

Implementation of e-Supply Chain Management

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Abstract – The development and evolution of the Internet and information technology have transformed the traditional way of working into electronic management and operation, opening new opportunities and strategic possibilities. This paper offers deep understanding of the electronic supply chain management concept, by giving insight into the nature of e-SCM and the opportunities that the information technologies are providing. Also, through analysis of real world examples of organizations that have implemented e-SCM, this paper exploits and examines the benefits and advantages to these organizations in building a sustainable competitive advantage.

Keywords – e-supply chain management, Internet, strategic possibilities, competitive advantage, information systems and technologies.

1. Introduction

The Internet and the recent technology development have undoubtedly changed the way of living and working and have opened new opportunities and ways for conducting competitive advantages for the organizations nowadays. In these regards, the development of the Internet and information technology has also brought new dimensions in the supply chain management. Poirier and Bauer have referred to this transition as a "tsunami change" representing the ability of the Internet to be an effective medium enabling integration and synchronization of all the information and processes connected to the supply chain and its management [1]. As a result, the new concept - electronic supply chain management (e-SCM) represents the opportunities derived from the integration and synchronization of the activities, functions and applications between the partners in order that the benefits of this concept are fully exploited, suggesting the merge of the Internet with the SCM as an indispensable asset of the successful organizations.

The topic e-SCM is a key area of concern and has been a topic regarded by many contemporary researches and published in various prestigious academic journals. As such, the literature review undertaken on the topic has shown that e-SCM has been acknowledged as an outstanding topic in the

supply chain literature in the most prestigious Operations Management and Logistics journals, especially after year 2000 [2].

This paper explores the concept of e-SCM as a source for creating a competitive advantage for the organizations that are adopting it. To support the theory, research on the organizations that have implemented e-SCM, their experiences and the benefits they have witnessed is included in the paper in addition to second-hand data relevant for this context.

After introductory notes, the authors give general overview of the e-SCM concept offering understanding of the factors that contributed to the introduction of e-SCM as well as the new opportunities that have been enabled as a result from the technology advancement. The adoption of e-SCM and how it serves to build and maintain a sustainable competitive advantage is supported by the analysis of the organizations that have already implemented this concept. The challenges and controversies behind adopting the e-SCM are presented in the following subsection to further evaluate the usability of the proposed practice. Finally, the advantages and benefits brought from adopting e-SCM are studied to fully exploit the acknowledgements that e-SCM practices contribute in creating a competitive advantage.

2. Insight into the e-SCM concept

E-SCM is a new dimension derived from the former SCM concept and developed as a result of the evolution of the information technologies as well as reengineering of the organizations' business processes towards partners cooperation enabled by the Internet. Laudon and Laudon have named these organizations as digital organizations where all the important business connections with the customers, the suppliers and internal among the employees are digitally enabled and coordinated through digital networks that connect all partners [3]. These connections and networks between the partners create an opportunity for adding value through the use of agile and flexible information systems and technologies by exploiting the benefits they bring to the concept. Giving more detailed insight into the

concept, the definitions of e-SCM are defined in the following subsection.

2.1. Definitions of e-SCM

Numerous definitions explain the e-SCM concept, however prior defining e-SCM it is important that the former traditional supply chain management concept is understood. Mentzer et al. defined SCM as the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular organization

and across businesses within the supply chain, for improving the long-term performance of the individual organization and the supply chain as a whole [4]. Another definition notes a supply chain management as a network of organizations that are involved through linkages in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer [5]. An example of a basic supply chain by Chopra and Meindl is demonstrated in Figure 1 [6].

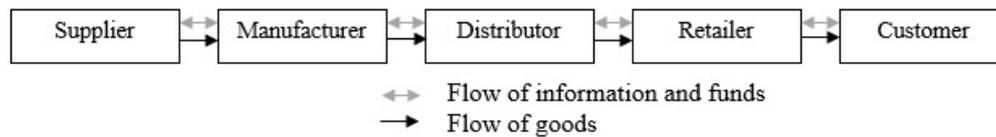


Figure 1. The Basic Supply Chain

As the figure demonstrates there is flow of goods as well as flow of information between the supply chain partners to distribute the final product to the end customer. The flow of information is both ways suggesting that information between the partners is essential and should be mutual to enable effective and efficient flow of goods from the supplier to the end customer, regardless of the number of partners in a supply chain. Today, the Internet technology has changed the supply chain management concept and has added new dimensions to the work transforming SCM into e-SCM. This transformation started from the year 2000 onwards, marked the beginning of a new phase, the e-SCM. The evolution of e-SCM in phases by Ross is shown in Figure 2 [7].

anyone, through the architecture of external collaborative partnerships enabled with the Internet and information systems and technologies.

