphasis was put on New Product Development (NPD). Also, the manufacturers made substantial investments in Work-In-Process (WIP) inventory, allowing them to eliminate bottlenecks and ensure a smoother flow of production. The importance of logistics is increased considerably since physical distribution management of manufacturing firms is one of the organizational functions (Habib, 2010).

Traditionally, firms did not accept supplier or customer as their partner; they even competed with their suppliers and customers because they were fearful of being taken advantage of by them (Fredendall and Hill, 2001). Therefore, no expertise and technology sharing as well as cooperative partnership were initiated between firms and suppliers or customers (Tan, 2002). Beginning in the 1960s until around 1975, most of the firms adopted a vertically integrated structure (Chandra and Kumar, 2000). This structure was characterised by a series of functional silos (Altekar, 2005); optimisation of activities revolved around functions (Chandra and Kumar, 2000).

In the mid-1960's, the evolution of SCM focused on materials logistics management or internal integration (Fredendall and Hill, 2001; Monczka *et al.*, 2009). Departments of purchasing, operation and distribution were integrated in order to minimise production cost, hence enhancing customer service (Fredendall and Hill, 2001). Owing to negative effects of high carrying cost of WIP on manufacturing, product delivery, delivery lead-time and quality (Tan, 2002), Material Requirement Planning (MRP) was introduced in the late 1960s (Chandra and Kumar, 2000; Tan, 2002; Dudek, 2009) to improve performance. While firms successfully integrated their material management they did not integrate vendors into their operations; win-lose was very much a pattern in historical buy-sell relationships (Chandra and Kumar, 2000). In the 1980's, many manufacturing companies begun to offer high quality products that reasonably priced in response to fierce global competition (Novicevic and Antic, 1999; Tan *et al.*, 1999; Tan, 2001; Shukla *et al.*, 2011). The increased quality caused customer customization. The 1980s forced manufacturers to apply new philosophy of management and technologies into their operation. Just-In-Time (JIT) manufacturing was the key management philosophy from the Japanese (Tan, 2001). JIT is a production strategy which materials are delivered right to the production line only when they are required, thus efficiency can be enhanced and inventory costs can be reduced

(Morris and Morris, 1992). Meanwhile, the concept of SCM was popularized (Fredendall and Hill, 2001) which had an emphasis on supplier collaborative relationship or partnership (Lummus and Vokurka, 1999; Tan, 2001). Popularity of supplier partnership was attributed by the development of the Quick Response (QR) strategy in textile and apparel industry, followed by Electronic Data Interchange (EDI) between companies and Point Of Sales (POS) scanning system. QR is a widely adopted SCM practice today that requires joint information sharing between firms to respond quickly to customer requirements (Lummus and Vokurka, 1999; Min and Mentzer, 2004). Many companies continued to employ a variety of quality approaches including TQM, philosophies of Crosby, Juran, Deming and ISO Standards in order to measure their products quality (Chandra and Kumar, 2000). In addition to the various quality initiatives, MRP-II was developed to further enhance the manufacturing system (Chandra and Kumar, 2000). The MRP-II Age continued to experience increased integration; purchasing, planning and production departments were grouped under one umbrella. However, other departments such as finance, sales, research and development (R&D) and others were not integrated into the MRP-II system; integration opportunities with customers and suppliers was still limited; they were not involved in corporate long-term strategy decision as they treated as external entities (Altekar, 2005).

By the early 1990's, intense competition and global markets forced organizations to incorporate "service" as another element for competitive advantage (Chandra and Kumar, 2000; Huque and Islam, 2007). Firms strived to deliver a right product and service at the most opportune time and at the lowest cost to the right customer (Chin *et al.*, 2004; Li *et al.*, 2005; Huque and Islam, 2007). The rules of thumb for manufacturing strategy included low production cost, high quality, speedy delivery, flexibility and superior service. Strategic suppliers and the logistics function were involved in managing corporate resources (Chandra and Kumar, 2000; Tan, 2002; Shukla *et al.*, 2011).

