The Effectiveness of Big Data Analytics on Supply Chain Management: a Cross Sectional Study

Ajay Sharma,

Asst. Professor, School of Management, Graphic Era Hill University, Dehradun Uttarakhand India

Abstract

Industry 4.0 is quickly approaching on the global scale. Future industrial transformation will place a greater emphasis on operations and services offered by machines that generate and gather enormous volumes of data. Supply chain includes a variety and abundance of data. Data for the supply chain is gathered from several businesses engaged in production, shipping, and retail. Big data analytics can be used to examine the voluminous data to draw conclusions and improve the efficiency of the supply chain management process. Supply chain management with big data analytics creates a lot of new opportunities. This information may be used to evaluate several supply chain management components, such as inventory forecasting and prediction. Big data utilisation is capable of altering the working if the Supply chain. Big data analytics enhance automated processes and employ predictive analytical methods to open up new opportunities and offer value. In a highly competitive market, big data analytics is used to build an integrated, efficient, and adaptable supply chain. The growth of data has made it simpler to create technologies that can efficiently examine enormous amounts of data. The incorporation of big data analysis into supply chain management boosts the effectiveness of the chain and offers a host of advantages to the company.

Keywords: Big Data Analytics, Supply Chain Management, Data Science, Logistics, Data Processing

Introduction

Big data is defined as high volume or enormous size, high streaming or movement, and high diversity of information with the goal of enhancing internal operations and decision-making. Big data analytics has lately acquired considerable popularity due to the accessibility of vast data, the ability to gather the data, and the application of powerful analytical tools to enormous data sets. Organisations are now able to gather large amounts of data and use strong analytical tools to automate very complicated decisions that were previously handled by human intuition and judgement. Big data and analytics describe many concepts for various people. For organisations, data and analysis provide a number of options. With the development of big data analytics, corporations are now able to evaluate crucial business data that helps them better understand their industry and market. Using this knowledge, they can now make timely business choices. Big data analytics generate dynamic capabilities, especially when an organisation has a routine

for knowledge generation in a market that is always changing (Chen, Preston, & Swink, 2015 and Gunasekaran, Papadopoulos, Dubey, Wamba, Childe, Hazen, & Akter, 2017).

Supply chain management is the management of a network of upstream and downstream enterprises. Information flow might take the form of materials, information, or resources. In the past, papers that could be physically handled were used to store and send information about the commodity. But today's supply chain looks nothing like it did in the past. A number of technologies, including big data analytics, are integrated with supply chain management to create a distinct information flow that enables businesses to gather, store, process, analyse, and share information about their operations. The modern supply chain connects enterprises to promote integration and collaboration at several levels. Supply chain analytics is a product of big data analytics and supply chain management. By measuring, monitoring, predicting, and controlling business activities connected to the supply chain, an individual or organisation may take use of the possibilities of supply chain analytics. Supply chain analytics reveal all available product and component information and provide a thorough picture of the whole supply chain. (Rozados, & Tjahjono, 2014 and Ghalehkhondabi, Ahmadi, & Maihami, 2020).

By improving discovery, boosting access, and supplying data throughout a firm and supply chain, big data analysis in supply chain management aids in the management of information. By developing new procedures, which aid in correct decision-making and increase in productivity through automation, it improves operation efficiency and maintenance. Regardless of the location of the data, supply chain data analysis improves real-time control and boosts supply chain visibility and transparency. By enabling better scalability and higher levels of customer care, it also aids in the introduction of new and creative product and marketing strategies. Understanding the demands of the consumer also aids in attracting a growing number of customers. Planning and managing production also benefit from data analysis. Data analysis evaluates the product's requirement, realises the planning, and forecasts the product's launch. Big data analysis aids in the creation of new business models, increasing one's edge over competitors. Additionally, it improves client retention and aids in the comprehension of consumer behaviours (Kache, & Seuring, 2017).

Literature Review

A study found that the participants in the supply chain and the chain itself are interrelated. Information and money flow are linked with the actual movement of raw materials, inventories of work-in-progress, manufactured commodities, and returned goods. Due of their interconnection, it is challenging for the manufacturer or supply chain management in today's globalised business world to maintain track of these physical items. To get a competitive edge in this complex supply chain, it is necessary to investigate cutting-edge technologies and techniques. The movement of materials and information between supply chain participants is primarily responsible for the complexity of the supply chain. Traditionally, the supplier-to-customer flow was arranged in a sequential manner. Today, however, information flows

simultaneously through electronic interactions between all supply chain participants rather than following a linear path. Companies are learning to use massive amounts of data to their advantage since it is highly challenging to arrange and analyse huge data in a way that benefits the business (Benabdellah, Benghabrit, Bouhaddou, & El Moukhta, 2016).

