

Abstract

In today's world supply chain has become more complex due to the multiplicity of drivers created by globalization, global geopolitical risk, technological disruption, market uncertainty, mass-customization and changing laws and regulations. Supply Chain Complexity (SCC) is one of the most difficult problems in today's global supply chains and assumed as the key impediment to business performance. SCC has the significant adverse impact on competitiveness, cost efficiency, customer satisfaction, product innovation and market share. It is imperative for the focal firm and its supply chain managers to know SCC drivers causing supply chain complexity. Identification and prioritizing of SCC drivers are required for effective monitoring and controlling of supply chain performance management.

Firstly, ranking and prioritizing the SCC drivers based on its impact on overall SC complexity enable SC policymakers to focus on key drivers. Qualitative situation-actors-process (SAP) and learning-action-performance (LAP) model has been applied to understand and analyze the concept of supply chain complexity drivers and its dynamic behaviour. Quantitatively multi-criterion decision making (MCDM) tool AHP is used to quantify and prioritize SCC drivers for managerial decision making. This study contributes towards developing a priority ranking of SCC drivers based on its impact on overall SCC.

Secondly, the context of the sustainable supply chain (SSC) is progressively getting attention among supply chain (SC) managers due to its competitive advantage in firms' performance. Though drivers of SSC and SCC have seemingly demonstrated mutual relationship in a practical scenario, supply chain managers tend to address respective drivers independently for managing and controlling. Limited availability of literature investigating interactions among drivers of SSC and SCC with its overall impact on the supply chain motivates deeper research. The established inter-relationship among the drivers of SSC and SCC can guide the supply chain managers to create a cohesive strategy for decision-making. The Delphi technique is initially applied to identify the critical SSC and SCC drivers followed by using interpretive structural modelling (ISM) to decipher the mutual relationship among the SSC and SCC drivers. The driving and dependence power of drivers provide a framework for SC practitioners to prioritize and focus on key drivers with a high impact on the overall outcome.

Additionally, manufacturing firms are constantly improving their supply chain strategies for efficient management of supply chain performance to enhance customer service by bringing in solution flexibility and product variety with a relentless focus on productivity and quality. For effective SCP management, it is critical that SCP metrics are identified/selected and important metrics with a significant impact on overall supply chain performance are ranked. The existing body of literature provides insufficient evidence of research aimed to investigate SCP metrics with identification, priority ranking, and inter-relationship among metrics, especially for a mining and earth-moving machinery manufacturing industry. To achieve this, a hybrid exploratory three-phased multi-criteria decision making (MCDM) model is adopted. The qualitative Delphi technique is initially applied to identify the critical SCP metrics, followed by Best-Worst Method (BWM) to rank SCP metrics, completed by decision making trial and evaluation laboratory (DEMATEL) method to establish the mutual relationship among the SCP metrics. The research finding suggests that sub-metrics such as flexibility in meeting customer needs, customer perceived

value, operating cost of SC, employee productivity, range of products and services, are significantly contributing to the overall SCP. This study has proposed SCP metric selection model highlighting cross-functional and inter-organizational importance in performance management.

Importantly, the research attempted to answer the key question “Which supply chain complexity drivers severely impact the supply chain performance?”, which remain largely unanswered from empirical research. It is critical for SC managers to know the drivers of SCC with significant negative impact on supply chain performance (SCP) for strategizing supply chain (SC). The present study decomposes the SCC into four major constituting sub-categories (upstream, operational, downstream, and external) to explore the causal impact of SCC drivers on SCP. This study examines the interrelationships among four major constructs of SCC with SCP, extended to the impact of SCP on customer satisfaction (CS) and market share (MS). The research work, conducted for Indian mining and earth-moving machinery manufacturing industry, explored the causality of inter-relationship by testing the hypothesis applying Structural Equation Modelling (SEM). The research outcome suggests the significant impact of upstream SCC and operational SCC on SCP. The result highlights the importance of CS in driving MS and provides empirical evidence that USCC has substantive positive impact on OSCC.