

Does Analysis-Driven Supply Chain Automation Enhance Operational Capacities?

Surender Singh Rawat¹, Reena²

¹PhD scholar, Baba Mastnath University, Asthal Bohar Rohtak

²Assistant Professor, Baba Mastnath University, Asthal Bohar Rohtak

Corresponding Author: Surender Singh Rawat, PhD scholar,
Baba Mastnath University, Asthal Bohar Rohtak

E-mail: surilinux@gmail.com

Abstract

Introduction: Technology-enabled big data analytics is the capacity to process vast quantities, in a timely manner, with considerable variation and variety of data in order to extricate valuable and significant insights that can assist organizations in attaining a competitive edge (Fosso et al., 2017).

Materials & Methods: Businesses in the UAE were sampled randomly. The survey's English-to-Arabic back-translation was modified multiple times. Line managers participated in the survey. UAE national attention was given to 400 companies. Division managers in the supply and logistics divisions were randomly given survey envelopes since they know their supply chains best. The similar technique has been used in supply chain analytics and supply chain innovation, risk management capacities (Kwak et al., 2018). Participants were asked to complete the survey at their convenience to maximize response rates. They were kept secret to minimize social desirability and technique bias. After collecting 245 survey forms, 32 were invalid owing to missing data.

Results: Therefore, by integrating big data analytics into operational procedures, organizations can leverage data to acquire strategic insights referred to as supply chain analytics in supply chain management (Jeble et al., 2018; Zhu et al., 2018). Big data analytics is a significant instrument that can enhance the performance of an organization, according to previous studies (Akter et al., 2016; Côte-Real et al., 2016; Ramanathan et al., 2017).

Conclusions: Supply and logistics firms may create value by engaging in BDA activities like supply chain analytics, according to this report. Supply chain analytics may boost competitiveness by fostering innovation, resulting in agile and resilient company operations

Keyword: Analysis; Driven; Supply Chain; Automation

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Introduction

Competitive weapons, specifically timely and high-quality data, can assist organizations in enhancing innovation within their supply chains (Fernando et al., 2018). Notwithstanding the assertions made in the literature, the precise influence that supply chain analytics (SCA) can have on supply chain management (SCM) remains unexplored (Lai et al., 2018). There is a scarcity of research that establishes a connection between supply chain analytics and supply chain innovation and robustness capability, for example. As far as the authors are aware, the sole research paper that establishes a connection between supply chain innovation and robustness capability is Kwak, Seo, and Mason (2018). Furthermore, Waller and Fawcett (2013) advocated for the integration of business and predictive analytics with logistics and supply chain management, emphasizing the potential for firms to capitalize on such connections. This call is addressed in this paper. The extent discussions underscore the necessity for further insights from the standpoint of logistics management. Theoretically, this paper utilizes a knowledge-based view to examine the relationship between supply chain analytics, supply chain innovation, and robustness capability in the context of Arabia. The purpose of this paper was to classify theories that were developed and evaluated in Western contexts. This study aims to investigate the correlation between supply chain analytics, robustness capability, supply chain innovation, and innovation. Specifically, it seeks to determine how supply chain analytics enhances robustness and innovation. This study undertakes an endeavor to address the following research inquiries:

- What is the impact of supply chain analytics on supply chain cutting-edge technology?
- In what ways does the implementation of supply chain analytics improve operational capability?

Supply chain analytics, which iteratively explore past knowledge, technology, and practices to gain insight, is relevant to this research. Supply chain analytics offers robustness, logical innovation, and unique resources.

2.1 The supply chain analytics and technology

In addition to granting access to large markets and economic benefits, outsourcing and offshore production present challenges pertaining to transportation, currency fluctuations, political unpredictability, and supply chain ecosystems. (Christopher and Lee, 2004) Conventional supply chain managers employ SC risk management to address these concerns. Prompt data and information are essential for supply chain analysis. Big Data and SCM intersected at this juncture. According to previous research, BDA enhances the visibility, robustness, resilience, and organizational performance of the supply chain. (Gu-nasekaran et al., 2017) Supply chain analytics extracts actionable insights and improves the performance of the supply chain ecosystem by employing machine learning and statistical techniques on historical and current data, in addition to predictive modeling. Chae, Olson, and Sheu (2014) define supply chain analytics as the integration of data management, IT-enabled resources, and supply chain planning.

