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| RESEARCH ARTICLE

From Data to Decisions: The Impact of Big Data Analytics Capability on Supply Chain Resilience and Agility

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| ABSTRACT
Purpose: This paper analyses how Big Data Analytics Capability (BDAC) can enhance supply chain resilience and agility in more challenging and uncertain business contexts. The study aims at the application of the data-driven decision-making to the operational responsiveness and to improve the supply chain performance. Methodology: The research approach will be qualitative research design with thematic analysis of scholarly articles based on peer-reviewed journals, academic books, and conference papers on the topic of big data analytics and the supply chain management. Key Findings: The results show that BDAC enhances the visibility of supply chain, predictive decisions, and responsiveness of an organization. The analytics features allow companies to predict disruptions, minimize the response time, and enhance the supply chain operation flexibility. Practical Implications: The study outlines the significance of digital transformation strategies, data infrastructure advancement, and analytics-based capabilities with regard to supply chain managers aiming to increase agility and resilience. Theoretical Contributions: The research paper has value in the supply chain literature since it combines the lenses of dynamic capability and information processing theories. Future Research Directions: Future research can be done to examine industry-specific applications and empirical support on BDAC effects.

| KEYWORDS
Big Data Analytics Capability; Supply Chain Resilience; Supply Chain Agility; Data-Driven Decision Making; Digital Supply Chain; Industry 4.0; Predictive Analytics; Supply Chain Risk Management.

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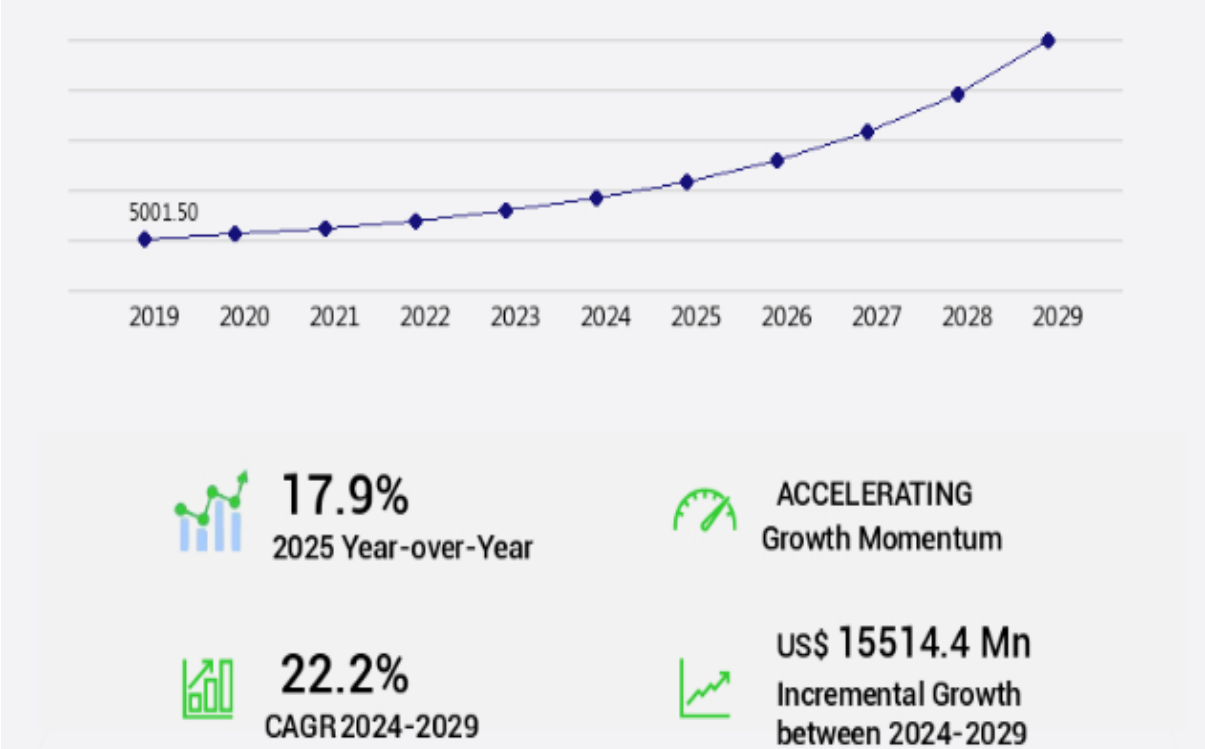
1. Introduction

The agility and resilience of supply chains is now a critical issue that organizations aiming to sustain continuity and stay competitive in the face of growing disruptions should adopt because of the globalized markets. The financial impact of weak supply chains and why strong systems are required become apparent in terms of costs of supply chain disruptions alone costing organizations some 184 million every year (Mu Sigma, 2025). Meanwhile, digital technologies and big data analytics are changing the way organizations track the operations and react to the risks where they can be able to make faster insights and predictive decisions (PricewaterhouseCoopers, 2025). The rise in using analytics is also evident in the market growth forecasts because the global supply chain analytics market is projected to grow by approximately 16 billion with the growth rate estimated at approximately 22% (Technavio, 2025). The developments support the escalating significance of Big Data Analytics Capability in facilitating data-based operational responsiveness and strategic decision-making (Rezvi et al., 2025).

