LIBRARIANS' AWARENESS AND SKILLS PROCESSED IN BIG DATA APPLICATION FOR SERVICE DELIVERY IN NORTH-CENTRAL NIGERIAN FEDERAL UNIVERSITY LIBRARIES

Fatima O. Momohjimoh (Ph.D)[1]
fatyhafsy12@gmail.com

Dr. Aliyu Musa, CLN[2]
aliyumusa989@gmail.com
&
Ayuba Ubale Sa'ad[3]
ayubaubalesaad@gmail.com
University Library, Federal University Lokoja, Kogi State [1&3]

Abubakar Tatari Ali Polytechnic Library Bauchi, **Wunti Dada** Jos Road Bauchi, Bauchi State[2]

Abstract

The rapid growth of digital information in the 21st century has positioned Big Data technology as a transformative tool for enhancing academic library operations. This study examined the level of awareness and the skills possessed by librarians in Federal University Libraries in North Central Nigeria regarding the application of Big Data technology for improved service delivery. A descriptive survey research design was adopted, and data were collected from librarians across selected federal universities within the region. Findings revealed that librarians possess a moderate level of awareness of Big Data technology, particularly in areas such as data collection and basic data management. However, advanced awareness of Big Data applications such as research data services and enhanced data usage remains low. Similarly, the study found that librarians generally exhibit moderate proficiency in foundational Big Data-related skills such as data analysis and visualization, while significant gaps persist in advanced competencies including data security, predictive analytics, database management, and data integration. The study concludes that although librarians demonstrate an emerging readiness for Big Data adoption, substantial skill development and infrastructural support are required to optimize Big Data integration in academic library services. It recommends targeted training, improved awareness programs, and the provision of technological tools to fully harness Big Data for effective library service delivery.

Keywords: Awareness, Skills, Librarians, Big data Technology Service Delivery

Introduction

In the 21st century, the rapid development of digital technologies has transformed how information is generated, managed, and utilized across all sectors, including university libraries. One of the most significant transformations in this digital era is the emergence of Big Data technology, which involves the collection, analysis, and interpretation of large volumes of structured and unstructured data to extract meaningful insights. Libraries, as information-driven institutions, increasingly recognize the potential of Big Data to improve decision-making, optimize resource management, and enhance user-centred services.

Big Data Technologies are the advanced technologies or software that are designed to analyse extremely large, complex and diverse datasets that cannot be effectively handled by the traditional database system. These technologies help organisations extract meaningful insight and support data driven decisions making from vast and complex information sources. According to Adamu et al (2024) big data technologies include platform such as Hadoop, Spark, NoSQL Databases, Data Warehousing and Data Lakes, Data Mining and Machine Learning. These technologies are capable of handling both structured and unstructured data, including textual documents, images, audio files, and social media content libraries to convert raw data into actionable knowledge. Through these technologies, libraries can uncover patterns, trends, and insights that support evidence-based decision-making and enhance user-centred services. Big Data has gained prominence for its ability to support evidence-based decision-making and improve service delivery across business, healthcare, education, and governance sectors. Leveraging Big Data technology will libraries gain deeper insights into user behaviour, personalize services, manage resources efficiently, and make data-driven decisions.

University libraries as the integral part of institutions of higher learning are saddled the core responsibilities of the diverse information needs of their users. In today's digital age, the information comes from the angles both in physical and digital form increasing it volume, variety, and velocity leading to the generation of both digital and non-digital data. This transformation has made traditional library service system insufficient to fully meet user expectations. In support of the above Adamu et al, (2024) stated the increase in volume and speed of information supported the Ranganathan's law that a library is a growing organism, particularly in this digital age where we have both digital and non-digital data. The increasing volume and complexity of data in the digital era has made big data technology important for libraries to efficiently manage and utilize their resources. Librarians, must be aware of these technologies so that their libraries may remain relevant and competitive. Using these technologies to improve service delivery and meet their users' demands

