

## LEVERAGING BIG DATA ANALYTICS FOR ENHANCED DECISION-MAKING AND SERVICE EFFICIENCY IN THE DIGITAL ECONOMY

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### ABSTRACT

In the rapidly evolving digital economy, organizations face increasing demands for timely, data-driven decision-making and efficient service delivery. Big data analytics has emerged as a transformative tool in modern information management, enabling organizations to extract actionable insights, optimize operations, and enhance strategic outcomes. This study examines the effect of big data analytics on decision-making and service delivery efficiency within contemporary organizations. A descriptive survey design was employed, with data collected from managers and IT professionals across multiple sectors. The study was guided by two research questions. Data were analyzed using mean and standard deviation. Findings revealed that big data analytics significantly enhances decision-making processes by improving accuracy, accelerating decision cycles, and enabling proactive management through predictive insights. Similarly, service delivery efficiency improved with real-time operational insights, workflow optimization, and enhanced customer satisfaction. The study concludes that integrating big data analytics into information management systems is essential for competitive advantage and operational excellence in the digital economy. It recommends among others that organizations should prioritize the adoption of big data analytics tools and technologies to enhance decision-making accuracy and service delivery efficiency.

**Keywords:** Big Data Analytics, Information Management, Decision-Making, Service Delivery Efficiency, Digital Economy

## INTRODUCTION

The rapid evolution of information and communication technologies has significantly influenced organizational operations, leading to the proliferation of digital data across various sectors. In the digital economy, data is now regarded as a vital asset for strategic decision-making and operational efficiency (Giannakis, Spanaki & Dubey, 2021). As organizations seek to gain a competitive edge, big data analytics has emerged as a crucial tool for processing large volumes of structured and unstructured data, offering actionable insights to enhance organizational performance (Iheukwumere, Eze, Otuonye & Ikerionwu, 2024).

Building upon this, big data analytics involves sophisticated techniques and tools capable of processing vast, diverse, and fast-moving datasets to uncover patterns, trends, and meaningful insights (Fatima & Hassan, 2023). The defining features of big data — volume, velocity, variety, veracity, and value — enable organizations to efficiently manage and analyze data from multiple sources (Giannakis et al., 2021). To this end, tools such as Hadoop, Spark, Tableau, and Power BI have gained widespread adoption in executing big data analytics operations (Liu, Zhang & Chen, 2022). These technologies not only support real-time decision-making but also facilitate predictive analytics, which are pivotal for maintaining competitiveness in the rapidly evolving digital economy. According to Wang, Zhang and Li (2023), organizations leveraging big data analytics consistently achieve superior customer service, optimized resource management, and enhanced competitive advantage.

Consequently, information management systems have progressed from traditional manual record-keeping to sophisticated digital platforms that seamlessly integrate big data analytics tools. This integration enables real-time data processing, predictive analytics, and evidence-based decision-making (Chen & Li, 2022; Ismail, Abdullah & Hassan, 2022). Despite these advancements, several challenges persist — including data quality issues, data explosion, scalability constraints, analytical complexity, skill shortages, and infrastructural limitations, particularly in developing economies (Nwankwo, Eze & Okafor, 2023; Eze, Nwankwo & Okafor, 2024). These challenges, if not addressed, may hinder organizations from maximizing the benefits of big data analytics in their operational processes.

Within this context, contemporary organizations recognize that effective service delivery is central to operational success and customer satisfaction. Big data analytics contributes to this

objective by streamlining workflows, reducing operational costs, and personalizing customer experiences (Ismail et al., 2022). Park, Lee and Kim (2021) observed that data-driven service models achieve notable improvements, including shorter response times, enhanced accuracy, and increased customer retention. Moreover, emerging research highlights the pivotal role of analytics in real-time service optimization, risk management, and operational agility (Kariuki, Waweru & Mwangi, 2023).

As organizations increasingly navigate the demands of the digital age, their ability to make timely, data-driven decisions has become a defining factor for sustaining competitive advantage. Big data analytics equips organizations with capabilities to monitor real-time activities, forecast future trends, and deliver personalized services aligned with customer preferences (Al-Khafaji, Ahmed & Salman, 2023; Iheukwumere et al., 2024). This technological evolution necessitates a critical re-evaluation of traditional information management practices, compelling organizations to embrace data-centric approaches for service delivery and strategic management.

