

Sustainable Supply Chain Management

D. Bhuvana St. Joseph's College of Arts and Science for Women, Hosur, Tamil Nadu, India.

Corresponding author: <u>bhubalu2009@mail.com</u>

Abstract: Nowadays, the integration of sustainability into supply chain management (SCM) is a key issue for ensuring corporate competitiveness in face of dynamic ecological and social environments. This paper reviews 185 journal publications of the last 20 years that formalize issues related to sustainable supply chain management (SSCM) in quantitative models. In a content analysis, modeling and SCM characteristics as well as sustainability and SSCM constructs are elaborated. The models are assessed numerically by counting frequencies of occurrence and by clustering the paper sample according to selected characteristics. The findings indicate that SSCM models predominantly focus on deterministic approaches and the integration of environmental aspects of sustainability while neglecting stochastic modeling techniques and the consideration of social factors. By now, comprehensive modeling approaches are most often employed on intra-organizational levels whereas broader application areas are assessed by less complex models. The integration of pressures and incentives of external stakeholders or the formalization of sustainable supplier management and sustainability risks are identified as future research perspectives. Furthermore, the interrelationships between the triple bottom line dimensions are to be scrutinized in greater detail in order to avoid focused optimization of selected sustainability criteria. Seven modeling guidelines are derived from the reviewed literature to facilitate future model-based SSCM research. Keywords: Sustainable supply chain management · Quantitative modeling · Environmental management · Social responsibility.

1. INTRODUCTION

Supply chains have always been driven by a multitude of global and political forces, and even by weather and natural events. But there is one thing that's certain in supply chain management: change. Shifting trade, environmental, and economic trends are causing many businesses to rethink their dependency on overseas manufacturing. And it is SCM technologies to a large degree, that are driving the evolution toward near-shoring and more domestic manufacturing. AI-powered solutions allow businesses to safely narrow their margins, reduce surplus, and minimise production times. This ability to see around corners – and analyse data in real time – gives businesses the efficiency and productivity they need to become less reliant on foreign production. Another fastmoving development is the growing demand for transparency around the provenance and sustainability of products, from raw materials to labour conditions, and the fuels that power delivery fleets. Modern shoppers also want more control over omnichannel shopping and order fulfilment options which adds an ever-evolving layer of complexity to supply chain management processes. Meaning of supply chain management Sustainable supply chain management is the practice of integrating environmental, social and financial considerations into the sourcing, production and distribution of goods and services. What is an End-to-End Supply Chain? An end-toend supply chain is a holistic approach covering all supply chain functions-from sourcing raw materials and inventory management to product delivery and after-sales support. This approach ensures every process in the entire supply chain aligns seamlessly to enhance efficiency, making supply chains more resilient and efficient.

2. NEED FOR SUSTAINABLE SUPPLY CHAIN

Sustainable Supply Chains: This book focuses on the need to develop sustainable supply chains – economically, environmentally and socially. This book is not about a wish list of impractical choices, but the reality of decisions faced by all those involved in supply chain management today. Our definition of sustainable supply chains is not restricted to so-called "green" supply chains, but recognises that in order to be truly sustain- able, supply chains must operate within a realistic financial structure, as well as value to our society. Supply chains are not sustainable unless they are realistically funded and valued. Thus, a real definition of sustainable supply chain management must take account of all relevant economic, social and environmental

issues.

Best Practice in Supply Chain Management: Supply chain management is the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers (Harland 1996). Thus, supply chain management covers all the necessary movement and storage of raw materials, work-in-process inven- tory, and finished goods from the point-of-origin to the point-of-consumption. While transporting goods to where they are most valued makes economic sense, there are major social and environmental implications. For example, trucking product by road may lead to congestion and pollution. However, by packing a vehicle more densely, we can reduce both congestion and pollution, thus creating a more sustainable supply chain. This book is the culmination of a 3-year worldwide search for "best" practices in logistics and supply chain management to do just that – to develop more sustainable supply chains.