There had been a growing application of IT tools in manufacturer's system such as ERP, electronic commerce, distribution requirements planning and so forth (Chandra and Kumar, 2000). Another significant business initiative during this period was an Efficient Consumer Response (ECR) working group used in the grocery supply chain. ECR helped suppliers and distributors to predict future demand more accurately, provided that the information flow within supply chain was quick and accurate. After that ECR advanced and became Continuous Replenishment (CRP). CRP allows retailers to monitor customer supplies current inventory data and make timely shipments to replenish inventory. CRP has supported several companies to improve their supply chain

performance successfully. Some of these included the following: Campbell soup, Procter and Gamble, General Mills Ralston and Pillsbury (Lummus and Vokurka, 1999).

This intensively competitive period witnessed the growth of SCM, more and more organizations are promoting supply chain competitiveness in order to attain organizational efficiency (Tan, 2001; Monczka *et al.*, 2009). Present competition is between effective supply networks rather than individual organizations (Li *et al.*, 2005; Koh *et al.*, 2007). The age of integrated SCM (2000 and beyond) was a period in which SCM became more emphasized on the supplier relationship. Organizations began to develop new supply chain value by incorporating long-term supplier relationships, supplier design involvement, supplier development, total cost supplier selection, the use of full-service from suppliers, strategic cost management, shared database, integrated Internet linkages and ERP with other supply chain members (Monczka *et al.*, 2009).

The history and evolution of SCM has been important to the growth of SCM. Each historical period has contributed something unique to the development of SCM that shaped today's integrated SCM. Today's SCM is undergoing a major transformation (Melnyk *et al.*, 2009) and evolving rapidly. SCM is increasingly forcing organisations to manage their processes and operations beyond corporate boundaries. Companies have shifted the focus of SCM from supply to demand. Customers drive the supply chain, not the supply base; for example, customers participate in the initial stages of the development process (Lagrosen, 2005). Xu *et al.* (2002) emphasized that many firms have shifted their focus from product-centric to customer-centric as now delivering superior customer value is imperative for the success of firms (Wang *et al.*, 2004). In addition, traditionally organizations sourced and purchased materials and services from the same markets and suppliers but now they seek for potential suppliers through global sourcing. Companies increasingly seek suppliers with innovative and technological abilities to gain competitive advantage (Monczka *et al.*, 2009; CSCMP, 2012).

Finally, what is the future direction of SCM-2010 and beyond? Undeniably, with today's globalization explosion, the supply chain world will be increasingly

complex in the future. Melnyk *et al.* (2009) have proposed a new vision of supply chain-the Adaptive Supply Chain (ASN). To deal with this future supply chain vision, companies must put their supply and demand sides in a better position to respond faster and more accurately to the challenges. Key supply chain challenges include price volatility and availability in raw materials; the challenges of demand side include changes in the customer demands as well as customer mix.

To cope with competitive environments, firms must define their strengths and core competencies, outsource effectively and improve their performance through benchmarking best practices (Sullivan, 2008). In addition, a new view of the supply chain is needed to promote to all stakeholders through a good flow of goods and information-for example, retailers, suppliers, manufacturers, governmental bodies, customers and so on (Habib (2010). Functional silos need to be broken down in order to enhance SCI, so that supply chain costs and processes can be optimised. Besides that, it is also important to increase both areas of responsibility and the knowledge base of all supply chain professionals (Sullivan, 2008). Thus, the new design of the supply chain must be able to help in responding to changes more quickly and efficiently in innovative ways. Therefore, IT tools are required as well to adapt to the new era of SCM. In addition, the effect of globalisation such as increasing competition, borderless markets, changing customer requirements and rapidly improving technology has altered the nature of original equipment manufacturers. This has encouraged and pushed the manufacturing industry via provision of value added services. The network perspective offers a new avenue for firms to obtain and exploit multiple firm's capabilities to support upcoming products and services. Services account for a growing proportion of total revenue for some of the manufacturers, therefore the tenet of service supply chain has become a driver of the supply chain transformation in future. Also, researchers (Thoo *et al.*, 2014, 2015; Zhang *et al.*, 2014) found that SCM has emerged as green SCM with emphasis on reduce, reuse and recycle. Lastly, it is an imperative to strive for supply chain excellence through collaboration, visibility, velocity and synthesis. A summary of SCM evolution is presented in Table 1.