Figure 1: Global Supply Chain Analytics Market Size Forecast 2025–2029 (US$ Million)



(Technavio, 2025)

2. Problem Statement

The contemporary supply chains are run in a setting that is defined by uncertainty, global shocks, and increasing complexity in operations. Pandemics, geopolitical tensions and climate-related disruptions, among others, have revealed structural vulnerabilities in traditional supply chain systems. The financial effects of such disruptions are very high, and the organizations have suffered average losses of approximately $184 million each year because of disruptions in their supply chains (Mu Sigma, 2025). The above pressures compel organizations to implement quicker, wiser and more strong-minded supply chain tactics, which can adjust to unpredictable market landscapes (PricewaterhouseCoopers, 2025; Lee et al., 2024). Meanwhile, companies are turning to the use of analytics technologies to enhance their decision-making and performance in the challenging supply networks (Technavio, 2025). Nonetheless, numerous companies are yet to transform massive amounts of data into strategic insights because of the shortage in technological infrastructure, organizational preparedness, and analytics capacity growth (Jha et al., 2020).

3. Purpose and Objectives of the Study

3.1 Purpose

To examine how Big Data Analytics Capability influences supply chain resilience and agility through systematic thematic analysis of academic literature.

3.2 Objectives

- To analyse the concept of Big Data Analytics Capability in supply chain management
- To examine how BDAC enhances supply chain resilience
- To explore the relationship between BDAC and supply chain agility
- To synthesise findings from existing academic literature using thematic analysis

4. Literature Review

Big Data Analytics Capability has become a strategic organizational capability which allows companies to convert the masses of data into actionable information which can be used to make operational decisions. The studies indicate that big data analytics contributes to forecasting, risk monitoring, and operational optimization through supply chains because it enables organizations to react better to uncertainty in the market (Lee & Mangalararaj, 2022). Strategically, the resource-based perspective implies that the analytics capability may serve as a valuable organizational asset that improves the performance and competitive advantage

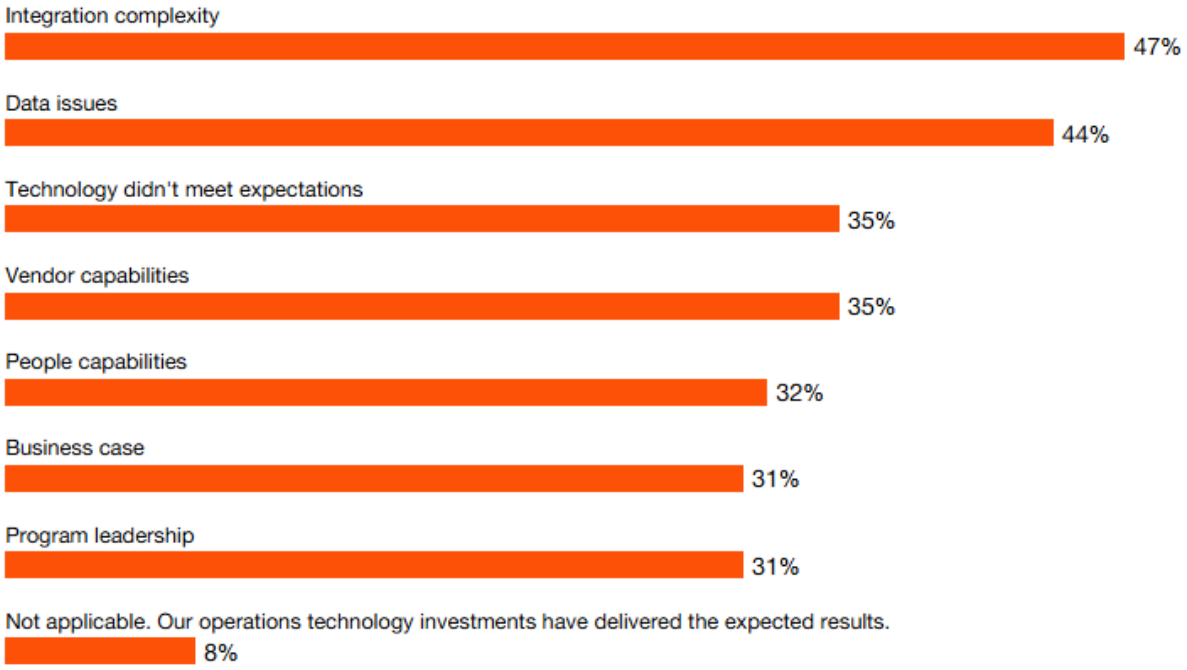
of firms based on the better operational intelligence (Yasmin et al., 2020; Olabode et al., 2021). Moreover, big data technologies bring many value dimensions such as informational, transactional, and strategic benefits, which enable organizations to improve the quality of decisions and organizational coordination (Elia et al., 2020). Nevertheless, the ability to build them involves a set of technological facilities, organizational skills, and managerial support to the analytics-based change (Jha et al., 2020).