It is important for librarians to be aware of areas where big data are created from in the library. This include data from library daily operations such as cataloguing, circulation, online searches, and user interactions with electronic resources. Harnessing this data through Big Data technology can help librarians better understand user behaviour, enhance collection development, personalize services, and improve overall service delivery. However, the successful integration of Big Data technology into library operations largely depends on the awareness and skills possessed by librarians. Without adequate awareness and skill

proficiency, librarians may be unable to fully exploit the opportunities that Big Data offers, thereby limiting innovation and the quality of library services.
To expose this potential, Nigerian university librarians require targeted training to enhance their awareness and technical competencies in the use of Big Data Technology for managing library resources and improving service delivery (Akanbi et al., 2024). In Nigeria, particularly in Federal University Libraries within the North Central region, the adoption of emerging technologies for service delivery has been gradual. Although some libraries have begun integrating digital platforms, the level of librarians' awareness and practical competence in Big Data technologies remains uncertain. This raises critical questions about their readiness to apply Big Data techniques for efficient service delivery. Understanding their level of awareness and skill proficiency is therefore vital for designing effective strategies to improve technology-driven library services in the region.

Overview of Big Data Technology
Big Data refers to extraordinarily massive and complicated datasets that cannot be easily handled, managed, or analysed using conventional data processing tools or methods. It involves the gathering, storage, and analysis of vast amounts of data from multiple sources (Ng 2024). Data is described broadly as a vast volume of structured, semi-structured, and/or unstructured data that cannot be properly managed and processed using typical databases and software tools. Big Data is characterize with high-volume, high-velocity, and contains a wide range of information that necessitates new management and processing methods to enable improved decision making, forecasting, business analysis, customer experience and loyalty, and process optimization in a variety of organizations, industries, and online social networks. Big data can generated from various sources such as Facebook, YouTube, and twitter. etc.

According to Dunmade & Hamzat (2022) believes data big are generated in university libraries from library catalogue, circulation statistics, usage statistics, electronic resources, institutional resource and research output. However, big data technologies encompass innovative methods for capturing, storing, managing, and analysing large datasets from the items listed above to enhance personalized services, improve library collections, optimize search functionality, and enable predictive analytics. However, research indicates that while university libraries are aware of the growing influence of big data in the field, they often lack adequate knowledge of specific big data tools and the readiness to integrate these technologies into library. This ineffectiveness on the part of the library perhaps can be blamed on the unpreparedness of libraries to meet advanced technological innovations, hence the reason this study attempts to analyse the need for awareness and preparedness of librarians. Big data plays a pivotal role in auditing by unlocking unprecedented opportunities to extract meaningful insights from vast volumes of data by Libraries and Librarians.

Librarians are increasingly required to develop big data skills to remain relevant in the digital information landscape. Brodsky, &Tripp (2025) stated that librarians require traditional skills like reference/consulting and data-specific competencies such as metadata creation,

data preservation, and data management plan creation to support big data technology services. These skills are essential for enabling data discovery and retrieval, maintaining data quality, and data management. The study suggests a need for structured training to prioritize these competencies. Multiple studies reveal that librarians must acquire advanced competencies in data science, including data curation, analytics, visualization, and digital literacy (K. Ahmad et al., 2019). Some of the big data skills require by librarians to enhance are develop digital data curation skills, understand data privacy and ethics, learn data organization and cleaning techniques and statistical and computational abilities (K. Ahmad et al., 2019). There are several challenges librarians face in acquiring big data skills to carry out library activities. The significant challenges include limited technological infrastructure and skills gaps, suggesting ongoing training and educational programs are critical for librarians' professional development (Matt Burton et al., 2018). Without sustained capacity-building initiatives, librarians may find it difficult to adapt to the rapidly evolving data environment, thereby limiting their ability to utilize Big Data.

