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BIG DATA AND KNOWLEDGE MANAGEMENT: PROSPECTS AND PROBLEMS NIGERIA

***ADETILOYE, B.L.,[1] AYANDOKUN, T.O.,[1] REBECCA, K.B.[1] AND ODEYEMI, T.H.[2]**
[1]Information and Documentation Library, Forestry Research Institute of Nigeria (Federal College of Forestry, Ibadan), Nigeria
[2]Lagos State University of Science and Technology, Ikorodu, Lagos State, Nigeria
*Corresponding author: faonifade@lautech.edu.ng

Abstract
This study examines the prospects and problems associated with integrating Big Data and Knowledge Management (KM) in Nigeria. It specifically explores the opportunities for leveraging Big Data in KM, challenges affecting adoption, potential contributions to economic growth, innovation and national competitiveness, and the cultural, organisational, infrastructural and policy barriers to effective implementation. The study adopted a systematic review approach, drawing on relevant literature, expert perspectives and case studies from selected sectors, including finance, healthcare and education. The review synthesised evidence on Big Data-driven KM systems, focusing on their applications, benefits, barriers and implementation requirements within the Nigerian context. The findings indicate that Nigerian organisations increasingly recognise the value of data-driven knowledge processes; however, adoption is constrained by weak knowledge-sharing cultures, reluctance to share organisational knowledge, inadequate technical infrastructure, limited data governance frameworks, weak integration of KM practices, and concerns about data privacy and security. Despite these challenges, Big Data offers significant prospects for evidence-based policymaking, improved customer insights, efficient resource management, enhanced decision-making and predictive analytics. Effective integration requires coordinated technological, organisational and policy interventions. The study contributes to the emerging discourse on Big Data and KM by providing a contextual perspective on their integration within Nigeria's developing digital economy. It proposes a framework emphasising strategic investment in digital infrastructure, cross-sector collaboration, capacity building, knowledge-sharing practices, robust data governance and supportive regulatory policies. The framework provides practical guidance for organisations and policymakers seeking to harness Big Data for effective knowledge creation, sharing and utilisation and sustainable socio-economic development.

Keywords: *Big data, Knowledge management, Prospects, Problem, Nigeria*

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Introduction

The advent of big data and knowledge management (KM) has transformed the way organizations operate, make decisions, and create value. However, Nigeria, like many other developing countries, faces significant challenges in harnessing the potential of Big Data and KM to drive economic growth, innovation, and competitiveness. Knowledge is the central object for achieving sustainable development, inclusive well-being, and quality of life from any context. Organisations employ various tools and technologies to support KM efforts. These include document and content management systems, intranets, enterprise social networks, customer relationship management systems, knowledge bases, wikis, and increasingly, artificial intelligence and machine learning applications. These tools help capture, store, and disseminate information efficiently, allowing employees to collaborate and innovate more effectively. Data, and eventually Big Data, is generated from practically everywhere; e.g., social media sites (Facebook, Instagram,Twitter, Linkedin), digital pictures and videos, e-mails, purchase transaction records, cell phone, global positioning system (GPS) signals, smart household appliances, meteorological sensors, to name a few.

The primary objective of knowledge management is to harness both explicit and tacit knowledge within an organisation to enhance performance and innovation. KM helps organisations avoid duplication of effort, reduce knowledge loss due to staff turnover, and streamline operations. It encourages collaboration, promotes a culture of continuous learning, and supports strategic goals by ensuring that the right knowledge is available to the right people at the right time. KM comprises several key components. People are at the heart of KM, as they create and share knowledge. Cultivating a culture that values knowledge sharing is critical. Processes are another core element, involving structured methods to capture, store, and disseminate knowledge. Technology plays a supportive role, offering platforms and tools that facilitate the storage, retrieval, and exchange of knowledge. Finally, strategy is essential; a well-aligned KM strategy ensures that efforts are coordinated with the organization's broader objectives and are supported by leadership and appropriate resource allocation.

Looking forward, the future of knowledge management is being shaped by emerging technologies such as artificial intelligence, machine learning, and big data analytics. These technologies are making KM more dynamic and responsive, allowing organisations to deliver personalised knowledge in real time and automate knowledge discovery. KM is increasingly being integrated into the flow of work, enabling smarter and more agile operations. Knowledge management is a vital discipline that helps organizations unlocks the full potential of their intellectual assets. By creating systems and cultures that encourage the flow of knowledge, organizations can become more innovative, efficient, and resilient. As competition and complexity increase, those who manage knowledge effectively will be better positioned to adapt, thrive, and lead in their industries. Yazdani *et al*. (2020) expressed that organisation in the age of knowledge is an organisation that is based on the best available knowledge and information.

