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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. 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). Big data, which is recognized by its large volume, diversity, truthfulness, velocity, and high value, has been introduced in the digital era with the expanding pace of data production. Big data has made it more difficult to analyze the data itself, which has forced businesses to adopt new analytical techniques and tools to deal with the complexity and volume of many data categories.

Big data analytics involves sophisticated techniques and tools capable of processing vast, diverse, and fast-moving datasets to uncover patterns, trends, and meaningful insights with the primary goal of transforming raw data into meaningful information that can inform strategic decision making (Gami & Batra, 2024). Mayer-Schönberger and Cukier (2013) argued that big data analytics enables organizations to analyze massive volumes of diverse, rapidly generated data to uncover patterns, trends, and actionable insights—effectively transforming raw data into information. Advanced analytics deals with deep data insights that go beyond internal data and include external data as well as a variety of data formats and types, including both unstructured and structured data.

Big data analytics plays a crucial role in enhancing business intelligence, by analyzing large volumes of structured and unstructured data, organizations can gain deeper insights into customer behavior, market trends, and emerging patterns (Kothati, 2023; Olaniyi, Abalaka, & Olabanji 2023). It empowers organizations to progress beyond descriptive analytics, which focuses on analyzing historical data to understand what has occurred, towards predictive analytics, which uses statistical models and machine learning algorithms to forecast future events and trends. It further extends to prescriptive analytics, which leverages optimization and simulation techniques to recommend the most effective actions for achieving desired outcomes. The integration of big data analytics into Management Information Systems (MIS) has been shown to yield multiple benefits, including enhanced decision-making capabilities, operational

cost reduction, and increased revenue generation (Hossian, Yasmin, Biswas & Asha, 2024). By integrating these advanced analytical approaches, organizations can transition from simply interpreting past performance to proactively shaping future strategies and making data-driven decisions that maximize efficiency and competitive advantage. Big Data serves as the lifeblood of contemporary enterprises, driving innovation and shaping strategic decisions. Its profound influence on decision-making enables organizations to transition from intuition-based approaches to evidence-based strategies. By analyzing vast and diverse datasets, companies can uncover patterns, trends, and actionable insights, resulting in more informed, accurate, and impactful business decisions.

The use of Big Data in business contexts is primarily driven by the objective of enhancing organizational performance and supporting strategic decision-making. This reflects the multifaceted nature of Big Data and its transformative potential for business operations and strategies. A key goal of Big Data utilization is to strengthen decision-making processes by enabling the analysis of large datasets to generate actionable insights applicable across various operational areas. Such insights can aid in identifying market trends, understanding customer behaviors, and optimizing resource allocation. By relying on empirical evidence rather than intuition, businesses can develop more accurate and effective strategies (Akter & Haque, 2022).

By harnessing the power of data, organizations can gain valuable insights, improve operational efficiency, and drive innovation. From enhancing business intelligence to facilitating evidence-based policy making, big data analytics plays an important role in various sectors, including finance, healthcare, and the public sector. As Nigeria continues to embrace digital transformation, the effective utilization of big data analytics will be crucial in shaping a sustainable and prosperous future for our country (Lindy, 2025).

Data analytic approaches/models are complex algorithms and techniques used to extract insights, patterns, and trends from large datasets. They could be referred to as models that are designed to handle and process massive amounts of structured and unstructured data in real-time or near real-time. To Seyedan and Mafakheri (2020), big data analytics consist of predictive analytics, prescriptive analytics, and descriptive analytics. Big data analytics consists of five different levels of analytics with each level having different role and desired outcome.

