

A STUDY OF THE UTILIZATION OF INFORMATION TECHNOLOGY FOR SUPPLY CHAIN MANAGEMENT (SCM) IN MICHIGAN

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ABSTRACT

Rapid growth of supply chain management (SCM) systems has brought significant changes to manufacturing industries. Supply chain management (SCM) systems are integrated computer information systems processing all the business activities from suppliers to customers. The purpose of this paper is to study the effectiveness and usefulness of the information technology in the State of Michigan.

I. INTRODUCTION

Recent development in the evolution of information systems has been directed toward integrating all the business activities from suppliers to customers. These information systems are commonly referred to as Supply Chain Management (SCM) systems (Lee & Etnyre, 2003; Fiala, 2005). SCM is thought to be an important tool to improve logistics efficiency and create customer value (Chopra & Meindl, 2001; Fiala, 2005). The purpose of SCM systems is to incorporate order entry, purchasing, and direct interfaces with customers and suppliers such as e-procurement and advance shipping notices (Bhaskar, 2005). One of the important features of an SCM system is its global supply network. A company may use a full integrated SCM system to receive a sales order from a customer in Europe, issue the procurement orders for parts to suppliers in Mexico and China, plan for assemble, and notify shippers and customers on both ends of the transactions. It is believed that SCM systems provides a broad range of general benefits such as lower operating cost, higher operating efficiency, improved customer perception, increased product quality and enhanced vendor relations (Yang and Whitfield, 2004).

SCM systems were evolved from the Enterprise Resource Planning (ERP) systems (Chen, Lee, Yang, 2002). Since 1980, ERP was one of the major information systems for production planning and control. SCM, however, is more specific with e-procurement, logistics management, global collaboration, and new technology such as radio frequency identification (RFID) (SAP, 2005; Hannon, 2005). Other information technology includes:

1. Business Intelligence (BI) or Knowledge Management (KM) software
2. Customer Relationship Management (CRM) software
3. Artificial Intelligence (AI)
4. Computer-aided Design (CAD) and Computer-aided Manufacture (CAM)

Leading SCM software packages include SAP R/3, Oracle, and PeopleSoft. In 2002, the Ford Motor Company and Caterpillar dealers started the process of installing SAP for supply chain project (Songini, 2002).

The State of Michigan, along with the nation, is no exception to information revolution and is under immense pressure to adopt new global supply chain information systems. Since the 1980s the state's economy was hurt severely by competition from Japan in the auto industry. Business leaders in Michigan realized the importance of market diversification and the development of manufacturing industries. The rapid growth of global supply chain management (SCM) provides an opportunity for reshaping the economical structure of Michigan. Assisting these manufacturing companies to successfully adopt new SCM systems becomes an important issue.

Case studies in the United States regarding SAP and ERP projects indicate some successful experiences by production and service firms. However, implementing an SCM and ERP system requires that the company changes its business process and culture to match the approaches implemented in the specified software design (Chen & Lee, 2000; Cotter, Chen, & Lee, 2000). Applied Materials, Inc. originally thought that implementing SAP R/3 to 2,200 users would take approximately one year but unexpected complexity and lack of expertise have delayed their project for more than two years and cost \$23 million (Bancroft, 1996; Chen, Lee, Yang, 2002).

The rationale for this study is based on the lack of empirical data on the impact of implementing SCM systems to manufactures in the Michigan area. In order to support SCM operations, delivery frequency increases and product quality improves (Bancroft, 1996). Like an ERP system, the exchange relationship between the buyers and sellers may become closer. An SCM system may require a total new philosophy in which the suppliers become trusted members of the team (Gaither & Greg Frazier, 1999). Technologies such as E-procurement, Electronic Data Interchange (EDI), and Radio Frequency Identification (RFID) may have a positive impact on the SCM implementation.

The purpose of this study is to investigate the effectiveness and usefulness of the implementation of information technology in the State of Michigan. This study will provide information related to the following research questions:

1. What would be the impact of SCM systems to production/operations? What are the new production/operations strategies for SCM systems implementation? What are the differences in production/operations strategies between SCM users and non-SCM users? What is the impact of SCM systems for Michigan Companies in a

- global environment?
2. What are the new information strategies for the implementation of the SCM systems? What computer software, hardware and systems are being used to assist SCM implementation? How long does it take for a typical company to finish the SCM implementation? What is the obstacle to use the SCM systems?
3. What are the characteristics of companies that are successfully implementing SCM systems?

II. RESEARCH METHODOLOGY

The original research methodology is to use survey techniques to answer the research questions. This research surveys companies in Michigan. Both probabilistic and non-probabilistic sampling methodologies will be used. Quantitative and qualitative methods will also be used to analyze the survey data generated.

Due to the possible low response rate, the new goal is to use extensive case studies and informal interview of Michigan companies because of possible low response rate on mailing surveys. The questionnaire is used as a tool for structure interview. The additional goal is to review the SCM vendors in Michigan and their experiences with SCM customers.