Analytics capability has thus gained more significance with relation to supply chain resilience. When organizations incorporate analytics systems, it becomes possible to monitor disruptions, anticipate risks, as well as to decrease response time in case of disturbances of operations. The pragmatic experience shows that the ability to generate big data analytics enhances by a large margin the reaction time, which subsequently increases organizational resilience in times of disruption in the supply chain (Bronzo et al., 2024). Also, the analytics ability complements risk management and strategic ambidexterity that enable firms to identify threats sooner and react better to operational shocks (Munir et al., 2024). Predictive analytics also enhances visibility of the supply chain and allocation of resources in case of disruption of the environment (Bag et al., 2022).

The other important result of analytics capability is supply chain agility. Data-based analytics offers more rapid decision-making and better operational adaptability by enhancing the supply chain connectedness, and network connectivity of digital platforms (Cui et al., 2024; Rehman et al., 2026). Agile practices in lean, resilient, and sustainable supply chain systems are also supported with the help of big data analytics that provides the possibility to monitor everything and make decisions automatically (Raut et al., 2020).

Figure 2 identifies crucial implementation issues that organizations are experiencing in their adoption of online technologies in supply chains. It shows that the complexity of integration influences approximately 47% of companies, whereas the problem of data quality influences approximately 44% of companies, proving that technology and organizational issues tend to restrict the successful application of analytics-driven decision systems. These difficulties strengthen the necessity to have the greater analytics ability in place to facilitate the resilient and agile supply chain strategies (PricewaterhouseCoopers, 2025; Razaghi & Shokouhyar, 2021).

Figure 2: Reasons Why Operations Technology Investments Have Not Delivered Expected Results



(PricewaterhouseCoopers, 2025)

5. Methodology

The qualitative research study design adopted in this study is based on thematic analysis of available academic studies. Peer-reviewed journal articles, books, and conference papers included in databases like Google Scholar, Scopus, and Web of Science were considered relevant and were used as the source of collected materials. The strategy enables the compilation of knowledge on the studies that are connected to the subject of big data analytics and supply chain management. Literature-based research has been extensively applied to thematic analysis to establish common themes and patterns of analysis in the studies (Rezvi et

al., 2025). On the same note, systematic literature reviews have been useful in the study of theoretical underpinnings and new trends in big data analytics studies (Lee & Mangalararaj, 2022).

6. Results / Findings

Table 1: Thematic Analysis

Theme	Source 1	Source 2	Source 3
Data-Driven Decision Making	Big data analytics enables organizations to transform large datasets into actionable insights that improve supply chain decision-making and operational planning (Lee & Mangalaraj, 2022).	Business intelligence analytics supports segmentation, personalized engagement, and measurable improvements in performance metrics through data-driven strategies (Rezvi et al., 2025).	Analytics tools improve forecasting accuracy and inventory optimization by converting operational data into strategic insights (Mu Sigma, 2025).
Supply Chain Resilience	Big data analytics capability reduces reaction time and strengthens organizational resilience during supply chain disruptions (Bronzo et al., 2024).	Predictive analytics improves supply chain visibility and enables firms to anticipate environmental disruptions and resource constraints (Bag et al., 2022).	Analytics capability complements risk management and strengthens organizations' ability to identify and respond to threats within supply chains (Munir et al., 2024).
Supply Chain Agility	Data-driven supply chain analytics capability enhances agility by strengthening supply chain integration and digital platform connectivity (Cui et al., 2024).	Big data analytics improves operational responsiveness and enables firms to adapt strategies under dynamic environmental conditions (Yasmin et al., 2020).	Analytics technologies support agile supply chain practices by enabling continuous monitoring and adaptive decision-making processes (Raut et al., 2020).

