

Innovations in Supply Chain Management for Information Systems: Novel Approaches

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Modeling Accuracy of Promised Ship Date and IT Costs in a Supply Chain 1
Young M. Lee, IBM T.J. Watson Research Center, USA

In the current dynamic, competitive business environment, customers expect to see products they purchase to be shipped on the date it is promised. However, accurate calculation of promised ship date by suppliers can only be obtained at expense of corporate IT systems that provide accurate availability data. Our study indicates that refresh frequency of availability data in IT system substantially impacts accuracy of the ship date that is promised to customer. The value of customer service level corresponding to accuracy of promised ship date needs to be estimated against the costs of having necessary IT system. The estimation requires a simulation model of availability management process. In this paper, we describe how to model and simulate the availability management process, and quantify the customer service level resulting from various availability refresh rate.

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Cost Estimation in a Capacitated Environment 16
Mark Eklun, Israel Institute of Technology, Israel
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In this chapter we discuss rough-cut cost estimation in a capacitated made-to-order environment. We develop models that analyze the effects of shop workload, machine loading, and outsourcing decisions on product unit cost estimation. A comparative study of five alternative rough-cut cost estimation methods is presented. An activity based cost estimation model, which takes into account stochastic process characteristics as well as setup time, machine failures and product yields, was developed. The activity based cost estimation was found to perform better than the traditional cost estimation. We found that by taking into account the capacity and stochastic nature of the parameters, the cost estimation accuracy is improved significantly.

Chapter 3

Analysis of Financial Returns and Risks of Implementing RFID for Supply Chains 89

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Radio Frequency Identification (RFID) is believed to change how supply chains operate today. While RFID's promise for improved inventory visibility and automation in inventory management is making many supply chain players hopeful for increased sales and reduced operating costs, these benefits do come at a cost and involve risks. This paper presents a financial returns analysis that captures RFID's costs and benefits, and quantifies the financial risks of implementing RFID for various business sizes and products with different unit profits to understand when RFID makes business sense. More precisely, the returns analysis is performed using an econometric model to understand how break-even sales volumes, unit profits, tag prices, return on investment, and risks vary between a manufacturer and a retailer in a supply chain. The results are extended to multi-product cases as well. A sensitivity analysis is also performed to understand the returns in pessimistic and optimistic scenarios.

Chapter 4

Collecting Consumer Behavior Data with WLAN 125

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Knowing consumers' shopping paths is an essential part of successful retailing. Good space management requires accurate data about consumer behavior. Traditionally, these data have been collected through, for example, panel interviews, camera tracking, and in-store observation. Their nature is more or less subjective. Modern technology makes it possible to use more objective methods, such as wireless local area network (WLAN) and radio frequency identification (RFID). In this article we examine the possibilities WLAN provides information systems studies. The empirical data is collected from a large DIY (do-it-yourself) store. The results show that WLAN has great potential for accurate and objective data collection processes and modeling data in retailing.

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Facing the Challenges of RFID Data Management 142

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Radio frequency identification (RFID) has generated vast amounts of interest in the supply chain, logistics, and the manufacturing area. RFID can be used to significantly improve the efficiency of business processes by providing automatic data identification and capture. Enormous data would be collected as items leave a trail of data while moving through different locations. Some important challenges such as false read, data overload, real-time acquisition of data, data security, and privacy must be dealt with. Good quality data is needed because business decisions depend on these data. Other important issues are that business processes must change drastically as a result of implementing RFID, and data must be shared between suppliers and retailers. The main objective of this article is focused on data management challenges of RFID, and it provides potential solutions for each identified risk.

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The purpose of this chapter is to enhance our understanding of how web-based applications and complementary resources can work together to create competitive advantages in supply chains. This chapter is organized as follows. First, this chapter introduces the theoretical background of complementary resources. Then, it moves on to report a preliminary result of secondary data analysis that explores the role of complementary resources to the development of web-enabled supply chains. Lastly, this chapter reports a case study that focuses on identifying: 1) the complementary resources that influence the successful implementation of web-based applications for supply chain management, and 2) the degree to which certain types of complementary resources function to support the successful implementation of web-based applications.