According to Gartner (2022), knowledge is generally distinguished from data and information. While data represents raw facts and figures, and information is data given meaning and context, knowledge is the deeper understanding that emerges from the application and interpretation of information. Knowledge allows individuals and organisations to make informed decisions and take effective action. It can be classified into different types: explicit knowledge, which is docume nted and easily shared through manuals, databases, and reports; tacit knowledge, which is personal, experience-based, and often difficult to articulate; and embedded knowledge, which resides within organisational processes, products, culture, and norms.

Knowledge Management is a broad area. It has been, and remains, both a blessing, there is scope for contributions from any area of expertise, and the potential for cross-fertilization between the understandings of different disciplines. The literature reflects this, with inputs from sociology, economics, finance and accounting, computer science, library and information science, human resource management and operational research/management science (John and Lönnqvist, 2023). Knowledge is the central object for achieving sustainable development, inclusive well-being, and quality of life from any context (Hernández *et al*., 2021).

Therefore, evidence shows that any academic institution is associated with knowledge. In these institutions, the information and knowledge gained in the scientific community's core area should be disseminated for further growth. However, there are challenges in this direction. Studies have demonstrated that knowledge created in educational institutions is not properly stored and obtained. Most of the time, knowledge created in that system remains unknown and is considered as gray literature. The academic environment is considered as the knowledge houses, but if the generated knowledge in that organisation is not properly organised, it will minimise its usefulness and leads to repeat activities (Yazdani *et al*., 2020).

In recent years, Nigeria has witnessed significant advancements in both big data and Knowledge Management (KM), reflecting a global trend towards data-driven decision-making and efficient information utilisation. These developments are evident across various sectors, including healthcare, finance, and education, indicating a growing recognition of the importance of data and knowledge in enhancing organisational performance and national development (Ajayi and Ogunleye, 2023). This development is part of the most recent strategic management trends to explain its vision, based on the knowledge that generates multi-dimensional strategies to create value. Big data analytics in Nigeria is gaining momentum as organisations seek to improve operational efficiency and competitiveness. A study focusing on lending firms in Nigeria demonstrated that the adoption of big data analytics significantly enhances risk mitigation and decision-making processes. The research employed linear regression analysis, revealing a statistically significant relationship between big data analytics adoption and improved performance indicators in these firms (Anake and Okeke, 2023). This underscores the potential of data analytics in transforming business operations within the Nigerian financial sector.

In the healthcare sector, big data analytics is being utilised to address operational challenges. (Jimoh and Abdullahi, 2023) conducted a study in Lagos State investigated the impact of big data analytics on healthcare service firms, highlighting its role in enhancing operational value. Despite the strategic importance of healthcare in Nigeria, the sector faces underfunding and resource constraints. The study suggests that leveraging big data can improve service delivery and resource management, thereby addressing some of these challenges. Despite the progress, several challenges hinder the widespread adoption of big data and KM practices in Nigeria. One significant issue is the skills gap; particularly in the context of Africa's green energy transition (Reuters, 2024). the shortage of skilled professionals hampers the development and maintenance of projects that rely on advanced data analytics and knowledge management. Addressing this gap through targeted training programs is essential for sustainable development (Osabutey and Jin, 2022).

However, the current state of big data and knowledge management in Nigeria is characterised by a growing awareness of their potential benefits and an increasing number of implementation efforts across various sectors. While challenges such as infrastructural deficits, regulatory concerns, and skills shortages persist, ongoing initiatives and research indicate a positive trajectory towards a data-driven and knowledge-centric economy. Continued investment in infrastructure, education, and policy frameworks will be crucial in overcoming existing barriers and fully harnessing the transformative power of big data and knowledge management in Nigeria (World Economic Forum, 2024).

In all indication despite the potential benefits of big data and KM, Nigerian organisations face numerous challenges in adopting and effectively utilising these technologies. The country's inadequate infrastructure, limited technological expertise, and cultural and organisational barriers hinder the effective collection, storage, analysis, and application of big data and knowledge management. Furthermore, the lack of awareness, inadequate skills, and limited resources among Nigerian organisations impede the adoption and effective use of knowledge management (KM) practices. Despite these benefits, implementing knowledge management can be challenging. One major obstacle is cultural resistance employees may hesitate to share what they know out of fear of losing job security or due to a competitive mindset. Other challenges include lack of leadership support, poor alignment of technology with user needs, and difficulty in capturing tacit knowledge.

