Modelling Supply Chain Management In B2B E-Commerce Systems

Idris Asmuni[#1]

#Industrial Engineering Departement
Sekolah Tinggi Teknologi Nusantara Lampung
Jalan Pulau Damar, Gang Sapta Marga,
Kel Way Dadi Baru, Suka Rame, Bandar Lampung, Lampung, INDONESIA
pakidris@gmail.com

Abstract -Applying supply chain management in e-commerce systems has been a need for enterprise to win the competition global in a term of customer-oriented market. Although investing in supply chain technology demand high costs and resources, many companies attempt to strengthen business function with systems application under ERP packages and other systems related. This paper discusses about B2B e-commerce modelling as an integral part of E-Business in supply chain company activities. Some critical factors which bring successfull of B2B e-commerce according to previous research also explained that will be valuable information for management in building partnership. With the innovation of information technology, the pattern of partnership in the future will give some new opportunities in improving customer service.

Keywords— modelling, e-commerce, supply chain management, ERP packages, customer-oriented market.

I. INTRODUCTION

1.1. Why Shoud be B2B E-Commerce

There are three ways why should B2B E-commerce become so important, namely [1]:

a. Most customers want convenient and fast : The competition among enterprises has transformed from product-centered to customer-centered in order to attrack more customers buying the products. Today, the buyers can gain the products easily through market, that has forced enterprise will face serious challenge to win the competition by fullfilling customer needs.

b. Satisfying service with cross-channel : With integrated data through Enterprise Resources Planning (ERP) where information about kinds of products, prices and stocks can be shared and visible for customers, it has made the enterprise easier to serve the customers in the consumers' cross-channel shopping.

c. E-commerce effficient operation platform : The attention for customers demands higher performance of e-commerce and it is suggested that e-commerce operation platform provides stronger business function to counteract the changing business seriously. Therefore, there are some ways   to achieve the higher e-commerce performance, such as 1). Rich Internet Application (RIA) that functions as the support business operation, 2). Business To Customers (B2C) and Business To Business (B2B) that provide store interface resources. 3). Tools for loading stable data which adopt standard generally accepted by industry with special requirements. 4). Built-in frame to collaborate data with the third party sourcing service in the form of data statistics for decision making.

1.2. Some Impacts E-Commerce To SCM

More sophisticated of course, there some reasons why e-commerce has an impact on supply chains [2]:

1. A performance gap must be exist. Due to its capability, e-commerce may indicate that website can help companies achieve more abundant if comparing to others which do not use e-commerce application.

2. Many companies have provided their business functions with ERP systems in medium, small or large scala data. This can unite certain locations. ERP systems application has the capacity to manage business operation and may cover customers and suppliers. In addition, some best-of-breed ERP software application such as e-procurement, e-distribution and so on also developed by companies.

3. Investing more in information technology as an e-commerce solutions. Supply chain technology becomes serious attention that make companies budget for purchase to support their supply chain activities. With some new software application developed, companies expect a lot to the successfull supply chain activities.

4. E-commerce can improve supply chain barriers by creating oppotunities in two ways, namely to update new solutions for old problems and to help reducing problems for cross-functional, cross-enterprise and cross-country changes.

5. The role of value chain of partners will raise as the world is shringking. This is to say that the companies using supply chain may integrate customers and suppliers across geographically and e-commerce will be the key to enable the integration and collaboration.

1.3. The Challenges For E-Supply Chain Management

There are some challenges for e-supply chain management [3],

1. Problems of Internet Security : It is the first concern where company starts business with internet and that is why most business organization address issue about security by using

3rd International Conference on Engineering & Technology Development 2014
Faculty of Engineering and Faculty of Computer Science
Bandar Lampung University