Analytic and data-driven decisions supported by IT and data science, according to KBT, enhance supply chain planning and management. While supply chain analytics may inhibit innovation, its primary objective is to enhance operational capabilities and mitigate risk. Gao, Xu, Ruan, and Lu (2017) state that innovation is vital to the sustainability of an organization. In supply chain management, it is difficult to identify innovative techniques and methods and to transform opportunities into novel concepts and practices. (2011) Shniederjans Lee and Lee. Supply chain analytics employs intricate quantitative techniques to examine historical and present data. Transforming data into pertinent information to facilitate evidence-based decision making through efficient data collection, transformation, and storage. Managers may be able to plan, monitor, predict, and compare time series with the assistance of novel data that this method may yield. In order to reduce delivery time, error rates, and expenses while enhancing operational efficiency, this data may help identify areas prone to error and propose appropriate remedies. Competitiveness advantage is generated through knowledge, according to the KBT, which serves as its foundational theory. Logistics data analytics (SCA) entails the processing of supply chain data in order to derive pertinent insights that could be advantageous for innovation or serve as inputs for innovation, as opposed to business data processing (BDA), which aims to attain a competitive edge. Consequently, the subsequent theory is proposed.

2.2 Supply chain analytics and resilience

Physical power indicates robustness. Bieland and Wallenburg (2012) define robustness in supply chain management & logistics as the ability to withstand interruptions, human error, and business environment fluctuation. Risk awareness in supply chain and logistics networks reduces or eliminates risk (Kwak et al., 2018). Thus, resilience is crucial during disruptions. Supply chain and logistics networks should be able to handle disturbances. 2018 (Kwak et al.) Rustiness might provide a corporation more time to develop and execute risk-mitigation controls. Alarmingly, risk reduction and control techniques demand fast and reliable data. Data analytics helps firms save costs, manage uncertainty, and make better choices, according to scholars. Supply chain analytics as the extraction, transformation, purification, and integration of supply chain data into actionable patterns. According to KBT, supply chain analytics helps acquire, transform, and extract valuable data. This data can then be used to alert decision-makers to potential risks, help them develop strategies to counter diverse disruptions, improve the organization's adaptability to intense competition and a dynamic environment, and improve supply chain and logistics network efficiency. The following theory is proposed: Supply chain analytics will strengthen it.

Methodology

Businesses in the UAE were sampled randomly. The survey's English-to-Arabic back-translation was modified multiple times. Line managers participated in the survey. The research's goals and purposes were explained before they were told their data would not be disclosed. Everyone was informed of their right to leave the survey at any time, and they all did so on their own. UAE national attention was given to 400 companies. Division managers in the supply and logistics divisions were randomly given survey envelopes since they know their supply chains best. The similar technique has been used in supply chain analytics (Wiremans & Wallenburg, 2012; Zhu et al., 2018) and supply chain innovation, risk management capacities (Kwak et al., 2018). Participants were asked to complete the survey at their convenience to maximize response rates. They were kept secret to minimize social desirability and technique bias. After collecting 245 survey forms, 32 were invalid owing to missing data.

The firms' supply chain data analytics tool use to deliver better services is assessed using a triplet first order construct from (Wang & Byrd, 2017). The following criteria were set for participants: (a) adept use of data aggregation tools (three items); (b) adept use of data analysis tools (four items); (c) ability to comprehend and effectively apply data interpretation tools (three items); and (d) assessment of how their organization uses supply chain data analytic tools to improve service quality. How much participants' businesses use supply chain data analysis tools to enhance service quality was assessed using a five-point Likert scale. Developmentally inadequate one and progressing five.

