

ROLE OF E-BUSINESS IN SUPPLY CHAIN MANAGEMENT

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ABSTRACT

E-business has fully played its role on supply chain management due to human factors including insufficient leadership, unwillingness to cooperate, resistance to change, inertia, lack of trust, personal insecurity, fear of losing jobs, threat of being by-passed by technology, communication problems and difficulties in aligning the processes and cultures of partner companies. This paper calls for more research into the roles of e-business on supply chains, based upon the realization that the supply chain is often neglected in current e-business applications. E-business not only does it deal with technology, but also a range of important human and organizational issues. Research of ICT-based systems in organizations consistently demonstrate that insufficient consideration of a system's social environment and the relationships between people and technology has been a major reason why investments have often been assessed as being a failure, or only a partial success. Currently available e-business solutions are still some way from covering the entire spectrum of business requirements and relatively few options are readily available to support or automate complex activities.

Key words: *Supply chain, management, E-procurement, Information Technology, Outsourcing and performance.*

Introduction

Zwass (1996) observed that probably E-Business began with electronic data interchange in the 1960s. The current developments in e-business have been due to proliferation of internet in the 1990's where inter-organizational systems were used in operation and strategic management of supply chain and networks. At the beginning e-business was hoped to revolutionize the interaction of organizations with its customers, employees, suppliers and partners. E-business

was to play a major role in a global economy where businesses are experiencing increased competition (Melao, 2008).

The rise of the internet as a communication channel changed the nature of information as it gave rise to new opportunities, forms of affiliation between organizations, relationships and transaction between organizations(Evans and Wurster's ,2000). A parallel rapid rate of development of information technology (IT) significantly assisted in the evolution of e-business where organizations that use the internet have a profound impact on the management of inter-organizational processes. Supply chain Management plays a significant role in integrating activities within the organization and with external stakeholders. E-business through IT has been a key enabler of integration and efficient supply chain.

As a business concept, E-business has evolved significantly since its introduction in the 1990's. Supply chain management (SCM) is fundamentally concerned with integration of activities both with and between organizations. This paper focuses on the developments in e-business and its role on supply chain management.

Critical analysis of e-business to Operations Management and Supply Chain Management: Its application today and global perspective

E-business is among the most promising application of electronic technology that has emerged in recent years. It has revolutionized both supply chain management and operations management and has enormous contribution in manufacturing, retail and service industries. Application of e-business in supply chain and operations management has taken the form of automation and integration of organizational systems through concepts or technologies such as e-commerce, e-mails, e-procurement, e-auctions, collaborations, forecasting, EDI, ERP, EFT, telephone and fax.

The manufacturing sector has experienced tremendous application of E-business through changes in systems of operations from mass production to demand-driven, possibly customized, just-in-time manufacturing systems. Areas in which e-business is applied include design, production, sales and distribution marketing, purchasing, human resource management, warehousing and supplier development.

The impact of e-business on operations and supply chain management is high, diverse and cross-cuts the entire functions and processes of an organization. The first impact of e-business on

supply chain management is escalation of customer expectations where quality must be maintained and costs lowered. Second is that there is no more guessing about demand and build to-order products and services has been made possible. As a result inventory costs not only go down but product and service design improves. Third is that through e-procurement transaction costs are lowered, customer support costs decrease and eventually e-procurement accrues major savings for an organization. E-business has the fourth impact of increasing overall demand which makes order fulfillment and logistics to become major issues and production moves overseas. E-business has contributed to globalization that opened up markets and increased trade. Fifth impact is change in logistics from delivering to a store or distribution center to delivering to individual homes thereby making consumer demand become more erratic and unpredictable than business demand. Six is increase in outsourcing where more global alliances and partnerships are created. Seventh impact of e-business on supply chain management is that competitive bidding lowers cost of materials and supply needs can be found in one location. Eighth is that timely information is available with immediate access to all stakeholders in decision-making; designs of products and orders from customers can be clarified electronically and collaborative planning facilitated. Ninth impact of e-business on supply chain is productivity increase as there is increased efficiency in sharing information between business partners. Lastly, order fulfillment, logistics, warehousing, transportation and delivery become focus of managing operations and there is spreading of risk in both local and international trade.

