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DIGITAL INFORMATION MANAGEMENT PRACTICES AND BIG DATA UTILISATION IN UNIVERSITY LIBRARIES IN KWARA STATE, NIGERIA

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ABSTRACT

The advancement of digital technologies and the emergence of big data are transforming academic libraries globally, offering opportunities to enhance service delivery, improve accessibility, and support research and learning. This study investigated Digital Information Management (DIM) practices and the extent of big data utilisation in university libraries in Kwara State, Nigeria. Adopting a descriptive survey design, the study covered 137 professional and paraprofessional librarians across three universities, with data collected through a structured questionnaire and analysed using descriptive and inferential statistics. The findings revealed that record management, digital preservation, and data storage and retrieval were effectively practiced, while compliance and risk management were relatively weak. In terms of Big Data, user feedback, collection data, and digital repositories were highly utilised, whereas library operations data and learning analytics were underutilised. The study concludes that although DIM practices and Big Data adoption are evident in Kwara State university libraries, gaps remain in advanced analytics, infrastructure, and staff competencies. It recommends capacity development, improved funding, and stronger governance frameworks to strengthen digital transformation in Nigerian academic libraries.

Keywords: Digital information management, Big data utilisation, Academic libraries, University libraries

Introduction

In recent years, the advancement of digital technology and big data has significantly transformed the field of library and information science. University libraries as vital centers of knowledge and information

access for students, researchers and faculty face increasing pressure to meet the growing demand for digital resources and data-driven services. In the contemporary information age, university libraries serve not merely as repositories of knowledge but as dynamic hubs of digital innovation, where big data analytics and advanced information management systems converge to enhance user experiences and optimize resource utilisation (Akanbi *et al.,* 2024). Big Data, often described by its characteristics of volume, velocity, and variety (Laney, 2001), offers libraries the capacity to generate insights into user behavior, strengthen resource management, and tailor services to individual needs. Globally, university libraries are adopting Big Data analytics to identify trends, anticipate information demands, and guide decisions on resource allocation, thereby ensuring more responsive and efficient operations (Sagiroglu & Sinanc, 2013; Lomotey & Deters, 2013). With the exponential growth of digital content, conventional database systems are no longer sufficient to handle large and complex datasets (De Mauro *et al*., 2016).

The evolution of digital information management in academic libraries represents a progressive transformation from isolated digitization efforts to comprehensive, networked digital ecosystems. Digital libraries have evolved from simple digitization and cataloguing initiatives to distributed, networked collections that offer interactive services supporting multimedia access and remote retrieval of resources (Asogwa, Ezeani & Asogwa, 2021). With the transition from print to digital formats, libraries must develop expertise in digital preservation, metadata management, and information security to ensure long-term access to knowledge resources. Studies highlight that libraries which effectively implement DIM strategies are better positioned to meet user expectations for timely, reliable, and technology-driven services (Choi & Wallace, 2018). Despite these prospects, university libraries in developing contexts such as Kwara State, Nigeria, often encounter challenges in adopting both Big Data and DIM. Limited infrastructure, insufficient budgets, and shortages of skilled staff hinder the extent to which these libraries can leverage advanced technologies to support teaching, learning, and research (Aina, 2022). The lack of technical expertise in areas such as data curation, analytics, and digital preservation further complicates efforts to optimize library services.

Against this backdrop, this study seeks to investigate two core aspects of digital transformation in Nigerian university libraries: the level of Digital Information Management practices and the extent of Big Data utilisation. By focusing on university libraries in Kwara State, Nigeria, the study aims to provide empirical insights into how these libraries are adapting to the demands of the digital age and the challenges they face in the process. Findings from this study are expected to inform policy, capacity development, and infrastructural strategies to strengthen library service provision in Nigeria's academic institutions.

Statement of the Problem

University libraries are increasingly expected to evolve beyond traditional service in response to rapid advances in technology. Big Data and Digital Information Management (DIM) are widely recognised as transformative tools that can enhance library functions by enabling evidence-based decision-making, resource optimization, and seamless access to digital collections. While libraries in developed contexts are

progressively adopting these innovations, university libraries in Nigeria, particularly in Kwara State, face persistent challenges in their implementation. Constraints such as limited funding, outdated infrastructure, and shortages of staff with the necessary digital competencies have hindered the effective adoption of Big Data analytics and DIM practices. As a result, there is growing concern that university libraries in the region may be lagging behind in fully leveraging these technologies to meet the dynamic needs of their users.

