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Introduction

Special issue: "Towards the Transition from Supply Chain to Alliance and Supply Networks: *Concepts, Models and Methodologies*"

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Charu Chandra is an Associate Professor at the University of Michigan-Dearborn. He is involved in research in Supply Chain Management, and Enterprise Integration issues in large complex systems. He has published several books, book chapters and papers in leading peer reviewed journals, in areas of supply chain management, enterprise modeling, inventory management and group technology. His PhD degree is in Industrial Engineering from the Arizona State University.

In response to the fast pace of changes in the business environment, the traditional Supply Chain entity structure is traversing from the simple, sequential-link, single objective format into the multi-nodal, multi-objective, complex, modular, and flexible Supply/Demand Alliance Networks. Embedded in this transition are specific product, process, and resource configuration that ensure an efficient extended and modular enterprise formed by these networks. In the emerging structure, the traditional supply chain management issues such as distribution network configuration, inventory control, supply contracts, distribution strategies, outsourcing and procurement strategies, and customer value become more complex since the network must be network-integrated rather than sequentially optimized. Problem solving for such issues has required development of innovative concepts, models and methodologies rooted in the inter-disciplinary approaches that recognize the inherent system structure in traditional supply chains, require modeling capabilities at macro and micro levels, and information sharing at all levels.

The motivation behind this effort is to stimulate discussion on the causes, issues, and opportunities that instigate the transformation of the supply chain entity to an alliance and onward to a supply network.

The purpose of this special issue is to promote and disseminate research that meets the above needs for managing complex and global supply/demand networks. Its contents offer researchers and practitioners relevant concepts, methodologies, and techniques for managing such networks.

The papers in this issue address many of the above issues conceptually and methodologically. We briefly describe contributions in each of the papers below.

In modeling supply chain, multiple interrelated decision-making models are frequently used. Model integration is a precondition for efficient development and utilization of these models. In their paper "Information Technology Support for Integrated Supply Chain Modeling", Chandra and Grabis discuss the use of modern information technology techniques and methods for integration of supply chain decision-making models. An approach to using information technology at various stages of model development is presented.

One of the efficiency traits of a modern supply chain is managing product development time for product(s) served by it. A knowledge management mechanism to share the supply network capabilities in order to meet the changing decision-making needs for problem-solving is essential for this purpose. In their paper "Developing a Knowledge Management Plat-

form for Automotive Build-to-Order Production Network", Smirnov et al. argue that developing and maintaining a competence directory of entities associated with solving potential problems can significantly reduce product development time. Further, linking this directory to decision points and problems can enhance its effectiveness. As a result, the problem of semantic interoperability between supply chain entities assumes added significance. The paper proposes an approach to building a knowledge management platform for a build-to-order production network to solve the problem. It is based on application of ontology management, context management and profiling technologies. An automotive industry example is illustrated.

Borrowing from Computer Science and Artificial Intelligence disciplines, agency theory is being increasingly applied to design and implement decision-making models for supply chain management. In their paper "Supply Chain Network Optimization based on Collective Intelligence and Agent Technologies", Sheremetov and Rocha-Mier present an approach to dynamic optimization of local decisions to assure global optimization in supply chain performance within the frameworks of a Collective Intelligence and Multi-Agent Systems. The proposed framework is focused on the interactions at local and global levels among agents in order to improve the supply chain business process behavior.

A pre-requisite for a supply chain is a cadre of suppliers who can deliver quality product on time and cost effectively. In their paper "Utilizing Analytic Hierarchy Process for Improved Decision Making within Supply Chains", Kumar and Bisson deal with the problem of supplier selection in an integrated supply network. The Analytic Hierarchy Process has been applied as a multi-objective decision support tool to assist firms in the supplier selection process. The application is illustrated through an example of a medical device manufacturer with supplier-customer alliances.

A good candidate for learning about supply chain behavior is the study of causes of disruptions due to imperfect production conditions. These conditions are attributable to the general environment in which the supply chain functions and may be caused by either internal or external conditions, or both. Chen and Lin in their article "Establishing an Adaptive Production System for Smoothing Disruptions in Supply Networks", deal particularly with the question of disruptions caused in the supply chain operations due to imperfect production conditions. They argue that in spite of demand volatility, in reality, a manufacturer also encounters a number of production uncertainties, such as quality variance, equipment and machine unreliability, and defects and shortage incurred from imperfect production planning, implementation, and processing. Further, they classify these imperfect situations into eight independently recurrent categories. Utilizing the property of recurrence of Markov chain, the limiting probability of each imperfect situation is calculated through the transition probabilities matrix generated from these imperfect production categories. Finally, an adaptive (s, Q) production system with finite states that forms a Markov chain to determine the reproduction point and the quantity of production is established to reduce the production uncertainty and smooth the entire supply chain performance.

Security management has become a critical topic that supply systems have to handle recurrently. Li and Chandra through their article "Toward a Secure Supply Chain: *A System's Perspective*", seek an essential paradigm shift to design/management for security within the context of supply chain management. They define security centric supply chain management with its fundamental tasks and requirements, aided by a metaphor borrowed from information security. They propose a referential taxonomy that systematically accounts for security constraints, requirements, instruments and management, and investigate its relationship to underlying supply chain constructs. Through this, they also discuss modeling issues based on dependency representation and probabilistic analysis, which are suitable for security management.

It is hoped that through these expositions of theoretical as well as practical solutions to supply chain management problems, this issue contributes in some small measure to the body of knowledge in this critical research area.

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