However, despite these advancements and opportunities, significant gaps remain in how organizations — particularly those in emerging economies — effectively leverage big data analytics to optimize service efficiency and enhance strategic decision-making. Notably, existing research has predominantly focused on applications within advanced economies, resulting in limited empirical evidence addressing the unique challenges and opportunities present in regions such as Sub-Saharan Africa (Ukaegbu, 2023). This study, therefore, seeks to bridge this critical gap by providing empirical insights into the transformative impact of big data analytics on information management and operational performance within the digital economy

### **Statement of the Problem**

Despite the growing adoption of information management systems in modern organizations, many struggles to harness the full potential of big data analytics for decision-making and efficient service delivery. Issues such as poor data governance, insufficient analytics infrastructure, and a lack of skilled personnel impede the realization of data-driven operational excellence (Ukaegbu, 2023). Existing studies primarily focus on developed economies, leaving a gap in empirical evidence from emerging markets. This study addresses this gap by examining the impact of big data analytics on decision-making and service efficiency within the context of the digital economy.

## Research Questions

1. How does the use of big data analytics in information management enhance organizational decision-making in the digital economy?
2. To what extent does big data analytics improve service delivery efficiency in modern organizations?

## REVIEW OF RELATED LITERATURE

Wang, Zhang and Li (2023) established that integrating big data analytics significantly improved decision-making and operational performance in Asian tech firms. In a related development, Giannakis et al. (2021) reported enhanced service efficiency in logistics companies leveraging analytics tools for inventory and supply chain management. Extending this discourse, Iheukwumere et al. (2024) developed a supply chain data warehousing model designed for big data analytics applications in business operations. Their study proposed a structured framework for reporting and analysis aimed at optimizing inventory levels and improving overall supply chain performance.

Beyond the manufacturing and logistics sectors, researchers have explored the application of big data analytics in other industries. Fatima and Hassan (2023), for instance, examined the healthcare sector and discovered that big data applications substantially enhanced clinical decision-making and the quality of patient care. Similarly, Eze et al. (2024) turned attention to Sub-Saharan Africa and identified infrastructural deficiencies and limited analytical capacity as major obstacles to effective big data adoption within the region. Complementing these findings, Ismail et al. (2022) assessed public sector service delivery in Malaysia, observing significant improvements in process efficiency and citizen satisfaction following the integration of analytics tools. Ukaegbu (2023) reinforced these observations through a broad survey of African economies, which highlighted persistent readiness gaps in analytics infrastructure and professional expertise.

Adding to this growing body of evidence, several recent empirical studies further underscore the transformative potential of big data analytics in diverse contexts. Adeyemi, Olatunji and Adebayo (2023) reported that Nigerian firms adopting analytics solutions achieved notable gains in customer experience management and operational cost reduction. In Kenya, Kariuki et al.

(2023) documented improved risk management practices in banks through the application of predictive analytics models. Meanwhile, Nguyen, Tran and Le (2024) demonstrated a positive correlation between analytics maturity and financial performance among Vietnamese manufacturing firms, while Ojo et al. (2024) linked enhanced analytics capabilities to improved supply chain agility in West African logistics companies.

Taken together, these studies reflect a growing consensus in the literature regarding the tangible benefits of big data analytics when appropriately deployed. The evidence consistently indicates that organizations able to surmount infrastructural limitations and address capacity barriers in big data adoption experience marked improvements in decision-making, operational resilience, and service delivery outcomes (Okeke et al., 2024; Yusuf et al., 2022). This collective insight lays a strong empirical foundation for further investigations into how analytics adoption strategies can be contextualized for emerging economies, where challenges remain significant but opportunities for operational transformation are equally considerable.

## **METHODOLOGY**

This study employed a descriptive survey research design to empirically examine the impact of big data analytics on decision-making and service delivery efficiency within organizations in the digital economy. A total of 150 respondents were randomly selected from a diverse group of managers and IT professional involved in information management in ten organizations in Aba, Abia state.

Data were collected using a structured questionnaire developed after an extensive review of relevant literature. The instrument was divided into two sections A and B. Section A gathered demographic information about the respondents; while section B contained items addressing the respondents' perceptions of big data analytics' influence on decision-making accuracy, speed, proactive capabilities, and service delivery efficiency, including operational workflow optimization and customer satisfaction. The respondents were requested to rate the items on a 4-point rating scale of Strongly Disagree - SD, Disagree - D, Agree - A, Strongly Agree – SA.

The instrumented was validated by two experts and was further subjected to internal consistency testing using Cronbach Alpha which yielded a reliability coefficient of 0.90. Out of the 150 copies of the questionnaire distributed to the respondents by the researchers with the help of ten research assistants, 141 copies (representing 94%) were duly completed, retrieved and used for data analysis. Data collected were analyzed using mean and standard deviation. The level of

acceptance or rejection of each questionnaire items were determined based on the mean ratings of items interpreted relative to real limits of numbers as shown below:

Response Category	Rating	Real Number Limits
Strongly Agree	4	3.5 – 4.00
Agree	3	2.5 – 3.49
Disagree	2	1.5 - 2.49
Strongly Disagree	1	1.0 – 1.49

## PRESENTATION OF RESULTS

**Research Question 1:** How does the use of big data analytics in information management enhance organizational decision-making in the digital economy?