In regards to e-SCM, there are numerous definitions in the literature defining the electronic supply chain management. Lankford notes how e-SCM is a combination between the Internet and the supply chain management and the true balance between them [8]. A more extensive definition is provided by Ross explaining how the e-SCM is a concept that can be described as a network of independent partners who are not only distributors of certain products and services in the supply chain, but also stimulate the demand and lead the synchronization of capabilities and resources in the whole supply chain in order that they provide levels of operational efficiency and leadership on the market [7]. Hence, the objective of e-SCM is to incorporate the activities across and within organizations in order to provide customer value. Such integrated supply chain involves coordination and information sharing up and down the process among all stakeholders which is the cornerstone for exploiting the ultimate benefits of integrated supply chain leading to opportunities for competitive advantages.

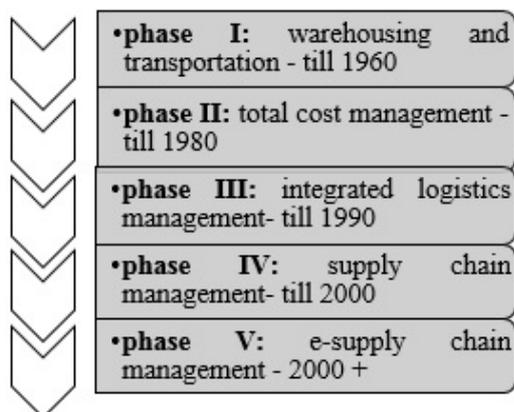


Figure 2. Evolution of E-SCM

Each phase brought enhancements and improvements from the former. The fifth phase, the e-SCM phase has brought new dimensions for global opportunities on information transfer and transaction executions all around, in any time, at any place to

Although the e-SCM represents an advancement from the SCM, the traditional processes carried in the supply chain management such as procurement, shipment, etc. also take essential part in the new, improved electronic SCM. What the new concept brings are other building elements that contribute to improved and integrated supply chain relationships enabled by technology solutions that allow electronic connection between the partners and their applications and systems. The Internet in fact enhances e-SCM by making real time information

available and enabling collaboration between the partners.

2.2. Factors contributing to the introduction of e-SCM

Various reasons can be found that contributed to the introduction of the new concept e-SCM, as a step forward from the previous phase SCM. The main factors that contributed to the transition from SCM to e-SCM are a response to the business requests set from the new needs of the organizations. These being [9]:

- The need for additional reduction in the costs as well as improvements in the processes through the expansion of the tools for modern management in the organizations from the supplier channels to the customer channels.
- The introduction of computerization and digitalization of the internal functions of the organizations with new techniques, tools, and management methods.
- The need for efficiency and agility of the organizations in order that they can respond to the higher demands of the customers whose growing demands and bargaining power continually increases.
- The effort to optimize the organization by having lower inventory levels both in manufacture and distribution by, in parallel, offering supreme quality and service.
- The deserting of vertical integration and functional oriented organizations.
- The tendency for outsourcing of some operational functions that are not the core of the business to other organizations specialized in that field.
- The explosive expansion of global commerce and the opening of new markets that only few years ago were closed.
- Finally, the e-business technologies and the Internet have enabled organizations of all sizes to have a network and be closely connected with their partners and conquer and compete for market share which was only possible before for the large corporations.

2.3. Opportunities provided by the new technologies in the context of e-SCM

New opportunities are emerging under the umbrella of e-business, the execution of business processes with the assistance of Internet technologies [10]. The rapid development of information technology, especially web-based information transfer between companies, their suppliers, their customers, and various service providers, has

improved information management in supply chains [11]. As such, companies are increasingly dependent on collaborative business processes where effective information sharing is an important success criterion [12].

The collaboration among partners and information sharing contributes to an improvement in forecasting and planning and thus mitigation of the risk and problem with stock over and stock out. This problem, known as the bullwhip effect represented a common weakness of the former, supply chain management. Therefore, having real time information available between all partners decreases the trend and possibility for larger and larger swings in the inventory that result in exaggerated fluctuations. The under and overestimations are bypassed as a result from the ability of the Internet and new technology to offer access and transmission of information among the supply chain partners.