45

encryption to protect data so members of supply chain systems can only look at information that is suittable for them.
2. The changing business process : E-commerce not only shares activities for supply chain technically but also face the real challenge with impact automation to achieve an ideal business process. The changing business process brings principle changes in the way companies work from planning to coordinating. In order to achieve what has been planned, it is a custom for business organization to integrate data with their suppliers regarding inventory dinamically over the internet and forecasts related to demand.
3. The poor supply chain. It often happens that smaller companies lose their businesses with big customers. They often decide that big cost is indicated and sharing to bigger companies due to the partners that make a link. Because, supply chain management is a coordinated activity, if something happens in one link, it means the whole chain will suffer the impacts.
4. Benefits sharing : It is a very important success factor within business organization. So, if a company wants to gain a lot of from suppliers and customers, the implementation of automating e-supply chain is a must

II. LIBRARY RESEARCH

2.1. Performance Measurement Of Supply-Chain Operations Reference-Model (SCOR) [4].

Supply Chain Operation Reference (SCOR) is developed as a cross-industry standard in supply chain management activities. As a standard for company applying supply chain management, a process reference model can be said as a combination of business process reengineering and best practices analysis. The direction of process reference model is to to provide a frame work for performance measures of supply chain and to give examples of best practices for standard processes.

SCOR eventually defines the supply chain as an integrated business management processes such as plan, source, make, deliver, pick up, return and activated from customers to supplier or in return. The SCOR systems can be described as a pyramid which cosists of four levels in figure 1 which represent the path where a company takes on the road to supply chain improvement. The top level defines the scope for the model and sets the basis for performance targets. Configuration level configures the supply chain so that the operational strategy can be implemented. The process element level consists of process element definitions, information inputs and outputs, performance metrics, best practices and system capabilities to support best practices. The implementation level is concerned with defining practices to achieve competitive advantage. SCOR therefore provides list of performance measure for each activity and process in a supply chain, and provides the best practices for each measurement.
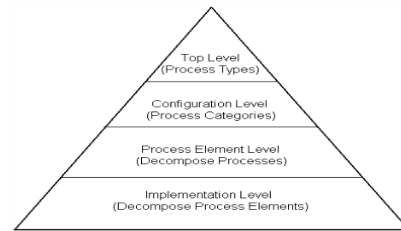

Fig 1. Supply Chain Reference Model [4]

2.2. Supply Chain Management Within E-Commerce

There are some advantages of supply chain management under e-commerce environment [5], namely :
1. Creating Good Customer Relationship : E-commerce gradually makes the competition between supply chains. In order to attract and maintain existing customers, it requires enterprises to provide shortcut and low cost commercial operation mode, keep and develop the frequent relationship with customers, improve customers' satisfactionand loyalty index. The supply chain management based on e-commerce link up directly the relationship between enterprise and customers, and can directly talk with final customers in an open network, which is good for satisfying customers' all kinds of needs and contribute to the management of customer relationship.
2. Increasing of Business Events : By implementing supply chain management based on e-commerce, it can realize electronization and networked management of product and business in the supply chain management system. And at the same time, all the enterprise in the supply chain can realize organized and designed unified management by some business means, reduce   intermediate links, reduce cost, improve efficiency, make the supply chain to a higher level, keep up with the advanced ones, and promote the development of enterprises.
3. Improving the Operating Performance of the Enterprise : Implementing the supply chain management based on ecommerce can also provide overall service for customers, let customers acquire the best quality of products and services, and at the same time realize the largest value-added. It can also provide whole e-commerce transaction service, realize global market and enterprise resource sharing. Supply and deliver order goods to customers in time, reduce operating and purchase cost, improve operating performance.

2.3. Modelling In E-Business and Supply Chain Management

There are four models that cover the bulk of quantitative models used in relation to e-business supply chain [6].
1. Statistical and sampling data models and inference. These include more recent models of data mining, industrial cluster.
2. Optimization. These are models from a single decision maker's perspective

3rd International Conference on Engineering & Technology Development 2014
Faculty of Engineering and Faculty of Computer Science
Bandar Lampung University

46

3. Game theoretic/equilibrium models Such models attempt to model multiple entities actively participating in defining joint outcomes.

4. Decision support. Simulation and system dynamics are one important class of models, besides that visualisation support and the provisioning of triggers for making decisions of various types.