Knowledge gap for the study

There has been a growing interest in e-business in recent years and several papers published on this topic. There has been extensive published works on this area including internet, ERP, EDI, e-commerce, sales and marketing. However, supply chain management dimension of e-business especially the holistic view of e-business has largely been neglected despite the various positive and negative effects of e-business on supply chain management. The contribution of e-business on supply chain processes and functions has not been extensively studied which would be important in future organizational decisions on adoption of e-business.

Evidently, there is a recognized need to increase the understanding of e-business in supply chain management. This paper aims to enhance the understanding of the role of e-business in supply chain management. Previous papers on this subject have dealt with limited roles of e-business in

supply chain whereas due to rapid development in technology, new applications have recently emerged. This paper aims to include emerging roles of e-business in supply chain management including e-procurement, e-collaboration, logistics, e-auction and outsourcing. Through that inclusion, the paper aims to fill a gap on understanding the role of e-business in supply chain management to enable decision makers appreciate the important contributions of e-business.

Theoretical review of variables, models supporting the variables and conceptualization

Various studies have been done to analyze the role of e-business in supply chain management. Scholars have used various variables in their analysis which have depended on time and context of their studies. Due to rapid developments in the e-business applications, new concepts and applications have emerged that have not been included in previous studies. For instance concepts such as e-auctions, reverse auctions, web-based logistics, collaborations and forecasting have not received adequate attention in research. They may have been mentioned in separate research studies, however the contribution of e-business on these practices have not been analyzed in an integrated approach. This research intends to use an integrated approach to study the role of e-business on efficient and effective supply chain management through the use of five variables: e-procurement, collaboration, logistics, e-auctions and outsourcing.

E-procurement

To study the role of E-business on supply chain management through e-procurement; their role on the following areas will be analyzed: cost performance, customer service, process capability, productivity and dependability, information systems, structure of supply chain and buyer-supplier relationship.

With e-procurement, the Internet offers a platform to facilitate efficient procurement as numerous buyers and sellers find each other and transact according to some pre-specified protocols and rules from governments. E-procurement represents an implicit part of supply management, whereby Internet technology is applied to facilitate corporate buying. The modern business environment is characterized by stiff competition, fast changing customer preferences, shortening product life cycle, and product variety proliferation which require adoption of e-procurement that provides fast information, flexibility and high process capabilities.

E-procurement efficiently facilitates supply chain from the initial stages of specification development to supplier payment and closure. The concept of e-design has emerged to facilitate supplier involvement in the specification development process of a product. It facilitates reduced time-to-market cycles by overcoming the silo-effect of the traditionally sequential design activities (Presutti, 2003).

The use of e-procurement also facilitates e-sourcing, which is the process of finding new potential suppliers using ICT with the aim of decreasing search costs. Identification of new sources of supply increases competition during the tendering process. In the Kenyan tendering process, for instance a government agency can send quotations, Expression of interests or Request for Proposal documents to potential bidders online and process such tenders via the internet.

Presutti (2003) notes that some of the earliest e-procurement solutions focused on establishing ordering routines and reducing transaction costs associated with operating resource purchasing for typically maintenance, repair and operating (MRO) supplies by automating the requisitioning to payment cycle.

E-business in procurement enables organizations to order products in online catalogues or desktop purchasing systems whereby the authorization of a person requisitioning is electronically checked. Once cleared, the order is aggregated with others to the same destination and issued electronically to the supplier. This process flow reduces operational costs, improves process efficiency, delivers greater centralized control over purchasing and may increase negotiating power with suppliers through order consolidation (Huber and Wagner, 2007). Supplier evaluation is a critical step in the purchasing process, which requires extensive and accurate performance data. E-procurement solutions provide data warehousing capabilities that capture and retrieve data to conduct effective and efficient supplier performance assessments.