Table 1: Summary of SCM evolution

Period	Characteristics	References
1950-1960's	Minimised production cost High product volume Mass production Low product flexibility Relied heavily on in-house capacity and technology Less emphasis on NPD High WIP inventory No expertise and technology sharing between suppliers and customers No partnerships with supplier and customer	Fredendall and Hill (2001), Tan (2002), Huque and Islam (2007)

Table 1: Continue

Period	Characteristics	References
1960-1970's	Vertical organisational structure Functional silos Started era of materials logistics management Integration of purchasing, operation and distribution MRP was introduced Win-lose relationship with vendors	Chandra and Kumar (2000), Fredendall and Hill (2001), Tan (2002), Altekar (2005), Dudek (2009) and Monczka <i>et al.</i> (2009)
1980-1990's	Fierce global competition Offered high quality and low cost product JIT, QR, EDI, POS, TQM, Crosby, Juran, Deming and ISO Standards were initiated Concept of SCM was popularized Started to emphasise on supplier collaborative relationship MRP-II was developed	Lummus and Vokurka (1999), Tan <i>et al.</i> (1999), Chandra and Kumar (2000), Fredendall and Hill (2001), Tan (2001), Min and Mentzer (2004) and Altekar (2005), Shukla <i>et al.</i> (2011)
1990-2000's	Intense competition and global markets Low production cost, high quality, speedy delivery, flexibility and superiorservice Growing usage of IT tools such as ERP, ECR, CPR Involved strategic suppliers	Lummus and Vokurka (1999), Chandra and Kumar (2000), Tan (2002), Chin <i>et al.</i> (2004), Li <i>et al.</i> (2005), Huque and Islam (2007) and Shukla <i>et al.</i> (2011)
2000-2010's	Age of integrated SCM Supply chain competition New supply chain value Emphasis on supplier relationship, development, supplier design involvement, etc Shared database, internet and ERP Undergone major transformation Management across boundaries Shifted from supply to demand side	Tan (2001), Xu <i>et al.</i> (2002), Lagrosen (2005), Li <i>et al.</i> (2005), Koh <i>et al.</i> (2007), Melnyk <i>et al.</i> (2009) and Monczka <i>et al.</i> (2009)
2010 and beyond?	Supply chain world is increasingly complex New vision-Adaptive supply chain More challenges of supply chain and demand (price volatility and availability in raw materials, changes in the customer demands and customer mix) Involvement from governmental bodies Require high knowledge base from supply chain professionals/advanced IT tools Service supply chain Green supply chain	Melnyk <i>et al.</i> (2009), Sullivan (2008), Habib (2010), Thoo <i>et al.</i> (2014), Thoo <i>et al.</i> (2015) and Zhang <i>et al.</i> (2014)

## RESULTS AND DISCUSSION

**SCM definition:** A supply chain results from the efforts of organisations to produce and deliver a finished good from supplier's supplier to customer's customer. The efforts include all activities involved in these five basic processes-plan, source, make, deliver and return which encompass matching supply with demand, sourcing components and raw materials, producing final products, delivering to end customers and providing post-manufacturing services such as return, repair and warranty (Supply, 2011).

As defined by Mentzer *et al.* (2001), supply chain is a network consists of all parties involved (e.g., manufacturer, supplier, retailer, customer, etc.) directly or indirectly in manufacturing and delivering products or services to ultimate consumers-both in upstream and downstream sides through physical distribution, flow of information and finances. As stated by Chopra and Meindl (2007), a typical supply chain includes the following five stages: component/raw material suppliers, manufacturers, retailers, wholesalers/distributors and customers. These five stages

are connected through flows of products, information and money. Each of the elements of the supply chain has its own terminology and they deal with different issues and methodologies since they are often studied independently. As pointed out by Chandra and Kumar (2000), managing a supply chain network is complex and difficult, since it involves various sub-systems, activities, relationships and operations. Therefore, an integrated supply chain framework is needed to tie a whole network together with the goal of reducing perennial supply chain challenges and providing best value to customers by measuring, planning and managing all the links in the chain (Drucker, 2010).