Moreover, the Internet also enables the supply chain partners to make and access data analysis and modeling and thus make better planning and decision making, commonly known as knowledge sharing [13]. Furthermore, many organizations have also implemented point-of-sales (POS) scanners which read, on real time, what is being sold. These organizations do not only collect information on real-time to make decisions about what to order or how to replenish the stores; they also send this information, through the Internet, to their suppliers in order to make them able to synchronize their production to the actual sales.

In that manner, the digital connection in the e-SCM enabled by the new technologies has an impact on the performance of the supply chain in that it enables e-commerce, information sharing and knowledge sharing. The first impact, the *e-commerce*, refers to the buying and selling of products and services over the net. The second refers to *information sharing* and the use of Internet as a medium to access and transmit information among supply chain partners. And the third impact addresses how the Internet not only enables supply chain partners to access and share information but also to access data analysis and modeling to jointly make a better planning and decision making. This is referred as *knowledge sharing*, applying analysis, interpretation and modeling to information. Knowledge is usually defined as information in context, or actionable information [14]. In these regards, Bhaskaran notes how lack of knowledge sharing between members has been shown to significantly affect overall performance [15].

The recent technological developments in information systems and information technologies have the potential to facilitate the coordination among the partners and allow for their virtual

integration. In fact, the new technologies bring the possibility for ceaseless integration among the supply chain and open the possibility for true utilization of the SCM philosophy in that the total performance of the entire supply chain will be enhanced when all the links in the chain are simultaneously optimized as compared to the resulting total performance when each individual link is separately optimized [16].

3. Adoption of e-SCM practices

In the new economy, having an effective supply chain management represents a vital element in creating a competitive advantage, as it directly influences coming forward to the changes in the demand effectively and efficiently [17]. For many companies it has become evident that the integration enabled by the Internet has enhanced the advantages of supply chain management by enabling information visibility and sharing in real time as well as great possibility for improving the cooperation among the partners involved in the supply chain as a significant competitive differentiator. In these regards e-SCM has received great attention due to the forward thinking organizations, the early adopters that have implemented such strategy and have witnessed benefits of following this practice.

3.1. E-SCM as a source in creating competitive advantage

Today, it is evident there is no such thing as secured competitive advantage as every advantage is momentarily. From these reasons, the aim of the organizations should not be to secure a short-termed and temporary advantage, however, to work on continuous improvement through implementation of new solutions according to the changes in the market and industry, the changes of the organization itself as well as the changes of the customers and suppliers.

In one interview, Fairbanks and Stacy have said for the competitiveness: "If you base your competitiveness on the grounds of advantages such as low cost working power, the fertility of the soil, the sunshine or similar, you will be poor. This is because these characteristics are easily imitated. However, if you base it on the quality of the product, the brand, certification, distribution and marketing you will be rich. And when you add these complex advantages to your basic advantages you will be successful" [18].

"Every organization that wants to maintain a sustainable competitive advantage on the market must pay special attention to the development of the technology and introduce innovations in their work" [19]. However, the organizations must also understand how "computerization does not automatically generate increase in the productivity,

but it is the basic component of wider spectrum of organizational changes that drive productivity" [20].

In these regards bringing the technology to the supply chain and having an e-SCM does not by itself guarantee a competitive advantage, however it is a vital element and a basic component for driving the organization towards this direction and with the right strategy it is step closer to a sustainable competitive advantage.

Therefore, what the organizations must ask upon themselves when adopting e-SCM is: *what is the right choice in partners* and also *what is the right choice in technology* that would contribute to the whole process and would ensure uninterrupted information flow. By addressing these aspects and rightfully selecting the partners and establishing the technology for digital integration and synchronization among these partners, the organizations can benefit from: shorter delivery time, decrease in the costs for moving the materials, parts and final products to the rightful destinations as well as reducing the inventory level due to the availability of information about where, when and how much materials, parts and final products are indeed needed. With the availability of truthful information in real time for all the concerned partners that is with rightfully established network of partners, efficient way of making decisions and efficient logistics are enabled.

Additional important benefit enabled by the Internet and information technologies that is basis for building a competitive advantage is speed, speed of information, and speed in delivery that in contemporary conditions is an essential element of work. In regards to speed, Klaus Schwab, director and founder of the World Economy Forum, says: "We move from a world where the big ate the small, to a world where the fast eat the slow" [21]. Also, Hof explains how Bill Gates notes that the organizations that do not use the information systems and technologies will lack behind the others as management of information is essential for a successful strategy and competitive advantage [22]. However, naturally, competitive advantage does not depend alone on implementation of technology solutions. In order that a competitive advantage is achieved it is necessary that the technology matches the business processes of the organizations.