As earlier indicated, the role of e-business through e-procurement will be analyzed using the following parameters: cost performance, customer service, process capability, productivity and dependability, information systems, structure of supply chain and buyer-supplier relationship.

Cost performance

E-procurement adoption in an organization when well-managed has the impact of reducing costs which is the aim of profit-oriented organizations. It is argued that the impact of e-business on supply chain costs is better understood by considering the four drivers of supply chain

performance. Facility costs include both site and processing cost which e-businesses is able to centralize facilities because online sales allow the separation of order placement and order fulfillment. Site costs may decrease as direct customer-supplier contact and geographical centralization eliminates or reduces retail sites. An e-business can decrease processing cost if they can increase the amount of customer participation. In some cases, e-businesses may face higher processing costs because they have to perform tasks currently performed by the customer at a retail store. A direct-sales manufacturer can reduce handling costs because fewer supply chain stages are involved in the product flow to the customer.

E-business allows transportation companies of all sizes to exchange cargo documents electronically over the Internet which streamlines document handling and delivery systems. By using e-business, companies can reduce costs, improve data accuracy, streamline business processes, accelerate business cycles, and enhance customer service. Malone et al (1987) hypothesize that increased use of electronic methods for searching and sourcing will reduce such coordination costs and, *ceteris paribus*, will increase the proportion of economic activity coordinated by markets.

Customer relations benefits

Customer satisfaction is the ultimate objective of business enterprises as it guarantees customer retention, increased revenues and profits. E-business has developed various systems aimed at competently managing the customer-supplier relations that is important to customer fulfillment usually through improved service. E-procurement adoption benefits include improved customer relations and the possibility of providing new and better products or services to customers. The development of the Internet and other e-business tools and methods provide companies with an opportunity to choose how they interact with their customers. Companies are using various customer relationship management (CRM) applications that track customer behavior, predict their future demand and send direct e-mail communications (Winer, 2001). By combining the abilities to respond directly to customers and to provide the customer with an interactive, customized experience, organizations have a better ability to establish and sustain long-term customer relationships. Kalakota and Robinson (2001) point out that e-business enhances the possibilities of managing multiple customer relationships more effectively, as it is easier to manage the different customer segments. From the supply chain management point of view,

improved service refers to the means of making the products available for the customer (Christopher, 1998).

Informational benefits

The quality and speed of information flow plays a major role in supply chain performance of organizations. E-business through e-procurement tries to streamline and preserve the quality of information sharing among all stakeholders in the supply chain. Mirani and Lederer (1998) observed that informational benefits comprise information access, information quality, and information flexibility aspects. Information access refers to faster retrieval or delivery of information and easier access to information. Information quality covers issues such as improved management for strategic planning, improved accuracy or reliability of information and improved information for operational control. Information flexibility means that it is possible to present information in a more concise manner or better format that will increase the flexibility of information requests.

Well-managed information flows in companies achieve supply chain visibility. Visibility means the possibility of providing each stage in the supply chain insights into such information that is needed in managing the supply chain. Lee and Whang (2001) point out that improved information visibility allows supply chain partners to better coordinate production and distribution.

The quality of Information in organizations has been studied extensively by researchers interested in computing, management information systems, databases and their management, data security and data warehouses to mention but a few (Melkas, 2004). In a supply chain there are processes that produce information such as planning, designing, selling, or distributing where for this information to have quality, it must be produced according to well-defined information.

Collaboration

E-procurement may have captured the attention of many organizations but the promise of e-collaboration may be far outweigh the former. E-collaboration is defined as business-to-business interactions facilitated by the Internet. These interactions go beyond simple buy-sell transactions and are better described as relationships.