Statement of Problem

The advent of Big Data technology has transformed information management across sectors, offering libraries unprecedented opportunities to enhance service delivery through data-driven decision-making, user behaviour analysis, and effective management of digital resources. In advanced economies, academic libraries have increasingly integrated Big Data analytics into their operations to optimize resource utilization, improve service efficiency, and enhance user satisfaction.

However, in Nigeria particularly within Federal University Libraries in the North Central region the adoption and application of Big Data technologies remain limited. Despite the growing emphasis on digital transformation in higher education, evidence suggests that many librarians in these institutions possess inadequate awareness and insufficient technical skills necessary for leveraging Big Data tools. This lack of competency constrains their ability to collect, analyse, and apply large-scale data for informed decision-making and innovative service delivery.

Consequently, many university libraries in the region continue to rely on conventional methods of information management, which are increasingly inadequate in addressing the complex needs of 21st-century users. The absence of adequate Big Data literacy and practical expertise among librarians may hinder the transition toward evidence-based library management and data-driven user services. These gaps underscore the need to investigate the level of awareness and skills possessed by librarians in applying Big Data technologies for effective service delivery in Federal University Libraries in North Central Nigeria.

Objectives of the Study

1. The level of awareness of librarians on the application of big data technology for effective delivering services at the Federal University Library in North Central Nigeria.

2. The skills possessed by librarians and IT staff for the application of big data technology for effective service delivery in Federal University Libraries in North Central Nigeria.

Hypothesis

Ho_1: There is no significant difference between the mean responses between professional and para-professional librarians regarding the level of awareness on the application of big data technology effective service delivery in Federal University Libraries in North Central Nigeria.

$H0_2$: There is no significant difference between the mean responses of professional and para-professional librarians regarding the skills possess for the application of big data technology for effective service delivery in Federal University Libraries in North Central Nigeria.

Literature Review

Level of awareness of librarians on the application of big data technology effective services delivery

Several scholars have discussed the level of awareness of big data technology. According to Reyes Veras et al. (2021), showed that the awareness of big data technology remains low across some industries, with significant gaps in understanding and implementation. Awareness of big data technology in the Dominican Republic's construction industry shows that nearly 95% of professionals had only basic or no knowledge of big data technology but only 5% had applied BD concepts in the construction industry. This paper establishes the need to develop continuous professional development programmes for construction professionals and a need to update curriculum in construction-related education. The researchers concluded that significant professional development and educational curriculum updates are necessary to improve understanding and implementation of big data in the construction sector. This low awareness represents a substantial barrier to technological advancement and potentially limits the industry's ability to leverage data-driven decision-making processes.

Evidence from several scholars' shows that awareness significantly influences technology adoption and service improvement. Study by Albert Moshi et al.,(2024) revealed that higher level of awareness directly correlate with increased perceived usefulness and ease of use of big data technologies. Sakat, M. (2020) specifically noted that awareness of big data technology has driven increased e-governance application usage, with data analysis helping governments make better decisions. However, the study by S. Memon et al., (2016) revealed that professional unawareness negatively impacts big data technology acceptance, with fear of job loss being a major hindrance.

These evidences suggest targeted training, workshops, and awareness programs could substantially improve big data technology integration and service delivery effectiveness. Big Data Technology generally referred to as the collection of advanced tools, techniques, and frameworks designed to collect, store, manage, and analyse massive or complex volumes of structured, semi-structured, and unstructured data generated from diverse sources.

Generally, in the course of this study the researcher observed that several researchers have established that librarians possess a moderate to high level of awareness on the application of Big Data technology for enhancing effective library service delivery. For instance, Ajani et al. (2024) reported that a substantial proportion of librarians are aware of application of Big Data technology and its capacity to improve library services through enhanced decision-making, service optimization, and the delivery of personalized user experiences.

Similarly, Alarape et al. (2024) found a high level of awareness of Big Data technology among university librarians. Nevertheless, empirical evidence suggests that this awareness is often conceptual rather than operational. Chigwada, & Kasiroori (2021) observed that although librarians are generally aware of the application of Big Data technologies, many have not progressed to the utilization of advanced applications such as data mining and analytics. This gap between awareness and practical implementation underscores the relevance of the present study.