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A Comparison of Information Technology in Supply Chains: U.S. Beef Industry and U.S. Food Industry 176

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Historically, the growth of the beef industry has been hampered by the various entities (breeders, cow-calf producers, stockers, backgrounders, processors, etc..) within the beef industry's supply chain. The primary obstacles to growth are the large number of participants in the upstream side of the supply chain and the lack of coordination between them. Over the last decade significant advances have been made in information and communication technologies. Many new companies have been founded to promote these technical advances. This research looks at both the upstream and downstream participants to determine the degree to which information technologies are currently being utilized and the degree to which these new technologies have driven performance improvements in the beef industry's supply chain. We find through our survey that, by and large, the beef industry does not use information technologies to their benefit and that the US beef supply chain is not yet strategically poised to enable the use of these technologies.

Chapter 8

The Impact of Social, Economic Variables and Logistics Performance on Asian Apparel Exporting Countries 204

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Endowed with abundant supply of raw materials and low labor cost Asian countries have become the world's largest exporters of apparel products for the past few decades. In 2007, the value of Asian suppliers' total apparel exports to the world amounted to US\$ 165 billion which represented 52% of the

world's total apparel exports. The gravity trade model is utilized with an exploration at the aggregate level. Analyzing the data for fourteen exporting countries and their sixteen importing partners from 2000 to 2007, the country-specific, economic, social factors, in addition to logistics performance are analyzed statistically to identify the major determinants that have influenced the apparel trading of Asian countries to the EU-15, and American markets. Taking the robustness advantage of the gravity model, the analytical results indicate strong support for the model with parameters including GDP, per capita GDP, population size, female employment, value added factors and logistics performance. All these show statistically significance and positive effects. In contrast, distance, real exchange rates and wages have negative impacts on apparel trading. An important finding is that new variables, namely exporting countries' logistics performance can derive competitive advantage, otherwise, it erects a trade barrier in its own right in apparel exports.

Chapter 9

A Supplementary Framework for Evaluation of Integrated Logistics Service Provider 216

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As a result of globalization, supply chains of many large business organizations nowadays tend to cover wider geographic areas spanning across different countries and continents. The growth in length and complexity gradually replaces the traditional linear supply chains with extended supply networks comprising not only suppliers, manufacturers, distributors, and end customers, but also service providers. With the increasing use of third-party logistics (3PL) providers by international firms seeking integrated logistics services, many global 3PL providers are forming partnerships with large corporations to take care of the latter's logistics operations in different regions. The selection of the right 3PL provider for alliance is therefore paramount to the success of global supply chain management. This chapter investigates the significance of this subject and proposes a supplementary framework for evaluation of 3PL providers as global logistics partners for international firms. Using resource-based view theory and competencies hierarchy as theoretical underpinnings, the framework focuses on the core competencies of 3PL providers and their abilities to attain economies of scale helping users achieve their outsourcing objectives.

Chapter 10

The Construction of Green Supply Chain Management System 239

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Considering the implications of EU environmental laws such as REACH (registration, evaluation, authorization, and restriction of chemicals) and EuP (directive on eco-design of energy-using products) as well as RoHS (restrictions of the use of certain hazardous substances in electrical and electronic equipment) Directive, they have been acquired to advance GSCM (green supply chain management) more and more. The aim of this article is to introduce the construction of GSCM system that improves collaborative relationships between an EEE manufacturer and its suppliers. The study is conducted in three steps. Firstly, the four elements, which are necessities to form collaborative relationships between an EEE manufacturer and its suppliers, are described. Secondly, the condition and construction of GSCM system including the four elements is proposed. Finally, we presented the method that the GSCM system is constructed as a practicable tool in the initial stage by a case study held in Shimadzu Corporation.

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This study investigated user satisfaction when a new interorganizational information system (green supply chain management system; GSCMS) was introduced to a supplier by a leader in the Taiwan electronic industry. GSCMS providers, according to the requirements of the supplier network leader, trained the representatives of suppliers. All suppliers of two sample vendors (manufacturers of electronic products) were surveyed. Five putative influencing factors were considered: perceived usefulness, perceived ease of use, training, computer anxiety, and computer self-efficacy. We find four factors significantly affect user satisfaction. The results show that the training provided by focal vendors will influence the satisfaction of users. Next, the anxiety and uncertainty experienced by users decreases when they acquire more knowledge about the operation of the new GSCMS. Finally, user satisfaction can be increased by designing the functions and interfaces of a GSCMS in accordance with the user perceptions of usefulness and ease of use, moreover, implications and suggestions are also discussed.