In a research it was found that Supply chain management is benefiting greatly from big data. Big data may be used to lower the risk associated with contractually obligated external capacity and infrastructure expenditure. The information demonstrates how supplier networks develop over time, expand into new markets, and mature. Combining analytical methodologies may streamline the floor management and manufacturing logistics processes, which boosts the production of new products and lowers logistic costs. Big data is increasingly advantageous for the logistics, retail, transportation, and industrial sectors. Big data analytics may be used to comprehend customer perspectives. Understanding the needs of the consumers better enables the development of more specific goods and services, which in turn raises their happiness (Awwad, Kulkarni, Banpna, Marathe, 2018 and Meriton, Graham, 2019).

A study found that all supply chain management techniques can leverage Big Data Analytics to move information from one place to another. In order for Big Data analytics to be effective, the data must be accurate, timely, consistent, and complete. To analyse the market, point-of-sale data is necessary. In order to build transportation records using data analytics, a GPS transponder is also necessary. Customer knowledge has been turned by marketing into a flexible system that generates a tonne of data. Complex methods for client data analysis are required to communicate with the consumer. The supply chain management system has to be better integrated with customer input. Data may be used to understand social behaviour and customer information. Procurement is another aspect of supply chain management. It also poses issues since there are so many transactions in the age of globalised shopping. To accelerate data management and the entire procurement function, big data analytics must be switched on at the supply chain management stage of the procurement process. Technological improvements have led to significant changes in warehouse management, which support model identification systems. Due to the development of the internet of things, improved sensor connectivity, and sophisticated material handling and packaging technologies, big data analytics may result in real-time data for supply chains. Due to the widespread usage of software for location monitoring network design or vehicle routing, transportation analysis is fairly simple. Operational data may be used in novel ways, such as mobile and direct sensing technologies, to manage and coordinate in real time. Big data analysis may help with the evaluation of the weather, traffic, and real-time marginal costs for various delivery methods (Darvazeh, Vanani, & Musolu, 2020).

A study found that various data types, including both structured and unstructured data, might be evaluated to better understand and meet consumer demands while reducing supply chain process costs. The rise in data volume, faster dissemination, and supply chain technologies have made this feasible. Numerous supply chain management processes, including product development, distribution optimisation, supplier selection, market demand forecasting, customer fees, and

bagging, among others, may be made better with the use of big data analytics. Businesses employ a range of Big Data analytics approaches to obtain exact results. The marketing, purchasing, shipping, and storage sectors of the supply chain all benefit greatly from big data analytics. The marketing, purchasing, shipping, and storage sectors of the supply chain all benefit greatly from big data analytics. To remove barriers, build accurate forecasting techniques, and adhere to current supply chain management trends, big data and digital technology may be incorporated into manufacturing operations. The creation of a framework that might improve supply chain management performance in the industrial sector is aided by big data analytics. Big data analytics uses predictive analysis to help evaluate the supply chain's sustainability (Oncioiu, Bunget, Türkeş, Căpuşneanu, Topor, Tamaş, Rakoş, & Hint, 2019).

According to a research, companies use supply chain analytics to lower risk and monitor publicly available channels like news and social media that offer a variety of data kinds and link that data to other sources. This strategy enables organisations to quickly adapt to changes in the supply chain and seize market opportunities. By routinely compiling current data on suppliers and the sourcing industry, this strategy also aids in the creation of a backup plan. Most research focuses on creating broad models or methods to mimic supplier risk or determine how supplier risk affects supply chain effectiveness. Supply chain analysis is a powerful tool that businesses may use to review, manage, and keep track of the performance of their suppliers and find better sources. By obtaining precise data and aggregating information across multiple supply chain channels, supply chain analytics swiftly assess and analyse the performance of suppliers. information also analyses the quality delivery guarantee and deadlines. Supply chain analytics aids in the precise decision-making of enterprises. Supply chain analytics may reliably estimate demand with the use of technology and tools, allowing for planning in accordance. (Wang, Gunasekaran, Ngai, E& Papadopoulos, 2016 and Matthew, Fawcett, 2013).

Objective

To evaluate the Effectiveness of Big Data Analytics on Supply Chain Management

Methodology

This study is descriptive in nature in which data is obtained from 225 respondents who have big data analysis in the supply chain. In the above study mix of all businesses have been covered. A checklist question was used to analyze and interpret the data. In a checklist question respondents choose "Yes" or "No" for all the questions.