Dunmade, & Hamzat. (2022) examined the relevance of Big Data analytics in Nigerian academic libraries using the University of Ilorin Library as a case study. Adopting a descriptive design and thematic analysis of key informant interviews with systems librarians, the study found that although large datasets are generated in academic libraries, Big Data analytics software was not available in the library studied. Major challenges identified included inadequate funding, insufficient infrastructure, and lack of appropriate analytical tools. The study highlights that the existence of Big Data in Nigerian academic libraries does not necessarily translate into effective utilization, thereby underscoring the need to assess librarians' awareness and skills in applying Big Data technologies for enhanced service delivery

Big data Analytical Skills required by librarians for effective service delivery

Librarians at Federal University Libraries in North Central Nigeria needs big data analytical skills to improve service delivery, such as digital literacy, data management, and advanced analytics capabilities. The required big data analytical skills (BDA) are metadata skills, data ethics, data acquisition, data cleaning, data analysis, digital curation, data clustering, data protection rules, and digital visualization showed a beneficial relationship. The evidence from Nigerian studies reveals critical skills librarians need: data organization, digital curation, data analysis, and ethical data handling (Ajani et al., 2024). Librarians must specialize in data privacy, data availability, metadata management, and digital visualization (Ahmad et al., 2019)

Methodology

The study employed a descriptive survey research design. The population are 178 respondents which comprised all professional librarians working in Federal University Libraries within North Central Nigeria. The entire population was used because the population is relatively small and manageable. A structured questionnaire was used as instrument for data collection. The researcher administered the questionnaires with help of

research assistance. Descriptive statistics such as mean and standard deviation were used to answer the research questions. Inferential statistics, specifically the independent sample t-test, was used to test the null hypotheses at 0.05 level of significance. Decisions were based on whether the p-value was greater or less than the alpha level

Result and Discussions

Objective 1: The level of awareness of Librarians on the application of big data technology for effective service delivery in Federal University Libraries in North Central Nigeria

Table 1: Mean Response of the level of awareness of Librarians on the application of big data technology for effective service delivery in the Federal University Library in North Central Nigeria

S/N	Item statement	VHA	HA	MA	NA	ẍ	SD	Decision	Rank
1	Use as means of data collection	23	55	62	24	2.47	.910	**MA**	1st
2	Use for effective data management in the library	15	46	72	31	2.27	.874	**MA**	2nd
3	To store of large volumes of complex and diverse data	15	42	72	35	2.23	.888	**MA**	3rd
4	For data driven-decisions	21	32	71	40	2.21	.956	**MA**	4th
5	To clearly understand the changing user needs	16	33	79	36	2.18	.886	**MA**	5th
6	Use for budget allocation in the library	12	37	81	34	2.16	.838	**MA**	6th
7	To improve user experiences	15	35	75	39	2.16	.893	**MA**	7th
8	Use as means of data collection	20	35	59	50	2.15	.994	**MA**	8th
9	Help to improve cataloguing process	18	29	72	44	2.15	.961	**MA**	9th
10	Help in feedback analysis	13	38	71	42	2.13	.890	**MA**	10th
11	Help in the research data services	13	40	64	47	2.12	.916	**MA**	12th
12	Enhance data usage in the library	11	35	76	42	2.09	.857	**MA**	12th
	Grand Mean					**2.19**	**0.90**	**MA**	

Keys: Very Highly Aware [VHA] Highly Aware [HA] Moderately Aware [MA] Not Aware [NA]