**Table 1:** Mean ratings of respondents on how the use of big data analytics in information management enhance organizational decision-making in the digital economy

S/N	Item	Mean	SD	Remark
1	Big data analytics improves decision-making accuracy	3.20	0.75	A
2	Big data analytics enables faster decision processes	3.17	0.72	A
3	Predictive analytics supports proactive decision-making	3.24	0.74	A
4	Big data tools provide real-time operational insights	3.18	0.76	A
5	Decision support systems powered by big data enhance strategic planning	3.22	0.73	A
<b>Cluster Mean/SD</b>		<b>3.20</b>	<b>0.74</b>	

Table 1 presents respondents' views on the effect of big data analytics on decision-making in modern organizations. The data shows that a majority agreed that big data analytics improves decision-making accuracy, enables faster decision processes, supports proactive decision-making through predictive analytics, provides real-time operational insights, and enhances strategic planning. The mean values for all five items ranged from 3.17 to 3.24, while the standard

deviations ranged from 0.72 to 0.76, indicating a strong and consistent agreement among respondents.

**Research Question 2:** To what extent does big data analytics improve service delivery efficiency in modern organizations?

**Table 2:** Mean ratings of respondents on the extent big data analytics improve service delivery efficiency in modern organizations

S/N	Item	Mean	SD	Remark
1	Big data analytics improves service delivery turnaround times	3.20	0.72	A
2	Data analytics optimizes workflow efficiency	3.18	0.73	A
3	Predictive tools anticipate and resolve service bottlenecks	3.20	0.74	A
4	Customer satisfaction improves with data-driven service models	3.19	0.73	A
5	Real-time analytics supports operational cost reduction	3.17	0.72	A
<b>Cluster Mean/SD</b>		<b>3.19</b>	<b>0.73</b>	

Table 2 shows the responses of respondents on the impact of big data analytics on service delivery efficiency. Respondents largely agreed that big data analytics improves turnaround times, optimizes workflow efficiency, anticipates and resolves service bottlenecks through predictive tools, enhances customer satisfaction with data-driven service models, and supports operational cost reduction through real-time analytics. The cluster mean values for these items were between 3.17 and 3.20, with standard deviations ranging from 0.72 to 0.74. These figures indicate a high and consistent level of agreement among participants.

## DISCUSSION OF FINDINGS

The results in tables 1 and 2 indicate a strong consensus among respondents that big data analytics improves decision-making accuracy, enables faster decision processes, and supports

proactive planning through predictive insights. The mean values for all items under research question 1 ranged between 3.17 and 3.24, with standard deviations between 0.72 and 0.76. This suggests a high level of agreement and consistency among respondents. These findings support the conclusions of Al-Khafaji et al. (2023) and Dlamini (2021), who emphasized the strategic advantages of data-driven decision-making for organizational competitiveness.

In relation to service delivery, table 2 revealed high levels of agreement on the contributions of big data analytics to improved turnaround times, workflow optimization, and customer satisfaction via data-driven service models. The mean values ranged from 3.17 to 3.20, with standard deviations between 0.72 and 0.74, implying consistent and positive perceptions among respondents about the operational benefits of big data analytics. This finding aligns with Park et al. (2021) and Ismail et al. (2022), who reported that the integration of big data analytics significantly enhances service performance and responsiveness in contemporary business environments. Collectively, the findings reinforce the argument presented by Okoye et al. (2022) and Singh & Kaur (2024) that data-driven management practices are critical for operational excellence and strategic agility in the digital economy.

## **CONCLUSION**

In conclusion, big data analytics has become indispensable in contemporary information management, offering practical benefits for enhancing operational and strategic performance. The results suggest that to remain competitive and responsive in the digital era, organizations should integrate big data solutions into their information management frameworks.

## **RECOMMENDATIONS**

Based on the findings, the following recommendations are proposed:

1. Organizations should prioritize the adoption of big data analytics tools and technologies to enhance decision-making accuracy and service delivery efficiency.
2. Regular training programs should be organized for managers and staff to enhance their competencies in handling and interpreting big data analytics outcomes.
3. Big data analytics applications should be integrated with existing information management systems to create seamless workflows and real-time decision support systems.

4. Modern organizations should invest in robust data management infrastructures to support large-scale data processing and analytics.

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