E-collaborations include such activities as information sharing and integration, decision sharing, process sharing, and resource sharing. Lee and Whang (2002b) provides taxonomy of e-

collaboration and link the idea to earlier research in supply chain management. On information sharing of collaboration, the widespread interest in the bullwhip researchers have worked to quantify the impact of the bullwhip (Chen, Drezner, Ryan, and Simchi-Levi 2000) and examined the benefits of sharing information (for examples, see Cachon and Fisher 2000; Iyer and Ye 2000; Moinzadeh 2002). There has also been significant work to understand the benefits of IT investments for instance ERP within an enterprise (McAfee 2002).

Another collaboration aspect is process sharing achieved through collaborative innovation and product design. The web brings out innovation of processes as Johnson (2000, 2002) examined web-centric collaboration for product design in both the high-tech and apparel industries. He developed a framework for understanding the supply chain benefits of design collaboration.

Different elements of collaboration have been examined; from information sharing and integration to process and resource sharing. Several of these cases examine new web-native software companies who develop applications for different types of collaboration. For example, Agile looks at the role of collaboratively managing product design and engineering changes over the web while RFID tracks materials traveling through a supply chain among others.

Logistics

Logistics relate to production supply chain which involves flow of physical goods and associated information from the source to the consumer. Logistics activities include: transportation, inventory management, distribution, warehousing, customer service and sales forecasting. These processes are critical to the success of any operation whether they are manufacturers, wholesalers, or retailers.

E-business is fundamentally changing the nature of logistics and has revolutionized logistics through cost efficiency, change in distribution system, customer orientation, shipment tracking, shipping notice, freight auditing, shipment documentation and labeling and online shipping inquiry.

Cost efficiency: E-business allows transportation companies to exchange cargo documents electronically over the Internet and enable shippers, freight forwarders and trucking firms to streamline document handling without the monetary and time investment required by the traditional document delivery systems. Ocean carriers and their trading partners exchange bill of lading instructions, freight invoices, container status messages, motor carrier shipment

instructions, and other documents with increased accuracy and efficiency.

Changes in the distribution system: E-business gives businesses more flexibility in managing the complex movement of products and information between businesses, their suppliers and customers. E-business closes the link between customers and distribution centers through customers managing the complex movement of products and information in logistics.

Customer orientation: E-business provides a vital link in the support of logistics and transportation services for both internal and external customers. E-business helps companies deliver better services to their customers, accelerate the growth of e-commerce initiatives that are critical to their business, and lower their operating costs. E-business makes it easier for customers to do business with companies through simplifying the process of arranging transportation services that help build companies' business and enhance shareholder value. Through e-business; the website is a place where customers not only get detailed information about the services the company offers, but also where they can actually conduct business with the company.

Shipment tracking: E-business allows users to establish an account and obtain real-time information about cargo shipments. Organizations can also through e-business create and submit bills of lading, place a cargo order, analyze charges, submit a freight claim, and carry out many other functions.

Shipping notice: E-business automates the receiving process by electronically transmitting a packing list ahead of the shipment. It also allows companies to record the relevant details of each pallet, parcel, and item being shipped from one destination to another.

Freight auditing: This ensures that each freight bill is efficiently reviewed for accuracy. The benefit is a greatly reduced risk of overpayment, and the elimination of countless hours of paperwork, or the need for a third-party auditing firm. By intercepting duplicate billings and incorrect charges, a significant percent of shipping costs will be recovered.

Shipping Documentation and Labeling: There is less need for manual intervention because standard bills of lading, shipping labels, and carrier manifests are automatically produced; this includes even the specialized export documentation required for overseas shipments. Paperwork is significantly reduced and the shipping department will therefore be more efficient.

Online Shipping Inquiry: This gives instant shipping information access to anyone in the company, from any location. This happens since parcel shipments are tracked and proof of

delivery quickly confirmed. A customer's transportation costs and performance is analyzed, thus helping the customer negotiate rates and improve service.