The Results presented in Table 1 Indicates that librarians recorded the highest mean score in the application of Big Data for data collection (Mean = 2.47), while the lowest mean score was observed in the use of Big Data to enhance data usage within the library (Mean = 2.09). This pattern reveals a higher level of awareness of basic Big Data applications compared to advanced uses, such as data usage enhancement and research data services. Overall, the findings show that librarians in Federal University Libraries in North Central Nigeria possess a moderate level of awareness of Big Data technologies across the assessed areas. This outcome aligns with the findings of Ajani et al. (2024), who reported that although librarians exhibited considerable awareness of Big Data, their understanding of advanced applications was relatively limited. Similarly, Alarape et al. (2024) found that there are generally high level of awareness of Big Data technology among university librarians but noted that such awareness is largely on conceptual rather than application-driven. Therefore is a need for capacity building, training, and sensitization programs to raise awareness to a high level, especially in areas related to research data services and advanced data usage.

Objective 2: The skills possessed by librarians for the application of big data technology effective service delivery in Federal University Libraries in North Central Nigeria.

Table 2: Mean Response of on the skills possessed by librarians for the use of big data technology to enhance effective service delivery in Federal University Libraries in North Central Nigeria

S/N	Item statement	VHP	HP	MP	NP	ẍ	StD	Decision	Rank
4	Data analysis	16	35	80	33	2.23	.876	**MP**	1st
8	Data visualization	14	33	76	41	2.12	.885	**MP**	2nd
2	Data analysis to uncover patterns and insights	12	27	91	34	2.10	.811	**MP**	3rd
7	Communication skills	12	35	75	42	2.10	.870	**MP**	3rd
14	Data Processing	12	38	69	45	2.10	.890	**MP**	3rd
16	Data integration	11	37	70	46	2.08	.879	**MP**	6th
3	Use of data for marketing of library services	15	24	72	53	2.01	.917	**MP**	7th
9	Evaluation of library services	10	29	77	48	2.01	.847	**MP**	7th
10	Technology Proficiency	8	28	80	48	1.98	.814	**MP**	10th
5	Collection development	11	23	78	52	1.96	.853	**MP**	11th
11	User behaviour analysis	8	28	77	51	1.96	.824	**MP**	11th
15	Data security	13	19	81	51	1.96	.864	**MP**	11th
6	Data management	9	27	71	57	1.93	.855	**MP**	11th
1	Database management	9	24	72	59	1.90	.848	**MP**	15th
12	Predictive analytics	8	24	75	57	1.90	.826	**MP**	15th
	Grand Mean					**2.02**	**0.86**	**MP**	

Key: Very Highly Possessed **[VHP**] Highly Possessed [**HP**] Moderately Possessed [**MP**] Not Possessed [**NP**]

Results presented in Table 2 revealed that librarians in Federal University Libraries in North Central Nigeria possess a moderate level of Big Data–related skills, as reflected by the grand mean score of 2.02. The highest-ranked skill is data analysis (Mean = 2.21), followed by

data visualization (Mean = 2.12), and data analysis for uncovering patterns and insights, communication skills, and data processing (Mean = 2.10 respectively). These findings indicate that librarians demonstrate relatively stronger proficiency in foundational basic analytical skills required for basic Big Data operations.

The findings of this study are consistent with existing literature such as Brodsky, & Tripp (2025) submitted that librarians require traditional skills like reference/consulting and data-specific competencies such as metadata creation, data preservation, and data management plan creation to support big data technology services. These skills are essential for enabling data discovery and retrieval, maintaining data quality, and data management. The study suggests a need for structured training to prioritize these competencies. Similarly, Ahmad et al. (2019) reported that librarians often possess basic analytical and visualization skills but lack advanced data science competencies. This alignment suggests that librarians in the North Central region of Nigeria reflect a broader global trend where foundational Big Data skills are more prevalent than advanced technical capabilities.

However, the present study also revealed areas of limited skill possession, particularly in advanced Big Data competencies. Skills such as data security (Mean = 1.96), data management (Mean = 1.93), database management (Mean = 1.90), and predictive analytics (Mean = 1.90) recorded the lowest mean scores. This finding agrees with Matt Burton et al. (2018), who observed that librarians face significant challenges in acquiring advanced technical skills due to limited technological infrastructure and inadequate professional training opportunities. Likewise, Chigwada, &Kasiroori. (2021) noted that although librarians demonstrate awareness of Big Data technologies, their practical capacity to apply advanced analytics and database-driven solutions remains low.