2.4. The Frontiers of E-Business Technology

The e-business technologies has some impacts on supply chains in four areas [7].

1. The Product Design Cycle : eBusiness technologies have impacted product design processes in three ways. First, to manage shrinking product life cycles, suppliers, and manufacturers are sharing design and engineering information over the Internet in the early stages of product development. The premise of such web-based collaboration is faster time-to-market, quicker upgrades, efficient life cycle management, and the elimination of unnecessary inventory. Second, many companies are finding ways to reconfigure products quickly to better match supply and demand. Third, sustainability is quickly becoming an important aspect of product design. Internet-based technologies are helping supply chains reorganize to manage the reverse loop from maintenance and after-sales service, eventually to recovery after end-of-use.

2. Collaborative Planning & Logistics : Firms have long realized that collaborating on procurement and replenishment increases product velocity while improving efficiency. Examples include vendor-managed inventory (VMI) agreements in the consumer products industry; Efficient Customer Response (ECR) initiatives in the grocery industry; and Quick Response in the Apparel industry. The latest Internet-enabled initiative is Collaborative Planning, Forecasting, and Replenishment (CPFR) whose central premise is that short- and long-term information regarding POS data, forecasts, shipping, and production plans; and order generation, is shared by supply chain partners over the Internet, who in turn use the information for joint planning.

3. Streamlining the order management cycle : The order management cycle (OMC) is the management of a customer order from the time it is placed to the time the product is delivered to the customer. This includes order preparation, transmittal, order picking, and packing, and eventually transporting it to the customer. Often the cycle extends beyond delivery to include after-sales service and product end-of-use recovery. The latest technology-enabled trend in managing the OMC is two-pronged: first, Customer Management Tools (like CRM & Demand management software) are making it possible to understand, market to, and serve the customer better. Second, an evolving trend in managing the OMC is the concept of fulfillment at web-speed.

4. Supply Chain Metrics : Performance measurement in the supply chain is evolving from traditional product-based functional financial measures internal to the firm to a dashboard of financial, time, logistical, and service measures that span every link in the supply process. Since the supply chain usually involves more than one firm, it is important for managers to evaluate what every firm brings in terms of costs and benefits to the supply chain.

2.5. Using Software As E-Business Strategy

Internet-enabled supply chains can reach out to a bigger market; perform mass customization to tailor product and services to meet the individual customers' needs and develop new products and services that adapt to the competitive and environmental needs. The Internet changes the way in which supply chains are managed, planned and controlled. The information, decisions and processes that form supply chain management are moving to the Web, breaking old paradigms of inter-company boundaries. This common ground will be where entire supply chains truly can be synchronized. In this environment, supply chain capabilities will be crucial. But gaining those vital competitive capabilities will not be through the typical supply chain initiatives of today. [8].
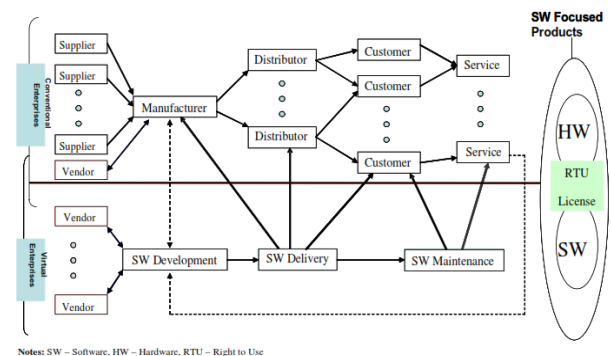

Notes: SW – Software, HW – Hardware, RTU – Right to Use

Figure 2. Software Focused In Supply Chain Management [8]

Software focused supply chain is a supply chain of software focused products and services. A software focused product consists of hardware component and software component, where the software component is either the higher value part of the product, or the major innovation of the product, or the main differentiator of the product. [8].