Table1. Effectiveness of Big Data Analytics on Supply Chain Management

	Effectiveness of Big Data Analytics on Supply Chain Management	Yes	%Yes	No	%No	Total
1	Big data analytics helps in value creation in supply chain management	195	86.67	30	13.33	225

2	Big data analysis predicts customers need	175	77.78	50	22.22	225
3	Big data analysis increases efficiency of supply chain	189	84.00	36	16.00	225
4	Big data analysis helps in risk assessment in supply chain	172	76.44	53	23.56	225
5	Big data analysis improves reaction time in supply chain	198	88.00	27	12.00	225
6	Big data analysis increases traceability in supply chain	192	85.33	33	14.67	225
7	Big data analysis helps in real time optimisation of delivery routes	185	82.22	40	17.78	225
8	Big data analysis estimates traffic condition, weather condition etc	191	84.89	34	15.11	225

Table 1 shows that 88.00% respondents agree that Big data analysis improves reaction time in supply chain while 86.67% respondents agree that Big data analytics helps in value creation in supply chain management. 85.33% respondents agree that Big data analysis increases traceability in supply chain, while 84.89% respondents agree that Big data analysis estimates traffic condition, weather condition etc. 84.00% respondents agree that Big data analysis increases efficiency of supply chain while 82.22% respondents agree that Big data analysis helps in real time optimisation of delivery routes. 77.78% respondents agree that Big data analysis predicts customers need while 76.44% respondents agree that Big data analysis helps in risk assessment in supply chain.

Conclusion

Big data is the primary element driving supply chain deployment, according to the aforementioned research. After looking at the processes and activities involved in the generation of big data in the supply, the information that is now accessible in supply chain management has the ability to correctly evaluate big data. Big data has been proven to have real-world applications that can address some of the most critical problems facing the supply chain even in recent years. These concerns include volume, variety, velocity, veracity, and value. This also contains complex information from supply chain operations. A new phenomenon that can assist in managing the growing amount of data in supply chain infrastructure can be introduced with the application of data analytics in supply chain management, it was discovered. Additionally, it was discovered that a lack of professionals with the necessary skill sets might reduce the use of big data analysis. In this increasingly globalised world, supply chain networks are becoming more intricate and complex, necessitating the use of data analytics by supply chain partners. Each sector of the supply chain requires efficient tools and methods for accurate forecasting that can aid in sound decision-making. To increase sensor accuracy in physical systems, it is essential to enhance data integration technologies across diverse supply chain activities.

References

1. Awwad, M., Kulkarni,P., Banpna, R., Marathe,A. (2018). Big Data Analytics in Supply Chain: A Literature Review, *IEOM International Conference At: Washington DC, USA*, 418-425.

2. Benabdellah, A., Benghabrit, A., Bouhaddou, I., & El Moukhta, M. (2016) Big Data for Supply Chain Management: Opportunities and Challenges. *International Journal of Scientific & Engineering Research*, *7*(11), 20–26.

3. Chen, D. L., Preston, D. C., & Swink, M. (2015). How the Use of Big Data Analytics Affects Value Creation in Supply Chain Management. *Journal of Management Information Systems*, *32*(4), 4–39.

4. Darvazeh, S. S., Vanani, I. R., & Musolu, F. M. (2020). Big Data Analytics and Its Applications in Supply Chain Management. In *IntechOpen eBooks*.

5. Ghalehkhondabi, I., Ahmadi, E., & Maihami, R. (2020). An overview of big data analytics application in supply chain management published in 2010-2019. *Production Journal*, *30*.

6. Gunasekaran, A., Papadopoulos, T., Dubey, R., Wamba, S. F., Childe, S. J., Hazen, B. T., & Akter, S. (2017). Big data and predictive analytics for supply chain and organizational performance. *Journal of Business Research*, *70*, 308–317.

7. Kache, F., & Seuring, S. (2017). Challenges and opportunities of digital information at the intersection of Big Data Analytics and supply chain management. *International Journal of Operations & Production Management*, *37*(1), 10–36.

8. Matthew, A., Fawcett, S. E. (2013). Data Science, Predictive Analytics, and Big Data: A Revolution That Will Transform Supply Chain Design and Management, *Journal of Business Logistics,* 34(2), 77-84.

9. Meriton, R., Graham, G. (2019). Big Data-Enabled Supply Chain Management: A systematic review, *Seychells Research Journal*, 1(1), 92-105.

10. Oncioiu, I., Bunget, O. C., Türkeş, M., Căpușneanu, S., Topor, D. I., Tamaş, A. S., Rakoș, I., & Hint, M. Ș. (2019). The Impact of Big Data Analytics on Company Performance in Supply Chain Management. *Sustainability*, *11*(18), 4864.

11. Rozados, I. V., & Tjahjono, B. (2014). Big data analytics in supply chain management: trends and related research. *6th International Conference on Operations and Supply Chain Managemen*.

12. Wang, G., Gunasekaran, A., Ngai, E. W., & Papadopoulos, T. (2016). Big data analytics in logistics and supply chain management: Certain investigations for research and applications. *International Journal of Production Economics*, *176*, 98–110.