In contrast, Ahmad et al. (2019) found that librarians in well-resourced institutions possess stronger competencies in data security, database management, and predictive analytics due to sustained professional development and institutional investment in digital infrastructure. The divergence between these findings and the present study underscores the contextual influence of infrastructure availability, institutional support, and training opportunities on librarians' skill development. Overall, the findings of this study confirm that while librarians in Federal University Libraries in North Central Nigeria possess moderate foundational Big Data skills, they lack advanced technical competencies necessary for the full deployment of Big Data technologies in library service delivery. Addressing these gaps will enable librarians to effectively harness Big Data technologies for improved service delivery.

Null Hypothesis 1: There is no significant difference between the mean responses of professional librarians and paraprofessional librarians regarding the level of awareness on the application of big data technology for effective service delivery in Federal University Libraries in North Central, Nigeria

Table 3: t-test analysis of mean ratings of professional and para-professional librarians with respect to the level of awareness of the application of big data technology for effective service delivery in Federal University Libraries in North Central, Nigeria

Librarians	N	Mean	St. D	Df	t-cal	Sig	Decision
Professional Librarians	91	2.15	0.68	162	-.825	0.411	Not Significant
Non-Professional Librarians	73	2.24	0.73				

P<0.05; **D:** Decision; **S:** Significant; **NS:** Not Significant

Table 3, shows that the t-test value -.825 is significant at 0.411. Since the significant value of 0.411 is greater than 0.05 level of significance at which the null hypothesis is tested, the null hypothesis is therefore upheld. Hence, there was no significant difference between the mean responses of professional and non-professional librarians with respect on the level of awareness the application of big data technology for effective service delivery in Federal University Libraries in North Central, Nigeria. However, female librarians had higher mean score than their male counterparts.

Null Hypothesis 2: There is no significant difference between the mean responses of professional and non-professional librarians on the skills processed of the application of big data technology for effective service delivery in the Federal University Library in North Central Nigeria.

Table 4: t-test analysis of mean ratings of professional and non-professional librarians with respect to skills possessed for the application of big data technology for effective service delivery in Federal University Libraries in North Central Nigeria.

Gender	N	Mean	St. D	Df	t-cal	Sig	Decision
Male	91	2.07	0.65	162	1.214	0.227	Not Significant
Female	73	1.95	0.65				

P<0.05; **D:** Decision; **S:** Significant; **NS:** Not Significant

Table 4, shows that the t-test value 1.214 is significant at 0.227. Since the significant value of 0.227 is greater than 0.05 level of significance at which the null hypothesis is tested, the null hypothesis is therefore upheld. Hence, there was no significant difference between the mean responses of professional and non-professional librarians with respect to skills possessed for the application of big data technology for effective service delivery in Federal University Libraries in North Central Nigeria.

Findings

1. The findings shows that librarians in Federal University Libraries in North Central Nigeria possesses a moderate level of awareness on the of big data technology for enhancing effective library services. Demographic factors such as gender, do not significantly influence this level of awareness.
2. The findings show that librarians in federal university libraries in North Central Nigeria generally possess a moderate skill level for the application of big data technology, particularly in basic data analysis and visualization. However, there is

a noticeable skills gap in advanced areas such as predictive analytics, database management, and data security, indicating a need for targeted training and capacity-building initiatives to enhance big data application for effective library service delivery

3. The Finding of the Hypothesis shows that both professional and para-professional librarians exhibited a moderate level of awareness, particularly in basic applications such as data collection, data management, and data storage, while awareness of advanced applications, including research data services and enhanced data usage, remained relatively low**.**

Recommendation

1. There is need for federal university libraries in North central to creating more awareness through workshops and training of how big data technology could be applied for effective library service delivery through organising in-house training and workshops for the librarians to understand how to innovatively apply big data technology for service delivery
2. Federal university libraries in North Central Nigeria should invest in both the development of librarians' big data skills and the provision of adequate technological tools needed for effective application.