3.2. Organizations that have adopted E-SCM practices

Some of the most influential business leaders worldwide were among the organizations first adopting the e-SCM and integrating their supply chain managements. Their experiences and learnings from the adoption of e-SCM serve as a benchmark for other organizations.

Dell has shown great success due to the management principles and the vision *Dell* had about a Zero time organization built by the principles of build-to-order using the advantages of the Internet, the integrated, virtual, organization and the online sales implemented by *Dell* by the fall 1996. Since then, *Dell* has demonstrated incredible growth: a 58% revenue increase and 82% profit increase in 1997, also rise in sales to \$12.3 billion in 1997, profits to \$944 million in 1997 and the stock split for the sixth time in 1998 [23]. At the heart of the success was the ability that this strategy offered *Dell* exchange of inventory for information. *Dell* kept information about customer orders, needs and forecasts knowing that information is easier to move, easier to discard, easier to store and less expensive to have than inventory. As such, *Dell* uses the virtual integration model shown in Figure 3 in which traditional boundaries and roles are blurred in the value chain.

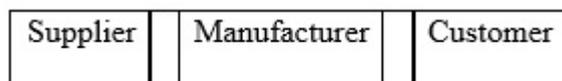


Figure 3. Virtual integration model

Today, *Dell's* performance is still among the organizations with highest ranking. Indeed, *Dell* is still selected as the top choice among IT leaders for enterprise flash deployments [24].

Lanier Worldwide Inc. is one of the largest global providers of document management solutions, helping customers in more than 100 countries, creating, enhancing and distributing high quality documents with greater speed, efficiency and economy. In order to achieve this they have an intense customer focus and a rigorous workflow methodology. *Lanier* uses an integrated Warehouse Management system (WMS), a Transportation Management System (TMS) module and with the Decision Support System (DSS) they have a shared database of information that provides visibility throughout their organization and to their customers [25]. Furthermore, *Lanier* offers order tracking, and *Lanier's* customers are satisfied as they are able to track the status of their orders, they are able to view all their order information and the real time status of their orders via the Internet. With the abilities offered by the DSS, all of the information from *Lanier's* distribution centers is collected and managed in a single combined database offering possibility for trend analysis, performance tracking and quality control reports addressed in the paper as knowledge sharing. From the integrated approach, *Lanier* has reduced inventories and operating costs on one hand side and increased customer satisfaction on the other

hand side resulting in both higher profits and revenues. *Lanier* continues to earn recognition and awards for the exemplary performance with various awards granted from year 2005 till 2008 [26].

Wal-Mart, is a multinational retail corporation that runs chains of large discount department stores and warehouse stores. The company is the world's third largest public corporation, according to the Fortune Global 500 list in 2012, the biggest private employer in the world with over two million employees, and is the largest retailer in the world. It also has the highest sales per square foot, inventory turnover and operating profit of any discount retailer owes its tradition from regional to global powerhouse largely to the changes they have made in effective management of its supply chain with efficient integration of suppliers, manufacturing, warehousing and distribution to the stores. Its state-of-the-art technology and network design allow *Wal-Mart* to accurately forecast demand, track and predict inventory levels, create high efficient transportation routes and manage customer relationships and service response logistics [27]. This strategy has helped *Wal-Mart* become a dominant force in a competitive global market providing several sustainable competitive advantages, including lower product costs, reduced inventory carrying costs, improved in-store variety and selection and highly competitive pricing for the consumer.

Cisco is the worldwide leader in networking that transforms how people connect, communicate and collaborate. Being connected with numerous partners, managing the supply chain management is one of the most important assets for *Cisco*. To maintain the leadership on the market *Cisco* has implemented a networked and integrated supply chain management processes/systems using the Internet to work together with suppliers, distributors, manufacturers and resellers closely and effectively as a single, virtual organization. In these regards, *Cisco* views their networked supply chain not as a chain, but a fabric of relationships supported by seamless connectivity collectively acting to meet the customer's needs. This view reflects the principles and practices of a well-established and integrated e-SCM. Over the past 10 years, *Cisco* has significantly leveraged the Internet to scale from \$1 billion in revenues to \$24 billion today while simultaneously increasing customer satisfaction and gross margins. *Cisco* has leveraged Internet solutions to tightly integrate its business processes across an extended virtual supply chain of component suppliers, contract manufacturers, 3PLs, distributors, and resellers. *Cisco* currently executes more than 90% of their sales orders online without any contact from a *Cisco*

employee, and 98% of their products are manufactured by their partners. Cisco also shares extensive forecasting and planning information with partners across the supply chain using advanced B2B solutions. In fiscal year 2004, Cisco realized \$270 million in benefits internally from Internet capabilities in SCM/Product Lifecycle Management [28].