Theme 1: Data-Driven Visibility and Supply Chain Transparency

One of the key themes that have been identified in the process is the increasing role of data-driven visibility within the supply chain networks. The big data analytics is a tool whereby the organizations can track the operations of operations in real time thereby establishing a clear picture of the processes involved in the supply chain and enhancing coordination among the suppliers of the supply chain. By having access to real-time operations data, firms can better identify when their operations are being disrupted and are able to react to unplanned changes in the market. Monitoring systems that are based on analytics also enable the companies to assess the operational trends and enhance the accuracy of forecasting, which reinforces planning and operational alignment within the supply chain networks. This greater transparency promotes upstream decision-making and less uncertainty in intricate global supply chains (Bag et al., 2022; Wamba et al., 2019).

Theme 2: Predictive Analytics and Disruption Management

The other theme is that of the role of predictive analytics in disruption management. The current supply chains are operating in a volatile environment whereby abrupt interruptions can have a great effect on the production and distribution processes. Predictive analytics enables the organizations to find the trends in the operational data and predict interruption before it transforms into an operational crisis. The empirical study shows that analytics capability shortens the reaction time and enhances the capability of firms to respond to disruptions, which builds the organizational resilience. Predictive analytics is essential to transition organizations when it comes to managing crises; instead of responding to issues after they arise, predictive analytics could facilitate proactive disruption prevention (Bronzo et al., 2024; Yu et al., 2020).

Theme 3: Data Integration and Supply Chain Collaboration

Data integration is also a very important aspect that enhances cooperation of supply chain actors. Combining both internal and external sources of information enables organizations to organize the activities of suppliers, manufacturers, and logistics providers in a more efficient way. The ability to share data better using integrated data platforms enhances operational synchronization and eliminates inefficiencies. Studies indicate that analytics capacity has the potential to mediate between risk management strategies and supply chain resilience, which helps organisations to notice the threat to the operations earlier and orchestrate more efficient responses throughout the supply chain ecosystem (Munir et al., 2024).

Theme 4: Digital Capability as a Strategic Resource

The results also indicate the strategic significance of digital capability in supply chains. The capability of big data analytics can be an asset of strategic value that reinforces the operational resiliency and operational adaptability. Research indicates that analytics capability enhances monitoring systems in the supply chain and increases the capability of firms to effectively allocate resources

in case of disruption. With organizations becoming more dependent on digital platforms and decision systems based on analytics, analytics capability emerges as a source of competitive advantage (Bag et al., 2022).

Theme 5: Big Data Analytics as a Driver of Supply Chain Agility

Lastly, the ability of the big data analytics plays a great role in supply chain agility. Agile supply chain entails quick decision making and quick response to emerging market needs. Studies indicate that analytics competency is improving supply chain integration and increasing connectivity with digital platforms that allow the organization to respond more quickly to changes in operations and fluctuations in demand (Cui et al., 2024). Moreover, the ability of analytics also contributes to enhancing the performance of the supply chain by boosting its resiliency and promoting innovation in the supply chain operations (Bahrami et al., 2022).

7. How HRM Can Implement Effective Privacy and Data Security Practices

Human resource management is an important aspect in facilitating safe and efficient utilization of information in digital supply chain systems. The digitization of supply chain platforms may necessitate the creation of sound data infrastructure and governance among organizations, and HRM should contribute to it. According to research, over 70 percent of organizations are investing in analytics system in the supply chain to enhance digital transformation and operational decision making (Technavio, 2025). But the effective deployment of such systems is dependent on good organizational competencies and effective staff that have the expertise to work in complex analytical settings (Jha et al., 2020).

The challenges of implementation are also high especially in terms of the complexity of data integration that impacts 47% of the organizations and the data quality that impacts 44% of the organizations that have implemented the digital technologies (PricewaterhouseCoopers, 2025). HRM thus has been on the forefront in creating analytical expertise, hiring of data scientists and advancing AI-facilitated predictive systems that assist organizations to forecast disruption and enhance the decision-making of supply chains with real-time insights (Mu Sigma, 2025). The SCOR model structure is another viable tool that organizations can use to coordinate technology, processes, and metrics throughout the process of supply chain operations (APICS, 2017).

8. Conclusion

The paper emphasizes the importance of Big Data Analytics Capability (BDAC) in enhancing the supply chain performance in more complicated and uncertain settings. The thematic analysis reveals that the analytics capabilities can help increase the visibility of the supply chain, enhance predictive decision-making, and decrease the time to respond to disruptions. These will enable the organizations to create more resilient and responsive supply chains that can respond to the fast-evolving marketing environments. This analysis also shows that digital aptitudes, facts combination, and foreseeable analytics are vital in contemporary supply chain management. In general, the results can be used in the current literature as they summarize already existing studies and provide valuable information to supply chain managers and scholars who are interested in utilizing analytics to enhance resilience and agility.

Statements and Declarations

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