Nigeria stands at a pivotal point in its journey towards embracing digital transformation, with big data and knowledge management (KM) offering immense potential for socio-economic development. As the country’s population, internet penetration, and mobile usage continue to grow, so does the volume of data generated across sectors such as healthcare, finance, education, and agriculture. Leveraging big data and KM provides an opportunity to unlock actionable insights, drive innovation, enhance public service delivery, and foster informed decision-making in both the public and private sectors (Ajayi and Ogunleye, 2023). One of the foremost opportunities lies in economic growth and

competitiveness**.** Big data analytics can help businesses identify market trends, understand consumer behaviour, and improve operational efficiency. When it with coupled with robust KM practices, organisations can harness institutional knowledge to refine strategies, avoid redundancy, and maintain continuity even amid workforce changes. In sectors like banking and finance, the integration of data analytics is already streamlining credit assessments and fraud detection, contributing to financial inclusion and stability.

Knowledge Management Systems (KMS) have witnessed a significant uptick in adoption across multiple industries, spurred by the rise of data-intensive operations and remote work requirements (Deloitte, 2023). Recently, survey data suggest that organisations are increasingly recognising the value of KMS in improving operational efficiency, fostering innovation, and enhancing strategic decision-making (Munikrishnaiah *et al*., 2025). A consolidated view of this trend is presented in Table, which shows the reported adoption rates and primary benefits of KMS across five major sectors.

Additionally, the risk of information overload can undermine the goal of making knowledge useful and accessible. However, the adoption of big data analytics in Nigeria is not without challenges, such as ICT infrastructure, top management support, and regulatory environment. Therefore, this study examines big data and knowledge management: Prospects and problems in Nigeria.

Methodology

The study adopted a systematic review approach involving the formulation of review questions, comprehensive literature searching, application of predetermined inclusion and exclusion criteria, screening and selection of relevant studies, quality assessment, data extraction, and thematic synthesis of findings. The review focused on scholarly literature addressing Big Data and Knowledge Management, with particular attention to the Nigerian context and evidence from sectors such as finance, healthcare and education.

Table 1: Industry Adoption of Knowledge Management Systems and Primary Benefits

S/N	Industry	Adoption Rate (%)	Primary KMS Benefit
1	Manufacturing	68	Accelerated process optimization
2	Financial Services	75	Enhanced compliance and informed decision-making
3	Healthcare	62	Streamlined cross-departmental sharing
4	Technology	80	Rapid innovation and product development
5	Retail	64	Improved customer insights and efficiency

Note. KMS = Knowledge Management Systems
Source: Munikrishnaiah (2025)

According to the survey, the technology sector leads with an 80% adoption rate, primarily because tech companies often experiment with cutting-edge collaboration tools and aim to streamline knowledge transfer among geographically dispersed teams. In the financial services domain, adoption stands at around 75%, driven by compliance mandates that require robust data storage,

audit trails, and systematic retrieval. Meanwhile, the Healthcare industry, at 62%, underscores the need for secure and rapid exchange of patient and research data across different departments (Oracle, 2022).

Public Service and Governance can also benefit immensely from the combination of big data and KM. Government agencies can use real-time data to track infrastructure projects, monitor health epidemics, manage urban development, and improve resource allocation. For example, during the COVID-19 pandemic, the Nigerian Centre for Disease Control (NCDC) utilised digital dashboards and data analytics tools for monitoring infection rates and managing vaccine logistics. With proper knowledge capture and dissemination practices, such institutional memory can inform future crisis response strategies.

Healthcare: In healthcare, the application of Big Data can lead to predictive diagnostics, improved patient care, and better allocation of scarce resources. KM can assist in preserving valuable medical knowledge and protocols that enhance treatment outcomes and standardize service delivery.

Agriculture: Similarly, agriculture a critical sector in Nigeria's economy can benefit from data-driven approaches for crop forecasting, climate adaptation, and supply chain optimization, while KM can support knowledge transfer between research institutions and rural farmers.