References

Adamu, R, Musa R, S &Muhamma, Z.D. (2024). Assessment of librarians' level of awareness on *big data technologies for enhanced service delivery in university libraries in Northern Nigeria. KHAIRUN International Journal of Contemporary Librarianship, 2(4), 25-46*

Ahmad, K., JianMing, Z., & Rafi, M. (2019). An analysis of academic librarian's competencies and skills for implementation of big data analytics in libraries: A correlational study. *Journal of Data Technologies and Applications*, https://doi.org/10.1108/DTA-09-2018-0085.

Akanbi, M. L., Sulaiman, K. A., Maliq Hammed Omolola, & Bilqees Jumia Nallah. *(2024). the use of big data in the management of library resources: Nigeria university experiences. Business Information Review, 41(3), 134–140. https://doi.org/10.1177/02663821241265894*

Ajani, Y.A., Adefila, E.K., Olarongbe, S.A., Enakrire, R.T., & Rabiu, N. *(2024).* Big data and the management of libraries in the era of the Fourth Industrial Revolution: implications for policymakers. *Digit. Libr. Prospect. 40, 311-329.* (n.d.).

Alarape, A. A. (2024). Perception, Competency and Use of Big Data Analytics among Librarians from University Libraries in Osun State. *International Journal of Research and Innovation in Social Science*, 8(6), 986–997. https://doi.org/10.47772/ijriss.2024.806075

Brodsky, Meryl & Hannah Chapman Tripp (2025). Data competencies for liaison librarians: A scoping review, IASSIST Quarterly 49(3), pp. 1-23. DOI: https://doi.org/10.29173/iq1154

Burton, M., Lyon, L., Erdmann, C., & Tijerina, B. (2018). Shifting to Data Savvy: The Future of Data Science In Libraries., n.d.

Chigwada, J.P., & Kasiroori, J. (2021). Awareness of Big Data Usage and Applications Among Librarians in Zimbabwe. *Advances in Library and Information Science (ALIS) Book Series*, 22–34. https://doi.org/10.4018/978-1-7998-3049-8.ch002

Dunmade, A.O., & Hamzat, S.A. (2022). Relevance of Big Data Analytics in Nigerian Academic Libraries: University of Ilorin Library Experience. Mousaion: South African Journal of Information Studies.

Ng, K. (2024). *Big Data: Understanding and Implementation in the Data-Driven Era*. ResearchGate; Kindle Edition. https://www.researchgate.net/publication/377359928_Big_Data_Understanding_and_Implementation_in_the_Data-Driven_Era

Memon, S., Wang Changfeng, Rasheed, S., Pathan, Z. H., Sehrish Khan Saddozai, Qiu Yixin, & Liu Yanping. (2016). Adoption of Big Data Technologies for Communication Management in Large Projects. *International Journal of Future Generation Communication and Networking*, *9*(10), 73–82. https://doi.org/10.14257/ijfgcn.2016.9.10.07

Moshi, A., Sife, A., & Matto, G. (2024). The Effect of Awareness on Big Data Adoption Readiness in Public Sector Auditing in Tanzania: Assessing TAM Model. *Asian Journal of Economics, Business and Accounting*, *24*(7), 341–354. https://doi.org/10.9734/ajeba/2024/v24i71414

Reyes Veras, P., Renukappa, S., & Suresh, S. (2021). Awareness of Big Data concept in the Dominican Republic construction industry: an empirical study. *Construction Innovation, ahead-of-print* (ahead-of-print). https://doi.org/10.1108/ci-05-2021-0090

Sakat, M. (2020). E- Governance in Big Data Era -The Dynamics of Shift for Traditional Governance using Big Data Analytics.