III. STRATEGY MODEL FOR IMPLEMENTING E-COMMERCE

3.1. Boundaries of E-Commerce

The impact of e-commerce is already being seen on the boundaries between companies, particularly in industries where great value is placed on inter-company collaboration. e-commerce will be a key enabler of this breakdown of boundaries, because it provides not only the solutions required for inter-company transactions but also the standards that will enable companies to connect and communicate. The breaking down of inter-company boundaries is likely to be a slow process. By establishing common standards for data

3ʳᵈ International Conference on Engineering & Technology Development 2014
Faculty of Engineering and Faculty of Computer Science
Bandar Lampung University

47

connectivity and content, e-commerce solutions have the capacity to eliminate a great deal of unnecessary duplication of effort in companies. The breaking down of inter-company boundaries can be seen in at least three areas [2]:

1. Inter-company collaboration. Collaboration is the logical next step in the process of breaking down barriers. Collaboration can happen without e-commerce, as already seen in famous case studies such as Procter & Gamble and Wal-Mart. However, a new phase of intercompany collaboration is now being enabled by e-commerce. Cisco and Flextronics provide a good example of how new levels of collaboration are being achieved between best partners almost one supply chain at a time.

2. E-marketplaces. Avast investment of money and time has been made in the building of e-marketplaces whether they are private, independent or consortia. Despite the predictions of industry outsiders, these marketplaces generally have failed to make a significant impact on industries. Some of these e-marketplaces will focus on areas such as indirect procurement or industry data standards and connectivity. In a more focused way, they will help to break down a number of inter-company boundaries.

3. Supply chain event management. The number of software vendors offering event management solutions has also risen. These e-commerce solutions set out to improve overall inter-company transactions by highlighting and sorting out problems in the supply chain. This technology has great promise, although it is still early days. Event management technology also offers the possibility that true intelligent fourth-party logistics companies could emerge soon.

3.2. Critical Success Factors For B2B E-Commerce

Learning from best experiences companies applying supply chain, there are some critical factors affecting B2B e-commerce, as stated below [9]:

1. Competitive Environment : The competitive environment is considerable as a significant factor related to strategic e-business management. The findings indicate that the environmental competitive factors have results in more complex supply chain operations and relationships. Organizations are facing competitive pressures to reduce costs and time to market, and increase product innovation and service quality.

2. Government Involvement : To encourage e-business diffusion, a government can provide supportive infrastructure, legislation, funds, industry policies and regulatory frameworks. In particular, small firms have lack skills and have fewer resources to facilitate adoption than do large firms. The government needs to continue to play the role of catalyst, accelerator and promoter with particular regard to e-industry policy.

3. Profitability of business : Supply chain may have a major impact on firms profitability. Collaborative B2B e-commerce systems can be used to achieve the lowest operational cost and time. Thus, e-business strategies for reducing cost include: e-commerce systems implementation, forming strategic alliances with key suppliers, collaborating in new product

development and functional alliances within the collaborative teamwork to speed up the cycle time of the supply chain. Some companies adopt B2B e-commerce technologies to help increase sales and services, to enhance firms ability to have the right product available for customer purchases at the right time.

4. Managing Partnerships : The key to a seamless supply chain is making available undistorted and up-to-date information at all levels within the supply chain. The trust-based sharing of information within the entire supply chain can create flexibility, but this requires timely, accurate information and secure transactions. By developing strategic partnership relationships with suppliers, it is possible to work more effectively with a few important suppliers who are willing to collaborate and share information for the success of products or services.

5. Customer Satisfaction : Customer service is to be viewed as the most important consideration for any firm in both the business-to-business (B2B) and the business-to-customer (B2C) markets that has led to many changes in supply chain practice and service approach. Customer service is an increasingly important focus of management attention since it creates wealth for the company by adding value for the customer.

6. Change Management : In our findings, implementation of an e-commerce system also brings increases in operational efficiency and effectiveness and a chance to re-engineer the business process. Business process re-engineering (BPR) is an activity that involves managing the restructuring of operation processes in an effort to improve efficiency. In fact, integration of business processes is often the justification for many information systems implementation. The changes to the firm may be inevitable, and can impact upon virtually every business process or function within the organization. Through B2B e-commerce application for e-supply chain integration, it is possible to improve inter-organizational level coordination and hence move towards the optimization of the supply chain.