SCM is about managing the supply chain (Mentzer *et al.*, 2001). SCM is a watchword in business (Li, 2002), Wall Street and in the news media (Stephens, 2001). As defined by the Council of Supply Chain Management Professionals (CSCMP, 2012), SCM is the management and planning process that involve all activities from sourcing and procurement, transformation of raw materials to finished goods as well as logistics activities. The supply chain incorporates all the collaboration and coordination within and outside an

organization with its channel partners (e.g., suppliers, intermediaries, customers and third party service providers) with the hope of integrating supply and demand management.

As proposed by Mentzer *et al.* (2001), there are three categories of SCM definitions: a philosophy of management, a set of activities to implement a philosophy of management and series of management practices. These definitions are under the category of management philosophy which views SCM as a whole system including cooperative efforts for managing and distributing a finished product from supplier to end customer (Monczka *et al.*, 2009) as well as information and funds coordination (Handfield and Nichols, 1999); SCM philosophy aims to integrate supply chain partners to create customer value and satisfaction.

To embrace a successful SCM philosophy, various activities are needed such as development of long-term relationships (Min and Mentzer, 2004; Chen and Paulraj, 2004), mutually sharing information, integrated behaviour (Tan, 2002), cooperation, risks and rewards, integration of processes, agreed goals, a focus on serving customers (Min and Mentzer, 2004) and partnership with supply chain members. In addition, SCM is about the process of managing materials flow, information and relationships between companies in fulfilling customer requests. This category emphasises the importance of all supply chain functions as key business processes (Ho *et al.*, 2002), such as customer service management, order fulfilment, customer relationship management, product development, procurement and commercialisation.

By the same token, Li (2002) developed three SCM categories, including purchasing and supply management, integrated logistics management and integrated SCM. Purchasing and supply management involve partnering and integrating with suppliers to better management of the supply and purchasing functions. Integrated logistics management deals with physical distribution and logistics activities within and beyond organizations, including suppliers and customers. Definitions under an integrated SCM focus on strategic nature of coordination between trading partners within a supply chain network with hopes to enhance performance of supply chains and organisations.

There have been an enormous number of definitions of SCM when the tenet has gained tremendous popularity since 1980s-approximately 173 definitions of SCM have been proposed in total (Stock and Boyer, 2009). As SCM covers a wide range of disciplines, the researchers have continued to suggest the SCM definitions as according to their own research directions. The lack of an overarching SCM definition (Mentzer *et al.*, 2001; Burgess *et al.*, 2006)

may affect the development and adoption of SCM theory. Without a single consensus SCM definition, researchers are unable to further develop the theory and practice (Stock and Boyer, 2009). Therefore, an encompassing and inclusive definition of SCM is of paramount importance to help scholars and practitioners such as supply chain executives to develop sound SCM strategies (Mentzer *et al.*, 2001; Burgess *et al.*, 2006).

The definition given by Stock and Boyer (2009) provides an all-encompassing and complete definition of SCM. The researcher concurs with this definition which posits that SCM involves network relationships management within and across companies. These entities include marketing, logistics, production facilities, purchasing, material suppliers and related systems are connected through forwards and reverse flows of information, materials, services and finances for the purpose of delivering the final products from original producer to end customer, thus enhancing customer satisfaction, bringing value-enhancing and maximising profitability through efficiencies.

**SCM benefits:** The main focus of SCM is to provide right product to the right customers at the right cost, right time, right quality and right quantity (Basher, 2010). Meanwhile, the short-term strategic goal of SCM is to reduce cycle time and inventory and thus increasing productivity, whereas the long-term goal is to enhance profits through market share and customer satisfaction (Tan, 2002). According to Mohanty and Deshmukh (2005), the quantifiable benefits of SCM include lower supply chain costs, overall productivity, inventory reduction, forecast accuracy, delivery performance as well as fulfilment cycle time and fill rates. SCM delivers improvement up to 60% with ranges between 10 and 60%. Fulfilment cycle time records the highest improvement, jumping from 30-60%. The application of SCM is able to remove communication barriers by coordinating, monitoring and controlling process (Power, 2005). The benefits of SCM include efficient partner collaborations and satisfying customer demand throughout a supply chain. Therefore, every aspects of the supply chain needs to be integrated well within an organization. For example, departments of purchasing, material management, production, distribution and marketing are significant to firm performance. Basu and Wright (2010) found that production and supply organizations, services organizations and also non-profit organizations are increasingly adopting SCM to achieve minimize operating cost and drive better customer value. Particularly, production and supply companies are required to understand every single production processes and the flows of the inventory throughout the systems.