Problems of Leveraging Big Data and Knowledge Management in Nigeria

Despite the growing recognition of KMS as pivotal to organisational success, implementing such systems often presents various challenges. These impediments can manifest across cultural, technological, and operational domains. Infrastructure inadequacy, shortage of skills professionals, Low awareness and organisational resistance to change, data privacy and regulatory issues, Lack of interoperability and integration between systems, Financial constraints, and Knowledge retention and continuity.

i. Infrastructure inadequacy: One of the most pressing challenges is infrastructure inadequacy, particularly regarding internet access and electricity. Despite Nigeria's digital growth, broadband penetration remains uneven across urban and rural areas. According to the National Broadband Plan (2020–2025), the country aims for 70% broadband coverage by 2025, but many rural communities still lack reliable internet connectivity. This digital divide severely limits the ability of organizations to gather, process, and utilize Big Data efficiently. Similarly, frequent power outages and underdeveloped ICT infrastructure hinder consistent access to digital tools needed for both data analytics and KM systems (NITDA, 2021).
ii. Shortage of skilled professionals: Another significant constraint is the shortage of skilled professionals. Big data analytics and KM both require specialised expertise in areas such as data science, database management, artificial intelligence, and information systems. However, the current education and vocational training systems in Nigeria have not yet evolved to meet these demands. A report by Reuters (2024) emphasised that the talent gap is particularly acute in sectors requiring advanced digital competencies, such as health technology, fintech, and e-governance.

Without a sufficient pool of qualified professionals, organisations struggle to effectively design, implement, and maintain KM platforms or interpret and act on big data insights.

iii. Low awareness and organisational resistance to change: The challenge is further compounded by low awareness and organisational resistance to change. Many Nigerian institutions especially within the public sector operate with rigid, hierarchical structures that discourage knowledge sharing. The concept of KM is often misunderstood or undervalued, leading to limited institutional support. As observed by Osabutey and Jin (2022), asset management departments in Nigerian public organisations often lack structured KM policies, resulting in knowledge silos and poor information flow. Similarly, many businesses do not yet have a culture that promotes the strategic use of data, and decisions are frequently based on intuition rather than data insights.

iv. Data Privacy and Regulatory Issues also present substantial hurdles. Although the Nigeria Data Protection Regulation (NDPR) was introduced in 2019 to guide data governance, enforcement remains weak, and awareness is limited among stakeholders. This creates a trust deficit among users and consumers, making it difficult to collect, process, and share data responsibly. In the context of KM, the absence of strong data protection laws may also discourage organizations from capturing and sharing sensitive internal knowledge, especially if they fear legal repercussions or security breaches (NITDA, 2021).

v. Lack of Interoperability and Integration Between Systems: Another challenge lies in the lack of interoperability and integration between systems. Many government ministries, departments, and agencies (MDAs) operate with siloes systems, using different data formats and storage protocols. This lack of standardization makes it difficult to consolidate and analyze data across sectors. It also undermines KM efforts, as fragmented information systems impede seamless knowledge capture, archiving, and retrieval. For example, a study by Jimoh and Abdullahi (2023) found that even where cloud ERP systems and big data tools are adopted, their effectiveness is limited by poor integration with existing legacy systems.

vi. Financial constraints are another notable problem. Setting up and maintaining big data infrastructures such as data centres, analytics platforms, and secure servers requires significant investment. For many Nigerian SMEs and public institutions, budgetary limitations make it challenging to adopt these technologies at scale. Even when international support or pilot funding is available, there are often sustainability issues due to lack of long-term funding and local ownership.

vii. Knowledge retention and continuity: This presents a unique challenge in Nigeria's workforce. Frequent staff turnover, especially in the public sector, means that tacit knowledge is often lost when experienced personnel leave. Without proper KM systems in place to capture and institutionalize this knowledge, organizations lose

valuable insights that could inform policy and operations. Law Pavilion (2024) highlighted this issue in the legal sector, where firms that implemented KM systems saw significant improvements in continuity, compliance, and efficiency, while those without such systems faced recurring setbacks.

Nevertheless, big data and knowledge management have the potential to transform Nigeria's economy and governance, a range of structural, technical, and cultural challenges must be addressed to unlock their full value. These include improving digital infrastructure, bridging the skills gap, fostering a culture of collaboration and knowledge sharing, strengthening legal and regulatory frameworks, and ensuring interoperability of systems. Addressing these challenges will require coordinated efforts between government, academia, private sector, and international partners to build an inclusive, knowledge-driven digital economy.