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With the rapid development of the Internet, many retailers and individuals nowadays use this technology to engage in direct e-retailing sales. In this article, we investigate the value of demand-forecast information sharing in a manufacturer-e-retailer supply chain. The value of market information depends not only on its accuracy, but also on the e-retailer's market power and the product's Web compatibility. We develop a theoretical approach to examine the value of information sharing for the manufacturer and the e-retailer first, and then we further check to see how information sharing is moderated by the e-retailer's market share and the product's e-market-base demand. Our results suggest that under some conditions, both the manufacturer and the e-retailer can be better off from information sharing. Especially when the e-retailer's market share is larger and the product's e-market-base demand is higher, information sharing is more valuable for the supply chain players. Using our analysis findings, we indicate marketing strategies that the manufacturer and the e-retailer may want to adopt.

Chapter 13

Designing a Dynamic Buyer-Supplier Coordination Model in Electronic Markets Using
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Functional relationship between supplier and buyer in an open market place leads to investigate the role of both quantifiable and non-quantifiable parameters in coordination mechanism with the aim of achieving higher performance in supply chain activities. Here, we develop a supply chain model and a new agent to analyze and simulate the players' behavior in the network. A cooperative game theory framework is utilized between buyer and supplier in order to increase the supply chain performance. The study is supported by presenting SC Net Optimizer as a tool for implementing the proposed coordination mechanism and evaluates the performance of the chain by simulation using stochastic Petri nets (SPNs). The model provides a more realistic optimization process by taking into consideration the dynamic information flow in an uncertainty environment.

Chapter 14

Strategic Management of International Subcontracting: A Transaction Cost Perspective 297

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Research on international subcontracting has been policy-oriented and industry-focused. There is a lack of understanding of the phenomenon from strategic management and international business perspectives. This article conceptualizes international subcontracting as a type of relational contract formed by buyers and suppliers from different countries, aiming to facilitate the sourcing of products or components with buyer-specific requirements. It builds a transaction cost model for studying the strategic choice of international subcontracting as an intermediate governance structure, sitting between arm's length outsourcing arrangement and vertically integrated multinational enterprises (MNEs). A set of propositions are developed to aid future empirical research and to provide managers with some guidelines for organizing supply chain across borders. The model also allows managers to examine the complex nature of a range of subcontracting relationships and identify the specific mechanisms that can be used to preserve and manage the dyadic principal-subcontractor exchanges.

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Streamlining information flows across the physical supply chain is crucial for successful supply chain management. This study examines different structures of e-networks (i.e., virtual supply chains linked via electronic information and communication technologies) and their maximum capabilities to gain e-network benefits. Further, this research explores four levels of e-network integration based on a 2x2 e-network technology and transaction integration matrix. Of the four levels, an e-network with high e-technology/high e-transaction integration appears to be most desirable for the companies that aspire to achieve the maximum benefits from their IT investments. Finally, this study identifies three alternative transformation paths toward a powerful high e-technology/high e-transaction integration network and discusses strategic implications of selecting those paths, in terms of e-network structures, availability of financial and technical resources, supply chain members' collaborative planning, e-security mechanisms, and supply chain size.

Chapter 16

A Strategic Framework for Managing Failure in JIT Supply Chains 328

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Supply chains can be disrupted at both local and global levels. Just-In-Time (JIT) companies should be particularly interested in managing supply chain failure risk as they often have very little inventory to buffer themselves when their upstream supply chain fails. We develop previous research further and present a strategic framework to manage supply chain failure in JIT supply chains. We identify two dimensions along which the risks of failure can be categorized: location and unpredictability. We go on to identify strategies which companies can use either before (proactive) or after (reactive) the failure to manage supply chain failure. We support our framework with examples of actual responses to supply chain failures in JIT companies. It is also hoped that our strategic framework will be validated empirically in the future leading to specific guidance for managers.

Chapter 17

A Nelder and Mead Methodology for Solving Small Fixed-Charge Transportation Problems 345

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The term 'supply chain management' has become common in the business world, which can be understood from the positive results of research in the area, particularly in supply chain optimization. Transportation is a frontier in achieving the objectives of the supply chain. Thrust is also given to optimization problems in transportation. The fixed-charge transportation problem is an extension of the transportation problem that includes a fixed cost, along with a variable cost that is proportional to the amount shipped. This article approaches the problem with another meta-heuristics known as the Nelder and Mead methodology to save the computational time with little iteration and obtain better results with the help of a program in C++.

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