A review of extent literature reveals that adoption of SCM may deliver a number of potential benefits to the organizations. Different criterion have been used to measure organization performance such as financial, non-financial, innovation performance, market share and customer satisfaction (Talib *et al.*, 2010). For example, the benefits include operation costs reduction, customer satisfaction, order fulfilment lead times (Chin *et al.*, 2004; Fawcett *et al.*, 2008), inventory improvement (Chin *et al.*, 2004; Talib *et al.*, 2010), responsiveness to customer requests (Fawcett *et al.*, 2008; Talib *et al.*, 2010), remain competitive (Chin *et al.*, 2004) on-time delivery (Fawcett *et al.*, 2008), increased flexibility, increased sales, increased internal coordination between departments, increased supplier and customer coordination, improved supply chain communication, a reduction in risk and in the duplication of inter-organizational processes (Talib *et al.*, 2010).

Cost-effective SCM is critical for survival and growth as purchasing cost makes up the largest share in terms of sales revenue-approximately 80% (Quayle, 2003). Meehan and Muir (2008) conducted a study in Small and Medium-sized Enterprises (SMEs) in Merseyside, UK to reveal the perceived benefits of SCM-SMEs. The potential benefits include increases in customer service and responsiveness, improved supply chain communication, risk reduction, a reduction in product development cycle time processes, a reduction in duplication of inter-organisational processes, inventory reductions and improvement in electronic trading. Another study by Koh *et al.* (2007) involving SMEs manufacturing companies in Turkey found that the execution of SCM practices could deliver benefits to SMEs in terms of reduced inventory level, reduced lead time in production, increased flexibility, forecasting accuracy, cost saving and accurate resource planning.

While there is voluminous research literature available on SCM potential benefits but till now there is limited study to reveal the actual benefits of SCM (Lambert *et al.*, 2005; Stock *et al.*, 2010). Explicit SCM does not seem to occur often enough in practice. This is mainly because respective functional managers view the focus of SCM differently; this disagreement in terms of SCM goal provides difficulty to supply chain managers (Fawcett *et al.*, 2008). This dilemma often happens in big companies. However, in comparison to large enterprises, SMEs usually have a small management team and the owner as the top manager (Jaidee and Beaumont, 2003; Schatz, 2006; Woolderink, 2010). An owner-manager can develop SCM roadmap more easily in order to drive for superior supply chain performance (Thakkar *et al.*, 2008). As the review has indicated, there is a lack of empirical

research confirming these significant benefits of SCM. Therefore, this review attempts to fill the gap by exploring the benefits of SCM and triggers more future studies to prove the importance of SCM in manufacturing industry.

## CONCLUSION

An integrated supply chain management is needed to tie the whole network together in order to reduce perennial supply chain challenges such as functional silos, poor transparency of knowledge and information and the inadequate formation of appropriate customer and supplier relationships. As such, SCM plays a pivotal role in improving organisational performance (Richey *et al.*, 2009; Boon and Wong, 2011). SCM requires a collaborative effort among suppliers, cross-functional departments and customers that are linked and coordinated by the flow of processes and information (Boon and Wong, 2011). In fact, SCM does not seem to occur often enough in practice or theoretically ideal SCM is seldom achieved in application. The managers from different functional areas view the focus of SCM differently; this disagreement in terms of SCM goals makes it difficult for supply chain managers to align the processes (Fawcett *et al.*, 2008). Also, most of the Malaysian manufacturing firms underestimate the potential benefits of SCM. For instance, organizations are advised to cooperate with other supply chain partners in order to improve processes in a cross-company culture, think outside of their own realm and view improvement opportunities holistically from one end of the supply chain to the other. As such this review provides insight to researchers and practitioners to have better understanding towards implementation of an effective and efficient SCM.

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