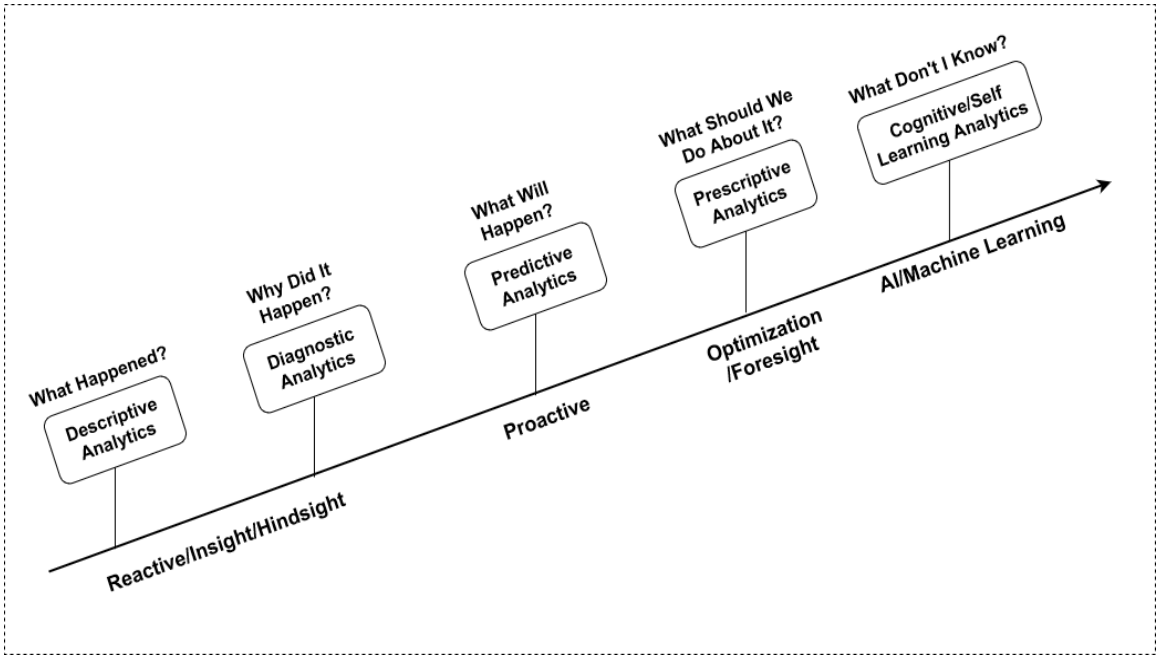

Figure 1: Data Analytic Models

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. Despite these advantages, organizations face significant challenges, such as data privacy and security risks, as well as the shortage of skilled professionals capable of managing and analyzing large-scale datasets (Gad-Elrab, 2021). Despite these advantages, organizations face significant challenges, such as data privacy and security risks, as well as the shortage of skilled professionals capable of managing and analyzing large-scale datasets

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 (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. 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

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

Numerous studies have examined the interrelationship between Big Data Analytics (BDA) emphasizing its critical role and impact on enhancing organizational decision-making (Gami & Batra, 2024). Odionu, Bristol-Alagbariya and Okon (2024) in their study on Big data analytics for customer relationship management: Enhancing engagement and retention strategies emphasized the importance of investing in advanced analytics tools and robust data management practices to maximize the benefits of big data analytics in customer relationship management (CRM). They concluded that big data analytics has significantly enhanced the organization's capacity to personalize customer interactions, anticipate customer needs, and identify at-risk customers, thereby improving engagement and retention.

In another study on the role of big data in business strategy: a critical review, Adaga et al. (2024) revealed that big data significantly enhances decision making capabilities, customer experience and competitive advantage. Their study recommended that businesses should adopt a data

driven approach that integrates big data analytics into organizational strategic planning to enhance decision making, customer engagement and ethical compliance; as this will enable businesses to leverage the full potential of big data, driving innovations and maintaining a competitive edge in the digital landscape. Gad-Elrab (2021)noted that big data analytics enables businesses to uncover patterns, trends, and correlations within large datasets, thereby supporting more informed and strategic decision-making.

Khadijah (2024) in his study stated that big data analytics plays a pivotal role in enhancing financial decision-making in Malaysia by extracting actionable insights from large and complex datasets. He went further to state that the big data analytics supports improved risk management, more precise customer segmentation, and greater operational efficiency in the financial sector. Hence, it facilitates predictive analysis of market behavior, enables the delivery of personalized financial services, and strengthens fraud detection capabilities.

Lang (2022) explored the integration of Big Data within the financial sector, highlighting the critical role of centralizing information in a Big Data environment to optimize financial products and decision-making processes. The study proposed guidelines aimed at ensuring progressive accessibility of Big Data for users and minimizing data silos, thereby improving the efficiency and effectiveness of financial analytics. 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.

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
Cluster Mean/SD		**3.20**	**0.74**	

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
Cluster Mean/SD		**3.19**	**0.73**	

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 Lindy (2025), who emphasized organizations can gain valuable insights, improve operational efficiency, and drive innovation by harnessing the power of data.

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 Lang (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 Kothati (2023) and Olaniyi et al. (2023) that by analyzing large volumes of structured and unstructured data, organizations can gain deeper insights into customer behavior, market trends, and emerging patterns

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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