Prospects of Big Data and Knowledge Management

In today's rapidly evolving global economy, big data and knowledge management (KM) have become essential drivers of transformation, particularly in developing countries like Nigeria. These tools offer the potential to catalyse on economic growth, innovation, and national competitiveness by enabling data-driven decision-making, fostering collaboration, and facilitating continuous learning and adaptation across sectors.

i. Economic growth: One of the most profound impacts of Big Data and KM is their contribution to economic growth through improved efficiency and productivity. Big Data allows organizations to analyze massive volumes of information to identify patterns, optimize operations, reduce costs, and make informed decisions. In Nigeria's financial sector, for example, banks and fintech companies use predictive analytics to assess credit risk, detect fraud, and offer personalized services thereby increasing financial inclusion and driving economic participation (Ajayi and Ogunleye, 2023). Knowledge Management complements this by ensuring that organizational knowledge is effectively captured, shared, and reused, avoiding duplication and enhancing strategic planning. Together, they enable more agile and intelligent business operations, which are critical in a dynamic and competitive economy.
ii. ***Innovation***: The integration of big data and KM also stimulates innovation, particularly in sectors like agriculture, education, and healthcare. In agriculture, data analytics is used to forecast weather patterns, assess soil quality, and optimize supply chains while KM facilitates the sharing of indigenous farming techniques and research-based knowledge among farmers, researchers, and policy-makers. Similarly, Nigeria's emerging edutech sector benefits from analytics to track student performance and engagement, while KM helps in curating and disseminating teaching resources. These innovations not only enhance sectorial productivity but also create employment and promote entrepreneurship.
iii. National competitiveness: The impact on national competitiveness is equally significant. As the global economy becomes more knowledge-intensive, countries that can effectively harness

data and knowledge are better positioned to compete. Nigeria's ability to use big data for policy formulation, urban planning, and business intelligence enhances its appeal to investors and international partners. Knowledge management ensures that best practices, lessons learned, and strategic insights are retained and applied, which enhances institutional memory and resilience. According to Osabutey and Jin (2022), Nigerian public organizations that implemented KM practices experienced improved performance and accountability factors that are crucial in a globally competitive environment. According to Iftikhar, Ali and Shah, (2021). In the dynamic marketplace where supply chains are competing with other supply chains, competitiveness is gained through the knowledge of SC partners. As a result, knowledge management (KM) has emerged as an important field of study within the supply chain management domain (Ali and Gurd, 2020).

Despite these gains, it is worth noting that the full impact of big data and KM is constrained by systemic challenges such as inadequate infrastructure, data silos, and skill shortages. Nevertheless, the growing adoption of these tools across sectors signals a shift towards a more efficient, innovative, and competitive national economy. With continued investment in digital infrastructure, capacity building, and policy support, Nigeria can fully unlock the transformative potential of Big Data and Knowledge Management.

Conclusion

The big data and knowledge management presents significant potential for enhancing decision-making, operational efficiency, and innovation in Nigeria. Big data offers an unprecedented volume, velocity, and variety of information that, when effectively harnessed, can improve the capture, sharing, and utilisation of knowledge across various sectors. However, Nigeria faces several challenges, including limited infrastructure, data privacy concerns, skill shortages, and inadequate policy frameworks, which hinder the effective integration of big data into knowledge management systems. Despite these constraints, there are growing opportunities for leveraging data-driven insights to transform sectors such as healthcare, agriculture, finance, and education. The success of this integration largely depends on the nation's ability to invest in digital.

Recommendations

1. Invest in Digital Infrastructure: The Nigerian government and private sector should prioritise investments in ICT infrastructure to support large-scale data collection, storage, and processing capabilities necessary for big data applications.
2. Develop Skilled Workforce: Institutions of higher learning and training centres should integrate data science and knowledge management into their curricula to produce professionals equipped with the necessary analytical and technical skills.
3. Promote Public-Private Partnerships: Collaboration between government, academia, and industry stakeholders should be encouraged to drive innovation and facilitate knowledge sharing and application of big data technologies.

4. Encourage Awareness and Adoption: National awareness campaigns and stakeholder workshops should be organized to promote the benefits of big data and its role in knowledge management, especially among SMEs and government agencies.
5. Enhance Data Accessibility: Creating centralised and open data platforms can facilitate easier access to high-quality data, enabling more effective knowledge creation and utilisation across sectors.

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