Auction

Internet exchanges create electronic markets and communities where firms can obtain information and buy and sell products through the auction mode. In Kenya's public procurement system, sale by auction is one of the most prominent modes of disposal as allowed by the public procurement and disposal act, 2005. E-auctions have not been fully embraced but scholars have indicated it to be one of the major emerging roles of e-business in supply chain management gaining popularity. E-auctions not only do they act as on-line auctioneer; they also inspect and approve bidders or suppliers along various non-price factors.

E-auctions have great benefits including increased ability of buyers to search across multiple suppliers when looking to procure an item. Another benefit of e-auctions is it substantially lowers barriers to entry in the bidding process thereby driving down supply prices. However there are considerable downsides with e-auctions. Purchase of all products using auctions may lower the purchase price but will tend to increase the total cost of purchase for a firm. The ability to lower supply chain costs requires long-term relationships within the supply chain.

Core products that a buyer requires in significant and a steady quantity is better not handled through a bid or auction process hosted by an intermediary. Direct e-business between the buyer and seller should be used in this setting to reduce transaction costs of order placement and fulfillment and improved information exchange during order fulfillment as well as product design.

When it comes to utilizing excess or surplus capacity (i.e., any capacity left after utilizing base capacity), the story is very different and on-line auctioning may provide significant opportunities. In case of surplus capacity or disposable items, e-auctions provide the ability to aggregate and display all available surplus capacity across an entire industry. As such, a market is created to better match surplus capacity with unmet demand. For example, a manufacturer in need of unforeseen additional transportation may place an emergency shipment out to bid if their regular trucking company has no trucks available.

Outsourcing

Outsourcing can be defined as “the strategic use of outside resources to perform activities traditionally handled by internal staff and resources”. Sometimes known also as “facilities management”, outsourcing is a strategy by which an organization contracts out major functions to specialized and efficient service providers, who become valued business partners. Another definition of outsourcing is a term referring to the recourse to market transaction for products, services and processes formerly undertaken internally.

E-business has had an impact on outsourcing by increasing the propensity of firms to outsource once they adopt e-procurement systems. In addition, there is existing evidence at the industry level indicating that increases in investment in e-business systems are associated with a decline in average firm size and rise in the number of firms. Kambil (1991) also shows that industries investing more of their capital stock in information technology also contract out more of the value of the goods and services they produced to external suppliers (i.e. a higher buy/make ratio in production), but with a two year lag from the time of investment. As investment in information channels increases, it is therefore anticipated that firms will increase their level of outsourcing.

With e-business, coordination costs are lowered that encourage more out-sourcing, enabling firms to buy goods and services less expensively than to produce them in-house (Malone, 1987; Malone et al., 1987; Malone et al., 1989). Since the cost of communication and information processing are also reduced, the cost disadvantage of out-sourcing a production process is also reduced.

Empirical literature review on variables

E-procurement

A paper by Boyer and Olson (2002) conducted a survey of 416 e-procurement users of Office Depot and studied the success factors in procurement of indirect material. The data and its step-wise regression analysis supports that buying companies indeed realize performance benefits from e-procurement and identifies drivers of success. The drivers of performance success are categorized into the characteristics of the purchasing company (strategy and environment) and Internet factors (Interrelated and site-specific). Combined with the work by Peleg, Lee, and

Hausman (2002), this work presents a very useful future research into the status and impact of e-procurement of direct materials.

Tempelmeier (2002) did another paper on procurement by considering an optimization tool to help in dynamic supplier selection. The author considers the case of a company facing dynamic demand and multiple suppliers offering various quantity discount schemes that varies over time. The problem is formulated as a mathematical program and a fast solution heuristic is proposed and tested. The author describes how the solution procedure was implemented as part of SAP's Advanced Planner and Optimizer (APO) software.