Ford Motor Company and UPS Logistics group launched an alliance in the year 2000 to reengineer Ford's vehicle delivery system as the consumer's demand for on-time vehicle delivery was increasing. The results were: decreased delivery time by up to 40% and of course increased customer satisfaction and trust. Ford has also realized a \$1 billion dollar reduction in vehicle inventory and more than \$125 million in inventory carrying cost reductions on an annualized basis [29]. Their ability to integrate the entire supply chain has provided all partners' complete visibility to track the journey of each vehicle along the transport route via a web enabled system. Ford continues to earn market share and profits, standing firmly in today's competitive market place. As such, Ford earned its biggest profit in more than a decade in year 2010 thanks to increase in the sales and customer satisfaction [30].

There are many other examples of organizations that have adopted e-SCM such as Fujitsu in America, Adaptec, Home Depot, Proflowers.com's cooperation with FedEx, HP etc.

What is common for all is that they use the benefits derived from the impact of the Internet on different supply chain processes and thus use information to speed execution, to reduce costs, to enhance customer satisfaction and in fact retain competitive advantage.

3.3. Challenges while adopting e-SCM

Effectively integrating the information and material flows within the demand and supply process among the channel partners is what e-SCM is all about. Such integration among the partners is a challenge in itself. The Internet and information technologies and systems offer such integration, however just implementing and adopting new software is not the answer and the solution towards a sustainable competitive advantage.

Although the implementation of Internet based technologies possesses great potential for cutting costs and driving efficiencies, this process generates some cultural and technical concerns [31]. On one hand side, collaboration is based on the efforts of trust and commitment and cooperative norms and it requires organizations to overcome the natural

resistance to reveal business secrets to other partners. Therefore, organizations need to bypass the cultural concerns in order that they exploit the benefits of integration. On the other hand side, regarding the technical concerns, this involves the insecure nature of the Internet and the challenge of application integration among trading partners.

Despite the initial enthusiastic expectations and some success stories, there are some controversies that dispute the overly positive outcomes from implementing e-SCM. Barrat reports how supply-chain collaboration has proved difficult to implement in practice as there has been an over-reliance on technology and a failure to understand what information needs to be shared and, especially, how the business processes need to be changed when new technology is implemented [32].

Lesson learned by early adopters is that adoption of technologies and transformation into virtual integration requires a carefully planned strategy. Wigand has also emphasized the importance of optimal organization fit and alignment in the deployment of information technology [33]. He has made it clear that what brings added value to a firm is not information technology itself, but well-tuned coordination between strategies and technologies. Finding the right partners, the right number of partners, the technology and systems to be implemented are an important pre-requisite prior starting the implementation.

Therefore, spending time and resources on upfront strategy development is essential. Analyzing SCM opportunities and creating a clear e-Supply Chain roadmap and strategy offers the possibility to direct the organization towards a successful adoption and an improved performance.

Regardless of the challenges, e-SCM has proved its importance for numerous reasons: improving operations, better outsourcing, increasing profits, enhancing customer satisfaction, generating quality outcomes, tackling competitive pressures, increasing globalization, increasing importance of e-commerce as well as the growing complexity of the supply chains [34].

3.4. Benefits of adopting e-SCM

It is clear that IT and the emerging e-business applications and related new business models are gaining a pivotal role in managing supply chains as firms are able to demonstrate reduced costs and increased responsiveness of their supply chains through e-business investments [35].

As was demonstrated in the previous section the organizations that have implemented e-SCM have witnessed numerous benefits, some of which:

- > Information visibility and sharing,
- > Real time communication,
- > Order tracking,
- > Better real-time forecasting decision,
- > Faster delivery;
- > Improved partner relationships,
- > Understanding of customer needs,
- > Increased customer satisfaction,
- > Faster market adaptation,
- > Reduced resources,
- > Cost savings;
- > Increased profits etc.