7. Project Management : Higher management support is crucial for any successful e-commerce project in the organization. To implement e-business solutions successfully, the main managers must understand and monitor significant problems that affect project performance, provide directions to the project teams and establish clear priorities to achieve e-business strategy. They perceive this critical path layout as being important and relevant to successful e-commerce project implementation. Some successful e-commerce projects depend on the capabilities and experiences of the consultants because the consultants have greater proficiency and in-depth knowledge of the software.

8. Knowledge Management : Knowledge management plays an important role within e-business strategy since SCC success is critically dependent on diffusion of knowledge and innovation in all aspects of the organizational learning and external environment collaboration. Strong relationships usually effect a close interaction and thus facilitate the

3rd International Conference on Engineering & Technology Development 2014
Faculty of Engineering and Faculty of Computer Science
Bandar Lampung University

48

exchange and transfer of knowledge across the interface of alliances.

3.3. Grand Design of E-Commerce Supply Chain System

The system has structured a unified business logic based on the design of underlying function modules. All sales channels share such unified business logic so that a more consistency customer experience is provided. Figure 1 shows the overall structure of B2B E-commerce supply chain system. This system comprises five parts [1]:

1. Enterprise application portal. As a unified access, it provides personalized information, services and applications for relevant staff on the same value chain including employees, partners of the enterprise and final customers. It is an application based on web that integrates different applications, back-end system, service and information into one man-machine interaction platform.

2. Front-end trading system. Including such front-end sales logics including commodity demonstration, order capture, marketing, pricing strategy and user management, it is the core application module of the whole scheme. In addition, this module comprises a strengthened function package customized for the domestic e-commerce field.

3. Back-end business supporting system. It is structured by a series of modules and applications that support back-end support to E-commerce transactions. The supports cover main data management, commerce intelligence, souring optimization, business monitor and application integration.

4. Partner system and service support. It defines and provides the technology frame and data format that carry out interaction or integration with enterprise's external applications and services such as enterprise resources planning, customer relationship management, supply chain management, online payment, sourcing and logistic distribution.

5. Enterprise service bus. As base installation for providing integration of applications, it provides reliable information transmission, service access and carries out transformation between agreement and data to achieve highly efficient, reliable and flexible integration among all the modules in the whole e-commerce system.
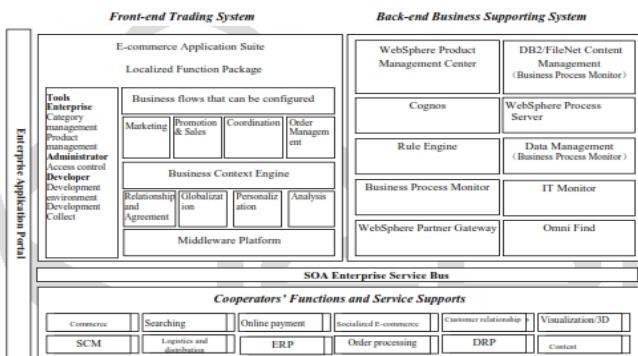

Figure 3. Overall Systems E-Commerce [1]

The previous system is based on a mature and complete E-commerce system business environment, covering all the aspects that might be involved in the e-commerce trading process. Because the each of the aforesaid five parts bears different functions, the adjustment and tailoring of different scale can be carried out according to the features of the clients to adapt the demands of different enterprises of diversified scales and development stages in the E-commerce field. Features of functions are introduced specially below [1]:

(1) Unilateral platform various commerce models : Business models including B2C and B2B are supported on the same application platform. This feature saves IT investment for the enterprises that expect to run several e-commerce models at the same time.
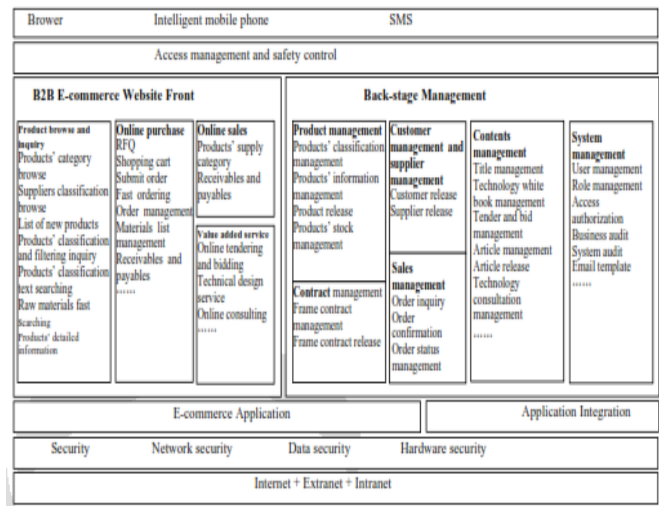

Figure 4. Function Modules E-Commerce B2B SC [1]

(2) Configurable commerce flows : Business flows provided in the system can be configured by modifying commerce strategies or contract terms. Enterprise may carry out timely adjustment on the existing business flows according to market situation, customers behaviors and enterprise development through such function so as to greatly shorten the market responding time and improve the capacity to changes.

(3) Efficient and flexible order processing : Conformed back-end order management function provides unified and cross-channel order management view to the business operators, having improved the order processing efficiency and the customers' satisfaction.

(4) Strong B2B functions : Aiming at the features of B2B business models, supports of functions including purchase order and channel management, enterprises trading contracts and clauses and online inquiry and bargaining have been provided.

IV. MODEL PHASES OF E-COMMERCE

Supply Chain Efficiency can improve customer service having the right product at the right place at the right time.[10] An integrated model is now emerging that is accessible to companies of all sizes and is based on internationally recognized standard. The integrated business models for

3rd International Conference on Engineering & Technology Development 2014
Faculty of Engineering and Faculty of Computer Science
Bandar Lampung University

49

electronic commerce has become a reality through the world wide web as the commercial platform in both business-to-business and business-to-consumer markets. Clarke (1993) proposed a five-phase process model for electronic commerce, which is summarized below [11]:

1. Pre-contractual phase : Focused on the gathering of knowledge concerning the products and services being sought, and identifying potential sources of supply that may be from the marketspace or marketplace. Virtual sourcing is considered as a shift in the gathering of information process from the physical to the use of semi-intelligent software agents, for example software from Autonomy (www.autonomy.com).

2. Contractual phase : The stage when formal relationship between buyer and seller is created. This phase will include the establishment or acceptance of terms and conditions for transactions under the contract. The learning curve, undertaken by many organisations operating B2B markets, in the implementation of EDI systems are transferable skills to internet based buyer-supplier activities.

3. Ordering and Logistics phase : For organizations operating in business-to-business markets, purchase orders are placed and processed and at this stage goods transported physically or virtually to the customer. In business-to-consumer markets this phase is probably part of the following phase and settlement will typically be expected at the time of ordering. FedEx (www.fedex.com) provides the currently accepted business model on the Internet for goods being tracked by the sender and receiver throughout the delivery process.

4. Settlement phase : This phase will include invoicing, payment authorization, payment and remittance transmission. Through the acceptance of the Web as a means of buying and selling the ordering, logistics and settlement have become integral activities for many organization especially in business-to-consumer markets.