Collaboration

A paper by Tatsiopoulos, Ponis, Hadziliadis, and Panayiotou (2002) described a methodology for implementing product collaboration within the Greek apparel industry. The methodology, based on structured modeling and simulation, did examination of the potential benefits of a web-based system prior to implementation. The authors extensively described one of several company cases that illustrate the methodology at Mass Fashion, a Greek apparel company. They include many details of the actual implementation and resulting changes to the overall product generation process.

Another paper by Zhang (2002) considered the incentives for firms to share demand information. The author's research follows a substantial stream of work on information and incentives in multi-echelon supply chains (for example, Cachon 2001). The paper develops a model for a two-echelon system of a manufacturer and two downstream retailers who are engaged in either Cournot or Bertrand competition. The authors examine the problem of information leakage in the sharing relationship and show that the optimal price of the manufacturer does not depend on the type of downstream competition but only on the information sharing arrangement.

Logistics

A paper by Matopoulos A et al (2009) on understanding the factors affecting e-business adoption and impact on logistics processes used a case study research, by conducting in-depth interviews in eight companies. Their findings were that e-business adoption is not exclusively a matter of resources. Increased e-business adoption and impact are caused by increased operational compatibility, as well as increased levels of collaboration. In terms of e-business impact this

mainly refers to cycle time reductions and quality improvements, rather than direct cost reductions as reported by other authors.

Auctions

A paper by Tassabehji, Taylor, Beach and Wood (2006) on reverse auction data was collected from the direct experiences of one large food-packaging supplier, using case studies of reverse e-auctions, and from exploratory interviews with other suppliers in the sector.

The finding was that while buyers are reaping significant short-term price reductions, the benefits to suppliers are less obvious. In fact, little reference was detected to the often-quoted reductions in overall transaction costs for either buyers or suppliers. However, most respondents were not able to specify their transaction costs and associated risks and did not appear to have adequate costing systems to enable such quantification. The report indicated the concerns of suppliers, outlined how buyers could embed trust-building mechanisms into the reverse e-auction process and proposes a model for testing the findings in future research.

Outsourcing

A paper by S Green (2001) found that trends in the UK and USA indicate that the incidence of outsourcing is increasing with e-business.

Business activity	Outsourced by		
	1991	1996	2001
Property services	13	42	46
Application development	5	29	41
IT technical support	4	21	34
Legal services	7	19	27
Distribution/support	9	21	24
Infrastructure maintenance	4	10	14
Manufacture/ assembly	6	9	12

Trends in outsourcing; (Croom, 1998 – from PA Consulting Group)

Summary or conclusion

Kenya is still in the first stages of increasing the recognition of the potential and role of e-business in supply chain management. Many organizations still lack an effective ICT

infrastructure to organize, support and facilitate the highly complex and often rapidly changing interfaces among the organizational entities and disciplines involved in business processes. Organizations whether they are public or private sector embarking on an e-business initiative have to consider a sensible alignment of technology (as enabler) to the business strategy for them to be successful. E-business can drive new organizational forms such as virtual organizations which fulfill certain tasks in the inter-firm operations and enable firms to improve their processes in supply chain. Therefore, e-business has a vital role to play in integrated SCM.