Furthermore, according to an Accenture survey in March 2002 on the impact of SCM and the Internet, these initiatives were credited with cost reductions, improved efficiencies, better customer service, more revenues and greater competitiveness by over 80% of the companies responding. Also, more than 70% felt that the application of e-based applications providing end-to-end visibility to the supply chain were the single most important enabler of collaboration with top trading partners. While the survey indicated that the prime reason why companies increasingly were turning towards supply chain partners to outsource functions was to cut costs in the short run, 70% of executives saw the long term creation of partnering agreements as a major strategy in achieving corporate objectives [36].

Moreover, in regards to worldwide proportions from the perspective of the development of e-SCM on yearly level it shows how the transactions from the supply chain represent an incredible figure of trillion dollars which in itself talks about the great impact on the potential for performance improvements [37].

Horvath has also acknowledged that the most considerable benefits to businesses with advanced SCM capabilities will be: radically improved customer responsiveness, developed customer service and satisfaction, increased flexibility for changing market conditions, improved customer retention and more effective marketing [38].

High speed, low cost, communication and collaboration with both customers and suppliers are critical success factors of the e-SCM as this concept assists business organizations in competing in the dynamic international market by making real time information available and enabling collaboration between the trading partners. Adding customer value is one of the most important assets for organizations.

In this manner Figure 4, demonstrates the customer centricity presented in the customer-centric/e-SCM that unlike the traditional supply chain management starts with the customer's needs instead of the assets and core competencies of the organization [39].

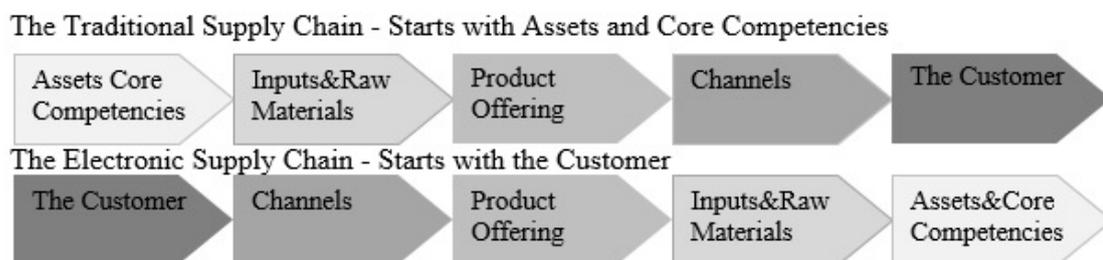


Figure 4. Customer-centric E-SCM

As companies implement Internet technologies that connect all channel information, transactions and decision, whole channel systems are able to continuously generate radically new sources of competitive advantage through cyber-collaboration, enabling joint product innovation, online buying markets, networked planning, operations management and customer fulfillment [7].

Such paradigm shift enabled by the Information and Communication Technology (ICT) has profoundly affected the way of work into accomplishing more with less and has opened opportunities for competitive advantages by enjoying the benefits of adopting e-SCM.

4. Conclusion

Given the importance of e-SCM and the impact it has for enhanced competitiveness from the ceaseless integration within a network of organizations has intrigued numerous researchers to examine this topic as well as many businesses to undertake this execution and prove the benefits of the merge on the Internet with SCM to their everyday business.

The main subject of this paper was the benefits of adopting e-SCM practices in terms that it contributes to creating a competitive advantage. After defining and giving insight into the e-SCM we have discussed the status of the organizations that have implemented e-SCM and are working by this concept. Improved

communication among partners, information sharing and synchronization, cost reduction, smooth production flows, shorter cycle times, reduced resources, over passing barriers of time and space leading to an improved customer satisfaction are all among the benefits of adopting e-SCM. Both real world's examples as well as second hand research data were used to prove the paper's goal that the adoption of e-SCM practices provides numerous benefits enabling organizations to work effectively and efficiently and thus build competitive advantage. The positive benefits of integrating the Internet into supply chain management outweighs the risks and associated costs as innovation and technology incorporation into how business is conducted has become essential and indispensable nowadays. Supporting the paper's goal is the analysis from the organizations that have adopted e-SCM and the benefits they have enjoyed. Enjoying the benefits of the integration with their partners brings advantage to these organizations over the organizations that have not yet completed such integration.

In these regards, demonstrating the benefits of e-SCM and the demands of working in this day and age, organizations will need to rapidly evolve to the e-SCM in the near future or be left behinds because the old ways of communicating and transmitting information are no longer fast or cost effective.

The future research related to this topic might include the future improvements as the technology advances, the opportunities of intelligent agents and systems, the advancements in mobile technology. Having this in mind this paper hopes to unlock frontiers for additional researchers in e-SCM areas in order further development and utilization of this concept.

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