5. Post Processing phase : Gathering and reporting of management information based on the analysis of trade information and statistics. The Internet has created far greater integration between the buyer and the seller and as a consequence virtually real time statistics can be view through web based management reporting tools for example Web trends (www.webtrends.com).
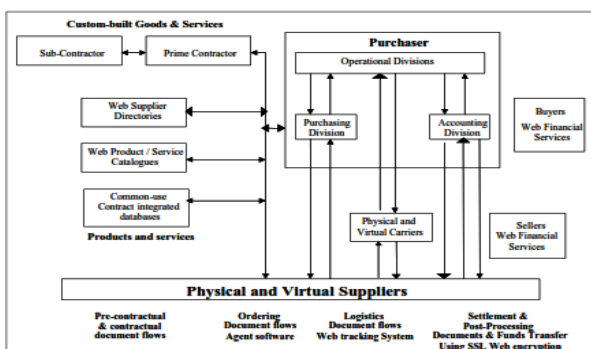

Figure 5. Five Phases of E-Commerce Supply Chain [11]

The web is allowing a highly integrated approach towards on-line transaction systems between buyers and suppliers. Businesses are able to establish new electronic storefronts on the web or move existing electronic transactions on to the Internet. In establishing transaction systems on the web it requires both a technological understanding but also a new way of thinking about virtual markets. The global reach creates many new challenges as well as opportunities in terms of realising cost efficiency, customisability, speed and quality of service. Business transformation is inevitable when Web payment systems are used to automate business processes. Business-to-consumer (B2C) markets are synonymous with Amazon (http://www.amazon.com) model of on-line trading, while in business-to-business (B2B) markets internet Exchanges are becoming drivers of emerging industry trading hubs.

V. CONCLUSION

The global B2B E-commerce in supply chain management will give some designs and impacts to business organization as internet technology developing mobility today. In industrial relationship, products and service for partnership will be built with enterprise application portal which in near future it is recommended to empower business function within business organization. E-commerce model actually has focused more on social resources and information which provides better customer experience. Some aspects viewed from industrial field will give modified pattern in e-commerce systems as new ideas in improving customer service.

References

[1]. Hui Tan, "Research and Design on B2B E-Commerce Supply Chain Management Based on Intermediary", Lecture Notes in Information Technology, Vol 19, International Conference on Convergence Information Technology 2012, page 91 – 94.

[2].Andrew J. Berger, " e-commerce and supply chains – breaking down the boundaries", http://www.ashgate.com/pdf/SamplePages/ghsupplych4.pdf.

[3]. Yang Xu, Qian Guo, "E-Business Impact On Supply Chain Management", http://www.sbaer.uca.edu/research/swdsi/2003/Papers/016.pdf.

[4].Ambuj Kare, Anurag Saxsena, Peeyush Teewari, "Supply Chain Performance Measures for Gaining Competitive Advantage : A Review. Journal of Management and Strategy, Vol. 3, No. 12, April 2012, page 29.

[5]. Meng Yang, "Supply Chain Management under E-Commerce Environment", International Journal of Innovation, Management and Technology, Vol 3, No. 3, June 2012, page 210.

[6]. Narayan Rangaraj, "Modelling in E-Business and Supply Chain Management", Invited paper for the Workshop on Frontiers of E-Business, organized by GM-India Science Labs, Bangalore, December 2005.

[7]. Tonya Boone, Ram Ganeshan, "The Frontiers of E-Business Technology and Supply Chains", Journal of Operations Management 25, page 1196 – 1198, 2007.

[8]. Chengxuan Cao, Heng-Qing Ye, Xue Ming Yuan, "e-Business Strategies for Software Focused Supply Chain Management", 2006 IEEE International Conference on Industrial Informatics, page 765 – 766.

[9]. Kuo-Pin Chang, Gary Graham, "E-Business Strategy In Supply Chain Collaboration : An Empirical Study of B2B E-Commerce Project In Taiwan", International Journal of Electronic Business Management, Vol. 10, No. 2, page 101-112 (2012).

[10]. Shaojun XIAO, Shensheng ZHANG, The Role of Supply-Chain Management in E-commerce, http://unpan1.un.org/intradoc/groups/public/documents/un/unpan001216.pdf

3rd International Conference on Engineering & Technology Development 2014
Faculty of Engineering and Faculty of Computer Science
Bandar Lampung University

50

[11]. Glenn Hardaker, Gary Graham, "Energizing your Supply Chain for e-Commerce", http://impgroup.org/uploads/papers/61.pdf