References

- Boyer, K.K. and Olson J.R. (2002), "Drivers of Internet Purchasing Success;' Production and Operations Management, 11,4.
- Cachon, G. and Fisher M (2000), "Supply Chain Inventory Management and the Value of Shared Information;' Management Science, 46, 8, 1032-1048.
- Cagliano, R., Caniato, F. and Spina, G. (2003), "E-business strategy: how companies are shaping their supply chain through the internet", *International Journal of Operations & Production Management*, Vol. 23 No. 10, pp. 1142-62
- Chen, f ., Dreznerj Z, .Ryan K, and Simchi-levi D (2000), "Quantifying the Bullship Effect in a Simple Supply Chain: The Impact of Forecast," Management Science, 46, 3, 436-443.
- Croom, S.R. (1998) 'Optimising the Purchasing Process for MRO Items: An investigation of the Strategic and Operational Value of adopting a Web-based System for the Procurement of Operating Resources'. Warwick Business School Working Paper
- Evans, P & T Wurster (2000). Blown to bits. How the new economies of information Technology. Boston Harvard Business School Press
- Flurry, G., Vicknair W. (2001), The IBM application framework for e-business, *IBM Systems Journal*, 40(1), pp. 8-24
- Huber, B., & Wagner, C. (2007). E-business and Supply Chain Management. In Sweeney, E. (Ed.), *Perspectives on Supply Chain Management and Logistics* (pp. 265–280). Dublin: Blackhall Publishing.
- Iyer, A. and Ye J (2000), "Assessing the Value of Information Sharing in a Promotional Retail Environment, " *Manufacturing and Service Operations Management*, 2, 2, 128-143.

- Johnson, M. E. (2000), "Supply Chain Synchronizing Through Web-Centric Product Content Management" in *Achieving Supply Chain Excellence Through Technology*, Vol. 2, Montgomery Research, Inc., 37-40
- Johnson, M. E. (2002), "Product Design Collaboration: Capturing Lost Supply Chain Value in the Apparel Industry," *Achieving Supply Chain Excellence Through Technology*, Vol. 4, Montgomery Research, Inc., <http://www.ascet.com>, 140-143.
- Kalakota R., Robinson M. (2000), *E-business 2.0: Roadmap for Success*, Boston, Addison-Wesley
- Kambil, A. (1991). Information technology and vertical integration: Evidence from the Manufacturing sector. In Guerin-Calvert & S. Wildman (eds) *Electronic services networks networks: A business and public policy challenge*, (22-38), New York: Praeger
- Lambert, D., Cooper, M., & Pagh, J. (1998). Supply chain management, implementation issues and research opportunities. *International Journal of Logistics Management*, 9(2), 1–19.
doi:10.1108/09574099810805807
- Lee, H.L. & Whang, S. (2001), *E-business and Supply Chain Integration*, Stanford Global Supply Chain Management Forum, White paper SGSCMF-W2-2001, p. 20
- Lee, H.L. and S. Whang (2002), "On e-Collaboration," Stanford University Working Paper.
- Christopher, M., (1998), "*Logistics and Supply Chain Management. Strategies for Reducing Cost and Improving Service*", Financial Times Pitman Publishing, London
- Malone, T., Yates, J. and Benjamin, R. (1987), "Electronic markets and electronic hierarchies: effects of information technology on market structure and corporate strategies", *Communications of the ACM*, Vol. 30 No. 6, pp.484-97
- Matopoulos A, Vlachopoulou M, Manthou V (2009). Understanding the affecting e-business adoption and impact on logistics process. *J. Manuf. Technol. Manag.* 20(6):853-865.
- McAFEE, A (2002), "The Impact of Enterprise Information Technology Adoption on Operational Performance: An Empirical Investigation," *Production and Operations Management*, 11, 1, 33-53.

- Melao, N. and Pidd, M. (2008), "[Business Processes: Four Perspectives](#)", In V. Grover and L. Markus (eds.), *Business Process Transformation*, Advances in Management Information Systems, New York: M.E. Sharpe, pp. 41-66.
- Melkas, H. (2004) Towards holistic management of information within service networks. Safety telephone services for ageing people. PhD dissertation, Helsinki University of Technology, Lahti Centre, Dissertations 2004/1, pp. 42-43
- Mentzer J.T., DeWitt W., Keebler J.S. Min S, Smith C.D. Zacharia Z.G. (2001a). What is supply chain management in Mentzer. J.T. (Ed.), *Supply Chain Management*, Saga Publications, Thousand Oaks, CA, pp. 5-62