III. RESEARCH RESULTS AND RESEARCH FINDINGS

One of the major limitations is that the extensive case studies of manufacturing and service companies in Michigan do not provide the statistical significance of the research finding. The following is a preliminary conclusion from the case studies:

1. *What would be the impact of SCM systems to production/operations? What are the new production/operations strategies for SCM systems implementation? What are the differences in production/operations strategies between SCM users and non-SCM users? What is the impact of SCM systems for Michigan Companies in a global environment?*

The Supply Chain Management (SCM) systems, which are extension of Enterprise Resources Planning (ERP) systems, include SAP R/3 and APO, Oracle, PeopleSoft, and Microsoft Dynamics. The primary difference between ERP Systems and SCM systems is that a SCM system is an Extranet system while the ERP is an Intranet system or a close system. The ERP systems originally focus on the internal functions such as Accounting and Finance which exist within an enterprise. We found that the SCM systems focus on the external communications between suppliers (supplier relationship systems) and customers (customer relationship systems).

From the case studies we conducted, it is found that Michigan companies have a long history of implementing the SCM systems for production (manufacturers) and operations (service companies). The SCM systems contribute to the daily productions and operations in manufacturing and service companies. For example, Both the Toyota Research Center in Ann Arbor and Municipal Employees' Retirement System of Michigan (MERS) in Lansing use PeopleSoft.

Both Ford in Dearborn and DuPont in central Michigan use SAP systems. The new supply chain management strategies for SCM systems in a global environment are:

- a) **Make the systems web-enable.** Because of the popularity of Internet, many traditional SCM/ERP systems are transforming to web-enabled SCM systems. In web-enabled systems, suppliers and customers can enter the data from the Internet browsers. An example is the Salesforce.com for their CRM systems. Salesforce.com has lobbied Google to market Writely, a web-based software, to business customers and demonstrated it to managers at General Motors, GE, and DuPont (Ricadel, 2006). Google established an office in Ann Arbor, Michigan recently.
- b) **Add new input mechanisms to the existing SCM systems.** These new mechanisms are Radio Frequency Identification (RFID), wireless communication systems, hand-held devices, and wireless scanning systems for warehouse management and other SCM functions.
- c) **Formulate the new standards for RFID and other communications guidelines.** The Automotive Industry Action Group (AIAG) at Southfield, Michigan is working with major companies, including GM, Ford, and Chrysler, RFID systems integrator Lowry, systems integrator Schaefer Systems, auto parts supplier Visteon, and RFID hardware provider Intellex, to formulate new guidelines for implementing RFID technology and bar-code labels for track the containers (Bacheldor, 2007).
- d) **Enhance the security function of new SCM systems.** Because of the web-oriented systems and the interaction with external suppliers and customers, security is a major concern for SCM systems.

2. *What are the new information strategies for the implementation of the SCM systems? What computer software, hardware and systems are being used to assist SCM implementation? How long does it take for a typical company to finish the SCM implementation? What is the obstacle to use the SCM systems?*

Moberg et al. (2003) list seven barriers to effective supply chain relationships

1. Lack of Trust
2. Little Understanding of or Commitment to SCM Principles
3. Fear of Relinquishing Control
4. Different Goals and Objectives
5. Inadequate Information Systems
6. A Short-Term "Wall Street" Focus on Outcomes
7. Involvement in Too Many Supply Chains

In this research, the obstacles for adopting the SCM systems are 1) cost, 2) the long lead time from installation to operations, and 3) training cost. Therefore, the new information strategies are:

1) **Select a stable but inexpensive product.** The cost of implementing a large SCM system such as SAP is more than several millions dollars. Cost is the major consideration for small and medium suppliers. Many small companies turn to software such as the Microsoft Dynamics GP or other software. Technology Resource Network LLC, an accounting software advisory group based in Ann Arbor, Michigan provides e-Banking function for their customers, who are using Microsoft Dynamics [2]. Atrio Systems, Inc. in Pontiac, Michigan also provides the consulting service on Microsoft Dynamics Customer Relationship Management (CRM) software. The cost is only a fraction of traditional SCM systems. SAP has announced to enter small and midsize

business market in Michigan area since 2003 but the price of SAP software is still too high [3].

2) **Provide end-user training to employees.** The more complex the SCM system is, the more importance it is in implementing the SCM systems.

3) **The support from the top management.**

3. What are the characteristics of companies that are successfully implementing SCM systems?

Moberg et. al. (2003) mentioned that in a Deloitte study “of companies claiming to embrace SCM, only 2 percent reported any appreciable supply chain success. Moreover, those supply chain success stories that we do hear about typically involve only two massive companies, usually a retailer and a manufacturer. “

Moberg et. al. (2003) listed the following way to overcome the barriers of implementing SCM system:

1. Develop a New Breed of Manager
2. Build Relationship-Management Skills
3. Establish Inter-organizational Teams
4. Create New Performance Measures
5. Invest in Information Technology
6. Develop a Long-Term Focus in Boardrooms and on Wall Street
7. Engage in More Practical and Applied Research

However, the success rate seems to be increasing. The characteristics for those companies which successfully implementing SCM systems also include 1) the consulting company, 2) the detailed plan from the managers and IS implementing team, and 3) the training support to the end-users.