The Need for Sustainable Supply Chains: The work behind this book has been funded by the European Commission. The European Commission recognise the importance to the economy of efficient and effective supply chains, and also recognise the potential negative impacts on society and the environment – hence, their funding of this work. Freight transport can be considered to be the key element in modern supply chains. The demand for freight transport continues to increase. This increase is due not only to the increasing demand for physical products, but also to many supply chain management decisions. As supply chains have become more sophisticated, they have sought to become more responsive, more reliable and more efficient, often leading to increased transport requirements. This was highlighted in the SULOGTRA report to the European Commission in 2002, as discussed below. The application of modern management principles throughout the supply chain, such as Just-In-Time, lean production and Efficient Consumer Response, have led to more responsive, more flexible supply chains that enable firms to compete in a global market.

The Implications of Modern Supply Chain Management: While actual figures are always subject to change, update, and arguments over definitions, the trends in modern supply chain management are clear. The following chart shows freight transport growth of the EU27 countries in terms of weight (tonnes) and weight carried by distance (tonne km), as well as economic develop- ment (measured in GDP at constant prices)

3. E2E SUPPLY CHAIN VS. TRADITIONAL SUPPLY CHAIN

Consumers today demand faster fulfilment. Rigid, outdated traditional supply chain systems can't keep up with real-time shifts. E2E models bridge gaps through integration. Here are the key comparisons.

Visibility

End-to-end visibility spans the entire process, allowing managers to track everything from sourcing to customer delivery. A traditional supply chain focuses on select areas, often lacking full transparency across the entire supply chain. High inventory accuracy is crucial for avoiding fulfilment errors and costly delays, ensuring that every step of the supply chain is transparent and efficient.

Integration

An end-to-end supply chain integrates procurement, manufacturing, and supplier delivery agreements into one streamlined process. Unlike the fragmented, step-by-step nature of traditional supply chain models, E2E approaches foster cohesive operations and data exchange across all parties involved.

Responsiveness

E2E approaches improve responsiveness by using real-time data and demand planning to adjust workflows based on shifts in customer needs. Traditional setups rely on slower, manual processes, making it harder to adapt to supply chain disruptions or changing demand.

Seven help points

- Connect: Businesses can connect with suppliers, customers, and other stakeholders.
- Create: Businesses can create products and services.
- Customize: Businesses can customize products and services to meet customer needs.
- Coordinate: Businesses can coordinate with suppliers, customers, and other stakeholders.
- Consolidate: Businesses can consolidate resources and operations.
- Collaborate: Businesses can collaborate with suppliers, customers, and other stakeholders.
- Contribute: Businesses can contribute to customer value.

4. CONCLUSION AND RECOMMENDATIONS

A conclusion on supply chain management would highlight that effective SCM practices, by optimizing processes across the entire supply chain from raw materials to final delivery, can significantly enhance customer satisfaction, reduce costs, improve operational efficiency, and ultimately provide a competitive advantage for businesses through better responsiveness to market demands and agility in adapting to disruptions, while fostering strong supplier relationships and ensuring sustainable practices throughout the chain; however, successful implementation requires a holistic approach with robust data analysis, collaborative decision-making, and continuous improvement strategies to address complex challenges like global logistics and fluctuating market conditions.

REFERENCES

- Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: Moving toward new theory. International Journal of Physical Distribution & Logistics Management, 38(5), 360-387.
- [2]. Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. Journal of Cleaner Production, 16(15), 1699-1710.
- [3]. Sarkis, J. (2012). A boundary and flows perspective of green supply chain management. Supply Chain Management: An International Journal, 17(2), 202-216.
- [4]. Pagell, M., & Wu, Z. (2009). Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars. Journal of Supply Chain Management, 45(2), 37-56.
- [5]. Govindan, K., Rajendran, S., Sarkis, J., & Murugesan, P. (2015). Multi-criteria decision-making approaches for green supplier evaluation and selection: A literature review. Journal of Cleaner Production, 98, 66-83.
- [6]. Ahi, P., & Searcy, C. (2013). A comparative literature analysis of definitions for green and sustainable supply chain management. Journal of Cleaner Production, 52, 329-341.
- [7]. Beske, P., Land, A., & Seuring, S. (2014). Sustainable supply chain management practices and dynamic capabilities in the food industry: A critical analysis of the literature. International Journal of Production Economics, 152, 131-143.