Six scale items from prior research are used to evaluate supply chain innovation (Seo et al., 2014; Kwak et al., 2018). On a 5-point Likert scale, participants were asked about their innovation methods. 1. Absolute opposition; 5. Complete agreement.

Four Kwak et al. (2018) metrics are used to assess robustness. On a five-point scale, participants rated their talents. Five represents strong agreement, whereas one represents serious dissent.

Results:

With a range of employee counts, approximately 12.6% of the investigated firms have fewer than 50 workers, 17.3% have 51 to 100 workers, and 69.6% have more than 100 workers. Among the sampled firms, 31.3% have been in operation for a period of 1 to 5 years, 23.4% for 6 to 10 years, and the remaining organisations have been in operation for over 10 years. 22.4 percent of the companies under investigation utilize the job shop method, 17.3 percent employ bulk methods, 27.1 percent utilize repetitive assembly, and the remaining companies utilize continuous flow methods. The remaining 15.9% is comprised of chemicals and allied products, while 13.1% is devoted to the automotive and spare parts sector, 15.9% to vegetable and perishable goods, 20.6% to supermarkets and household products, 16.4% to construction and building materials, and 12.6% to electric and electronic products. Table 1 provides a comprehensive summary of the details.

Variables	Frequency	Percentage
Number of employees		
Less than 50	27	12.6%
51 - 100	37	17.3%
Above 100	149	69.6%
Total	213	100%
Firms age		
1 - 5 years	67	31.3%
6 - 10 years	50	23.4%
10 years and above	96	44.9%
Total	213	100%
Manufacturing / production / procurement process		
Job shop	48	22.4%
Batch	37	17.3%
Repetitive assembly	58	27.1%
Continuous flow	70	32.7%
Total	213	100%
Sector / Industry		
Apparel and other textile products	34	15.9%
Automotive / spare parts	28	13.1%
Vegetables / perishable goods	34	15.9%
<small>Supermarkets and household products</small>	44	20.6%
Construction and building Materials	35	16.4%
Electric and electronics products	27	12.6%
Chemicals and allied products	11	5.1%
Total	213	100%

The reliability and convergent validity of the variables under investigation were assessed using Smart PLS 3.0 software. Each item's outer model factor loadings surpassed the established threshold of 0.70.

Conclusion

A lot of stakeholder data is needed for technical developments, competitive advantage, and successful inventions. Rapid market changes, strong rivalry, and constant technology improvements are to blame. This increases environmental unpredictability and complexity and puts organizations under pressure to obtain, evaluate, and understand intelligence or information and make quick choices. Managers must retrieve massive amounts of digital data in docile markets, whose changing pace depends on important aspects. BDA helped smartphone makers extract user preferences on social media for features including battery life,

waterproofing, solar panels, and more. By doing so, producers met customer needs for future items.

Data analytics methods allow supply chain and logistics companies to address stakeholder issues along the supply chain and channel, encouraging an ecologically responsible innovation cycle. This article supports this claim, therefore supply chain analytics implies digital information sources are important for managers. This study has shown supply and logistics managers how to use data to innovate and adapt by stressing supply chain analytics. This article also discusses how large investments, enormous data sets, and cutting-edge technology may boost supply chain innovation and resilience. Jeble et al. (2018) reiterated claims.

Strong supply chain innovation may make companies more resilient. The result supports prior research that suggests creative supply chain practises and new technology may improve risk management (Grant, 1991). Supply chain innovation may also improve organisation resilience (Kwak et al., 2018). Predictive analytics help firms avoid supply interruptions and variable demand, increasing network capacity. In this research, robustness capacity is included.

This research found that supply chain analytics may boost a company's innovation and resilience in extremely competitive marketplaces. This research shows that an integration of information systems, supply chain and logistics, innovation, and strategic management may be successful. Optimising business processes, supply channels, and routes allows organisations to quickly respond to external constraints and innovate. Supply and logistics firms may create value by engaging in BDA activities like supply chain analytics, according to this report. Supply chain analytics may boost competitiveness by fostering innovation, resulting in agile and resilient company operations. Using neural networks or other AI-based prediction models in future study.

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