For example, An integrated energy company in Michigan consists of two subsidiaries and is listed currently among the Fortune 500. The goal is move data from two locations to its Michigan headquarters. The consulting company Modis “provided technical professionals in multiple skill sets to assist with this data center move. Modis delivered an infrastructure project manager, technical support professionals, technical writers and client-server programmer analysts to complete this project.” (Modis, Inc., 2007)

REFERENCES

- Bancroft, N. H. (1996). Implementing SAP R/3: How to Introduce a Large Organization, Greenwich, CT: Manning Publications.
- Bacheldor, B. (2007). AIAG Plans to Issue RFID Guidelines for Containers in Early 2007, RFID Journal.
<http://www.rfidjournal.com/article/articleview/2778/1/1/>
- Bhaskar, R (August 7, 2005). Procurement Strategy: Key to Successful E-procurement,
<http://blogs.ittoolbox.com/supplychain/eprocurement/>, Retrieved 10/10/2005.
- Chen, K., Lee, H., and Yang, J. (2002). “An Investigation of Employees’ Perceptions of the Implementation of ERP Systems in Three Manufacturing Companies,” Communications of the ICISA, Vol. IV, No.1.
- Chen, K and Lee, H.(2000). A Study of a Computer-Based Training System for Enterprise Resource Planning (ERP) Subject in POM and Information Systems Courses, Proceedings of Southwest Decision Sciences Institute, Thirtieth Annual Conference, San Antonio, Texas, March 2000.

- Chopra, S. & Meindl, P. (2001). Supply Chain Management: Strategy, Planning, and Operation, Upper Saddle River, NJ: Prentice Hall, p.335-355.
- Cimulus (2007). Inc, Case Study: Diversity Products, http://www.cimulus.com/documents/os_diversity.pdf, Retrieved July 30, 2007
- Cotter, C., Chen, K and Lee, H. (2000). The Use of the Enterprise Resource Planning Software in Three Chemical Companies, Issues in Information Systems, Vol. I.
- Fiala, P (Oct, 2005). Information sharing in supply chains, Omega, Vol. 33, Issue. 5., p. 419.
- Gaither, N. & Frazier, G. (1999). Production and Operations Management, 8th edition, Southwestern Publishing, 1999.
- Hannon, D. (Sep 15, 2005). Purchasing, RFID News. Vol. 134. Issue. 15. p.52.
- Kirk, K. (2006). Mandatory Radio Frequency Identification (RFID) of Cattle in Michigan, http://www.michigananimalid.com/Mandatory_Radio_Frequency_Identification_RFID_of_Cattle_in_Michigan.pdf, Retrieved September, 2007
- Lee, H & Etnyre, V. (2003). A Study of .Net Framework, XML Web Services and Supply Chain Management, Journal of International Technology and Information Management.
- Moberg, C. R., Speh, T. W., & Freese, T. L. (Sep 1, 2003). SCM: Making the Vision a Reality, Supply Chain Management Review, <http://www.freeseinc.com/Monographs/SCM%20Vision.pdf>
- Modis, Inc., <http://www.modisit.com/Case-Studies/Utilities>, Retrieved July 30, 2007.
- Gupta, U. G. (2000), Information Systems, Prentice Hall, Inc, Upper Saddle River, New Jersey.
- Ricadel, A. (Aug 28, 2006). In Depth: Google Discloses Plans For Long-Awaited Office Suite, First Components Due This Week , InformationWeek, <http://www.informationweek.com/software/showArticle.jhtml?articleID=192300431>
- Roybal, J., (April 1, 2007). All Tagged Up, MyCattle.com, http://www.mycattle.com/news/dsp_national_article.cfm?storyid=19996, Retrieved July 30, 2007.
- SAP, mySAP SCM: Collaboration, Planning, Execution, and Coordination across the Adaptive Supply Chain Network, <http://www.sap.com/solutions/business-suite/scm/index.epx>, Retrieved October 10, 2005.
- Sullivan, L (Nov 2, 2005). Ford Motor Enlists RFID Just-In-Time Delivery System, InformationWeek, <http://www.informationweek.com/story/showArticle.jhtml?articleID=173402517>, retrieved July 30, 2007.
- Yang, J. & Whitfield, J. M. (2004). Supply Chain Management Software Development: An Empirical Examination. Communications of IIMA, Vol. 4.
- Songini, M. L. (August 5, 2002). Ford, Caterpillar Team with SAP on Supply Chain Project, Computerworld, <http://www.computerworld.com/printthis/2002/0,4814,73207,00.html>, Retrieved October 10, 2005

Other references available on request