

Chapter 3

The Development and Analysis of Environmentally Responsible Supply Chain Models

Ehab Bazan

Ryerson University, Canada

Mohamad Y. Jaber

Ryerson University, Canada

ABSTRACT

Inventory management and supply chain management are integral issues and prime areas of concern in production and operations management, and industrial engineering. There is a drive for businesses and organizations to be accountable for their environmental impacts. Guaranteeing environmentally conscious supply chain operations is strongly linked to an organization's sustainability and overall success. The responsible management of forward and return product flows in production and inventory environments is a rapidly increasing requirement. This can be attributed to economic, environmental and/or regulatory motivations. Mathematical modeling of such systems assists decision-making processes and provided a better understanding of the behavior of such production and inventory environments.

DOI: 10.4018/978-1-5225-0635-5.ch003

Copyright ©2017, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

INTRODUCTION

Inventory modeling in supply chains is a prime concern for research in production and operations management and industrial engineering. The approach is to have mathematical representations of systems that can be studied and optimized to satisfy dynamic market demands. Most of these inventory models are managed by the classical analysis (profit-maximization/cost-minimization) approach. There has been a push for businesses and organizations to be accountable and responsible for environmental and social impacts of their operations. This drive has been derived from various internal and external stakeholders leading to new regulations being imposed. Such responsibilities have accounted for the introduction and application of various concepts, programs, and efforts (Richards, 1997). Some of these include: environmental management systems, integrated management systems, corporate social responsibility, life cycle assessment, design for environment, pollution prevention, sustainable development, environmental indicators and reporting to name a few.

Applying environmental management concepts to supply chains is becoming known as green supply chain management. Relatively, this concept is considered in its infancy and many individual efforts using a variety of approaches and methodologies are existent throughout the literature. In light of the current environmental responsibilities, interest in industrial environmental performance metrics is increasing. The coupling of such measures and their integration into product procurement/purchasing decisions, investment decisions, and their effect on supply chain environmental performance will only increase environmental awareness and the ability of decision makers to reach balanced judgments and achieve sustainable choices.

This chapter addresses the importance of environmental awareness in firms and organizations, and the integration of environmental consciousness into supply chains as a necessity for sustainability and continuous improvement. This chapter will focus on the mathematical modeling of supply chains highlighting research gaps and providing insights to future work that remains to be done to achieve environmental responsibility.

SUPPLY CHAIN AND SUPPLY CHAIN MANAGEMENT

Supply chains are an important element of any business whether it is manufacturing products or providing a service. It is a direct result of differences and discrepancies between supply and demand throughout the different stages of a business. Assume the following scenario of a vendor who supplies products to a buyer: if the demand is more than what the supplier offers, shortages will occur and may lead to possible back-logs or lost sales. Conversely, if the supply available is more than the buyer's

29 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/the-development-and-analysis-of-environmentally-responsible-supply-chain-models/161156

Related Content

Explainable Bayesian-Optimized XGBoost Model for Component Failure Detection in Predictive Maintenance

Hemant Kumar, Krishna Kant Bharti, Dharmesh Dhabliya, Rashi Agarwal, Sunil Kumar and Shivneet Tripathi (2024). *AI and Machine Learning Impacts in Intelligent Supply Chain* (pp. 137-155).

www.irma-international.org/chapter/explainable-bayesian-optimized-xgboost-model-for-component-failure-detection-in-predictive-maintenance/338145

The Role of Logistics Operations in Humanitarian Aids: Lessons Learned From the Syria Crisis

Islam Abdelbary and Rasha Hassan Elshawwa (2023). *Cases on International Business Logistics in the Middle East* (pp. 205-229).

www.irma-international.org/chapter/the-role-of-logistics-operations-in-humanitarian-aids/319409

Study on International Logistics Service Trade and Sustainable Development of Ecological Environment

Airong Zhang (2024). *International Journal of Information Systems and Supply Chain Management* (pp. 1-20).

www.irma-international.org/article/study-on-international-logistics-service-trade-and-sustainable-development-of-ecological-environment/337289

Ontological Representation of Virtual Business Communities: How to Find Right Business Partners

Ingrid Petric, Tanja Urbancic and Bojan Cestnik (2013). *Supply Chain Management: Concepts, Methodologies, Tools, and Applications* (pp. 1492-1506).

www.irma-international.org/chapter/ontological-representation-virtual-business-communities/73412

Pricing and Bundling Strategies for Competing Mobile Phone Supply Chains With Network Externality

Yunpeng Yue and Tiaojun Xiao (2020). *International Journal of Information Systems and Supply Chain Management* (pp. 54-77).

www.irma-international.org/article/pricing-and-bundling-strategies-for-competing-mobile-phone-supply-chains-with-network-externality/252819