Despite the significance of these issues, there is a lack of empirical research examining the extent of Big Data utilisation and the level of Digital Information Management practices in university libraries in Kwara State. This knowledge gap leaves library administrators and policymakers without sufficient insight into the degree of progress made in adopting these innovations or the barriers that still exist. Without such understanding, opportunities for strengthening library services through digital transformation may remain unrealised. This study, therefore, seeks to investigate the level of DIM practices and the extent of Big Data utilisation in university libraries in Kwara State, Nigeria, with a view to providing evidence-based insights that can guide strategic improvements in academic library operations.

Research Questions

i. What is the current level of DIM practices in university libraries in Kwara State, Nigeria?
ii. To what extent is big data utilised in university libraries in Kwara State, Nigeria?
iii. What are the challenges faced by university libraries in Kwara State in implementing big data and digital information management?

Review of Related Literature

Digital Information Management Practices in University Libraries

Scholars have studied digital information practices from a variety of viewpoints, with a focus on user interactions with digital content, digital literacy, ethical considerations, and the growing information ecology (Lloyd, 2010). Digital information practices encompass a variety of actions in which humans interact with information in digital contexts. This includes searching, assessing, organizing, sharing, and producing digital content (Limberg, Sundin, & Talja, 2012). According to Lloyd (2010), these habits are not simply technical but also social and cultural, influenced by the circumstances in which users work. Digital information practices are inextricably tied to information literacy, media literacy, and digital literacy, all of which influence users' ability to engage critically with digital content.

According to Walsh (2012), mobile phones have become the major means of gathering and consuming information, particularly among younger users. Social media platforms such as Twitter, Facebook, and LinkedIn are rapidly being utilised to disseminate information and share knowledge. Cloud-based solutions such as Google Drive and Dropbox allow users to easily store, manage, and share information, disrupting traditional information management processes (Armbrust et al., 2010).

Effective digital information practices rely significantly on digital information literacy, or users' ability

to locate, assess, and ethically use information in digital formats (Head & Eisenberg, 2010). According to Leu *et al*. (2013), digital literacy is an essential talent in the twenty-first century, requiring competences such as critical thinking, content production, and digital collaboration in addition to basic ICT skills. Understanding how people engage with digital information is critical to developing effective digital services. Tenopir *et al*. (2011) found that users frequently prefer digital sources due to their convenience and accessibility. However, digital overload and difficulty in determining reliability present hurdles (Flanagin & Metzger, 2007). There are also generational distinctions in information behavior, with digital natives preferring non-linear, multi-modal information environments (Prensky, 2001).

Digital information practices bring ethical questions about privacy, intellectual property, and misrepresentation. The ease with which digital content can be shared can result in copyright infringement and the propagation of fake news (Kaplan & Haenlein, 2010). Furthermore, the collecting and use of personal data by digital platforms raises serious privacy concerns (Zuboff 2019). The sheer volume of digital content can overwhelm users, impairing their capacity to identify useful information (Bawden & Robinson, 2009).

Big Data Utilisation in University Libraries

In university libraries, big data has become a disruptive force that is propelling advancements in service delivery and information management. Big Data is being used more and more by university libraries to improve user experience and operational effectiveness. For example, by recognizing trends in user preferences and usage patterns, the incorporation of Big Data analytics enables libraries to maximize collection development. Big Data makes it easier to develop predictive models that foresee patron requirements, guaranteeing that libraries continue to provide proactive services (Singh & Malhotra, 2020).

Furthermore, through data mining and analysis, big data has been crucial in assisting scholarly research. Large datasets can now be stored, analysed, and shared using research data management services provided by university libraries that use Big Data technologies. These services aid academics in extracting patterns and insights from intricate information, which advances knowledge across fields (Zhang *et al*., 2019). This feature emphasizes how important university libraries are as centers for multidisciplinary and cooperative research. Big Data technologies can also be used to enhance university libraries' budgeting and resource allocation. Libraries can optimize their budgets by making data-driven decisions about subscriptions and acquisitions by examining statistics on resource usage.

For instance, Jabeen and Akhtar (2021) point out that libraries can reallocate funds to regions with high demand by using Big Data analytics to detect underutilised resources. The sustainability and applicability of library collections are guaranteed by this calculated strategy. Improving library space management is another crucial application of big data. Digital check-ins, seating occupancy sensors, and entry and exit log data can all be used by libraries to better understand patron circulation patterns and make the most use of available space. These findings allow libraries to design adaptable and useful settings that satisfy users' changing demands (Patel and Sharma, 2020).

Additionally, the impact of library services is being assessed and enhanced through the use of Big Data. Altmetrics and citation analysis are two examples of data analytics-derived metrics that assist libraries in evaluating their contributions to research output and academic performance. These indicators offer evidence-based insights that can guide advocacy and strategic planning, according to Wang *et al*. (2021). The importance of university libraries in advancing institutional objectives is reaffirmed by these assessments. Big Data use in university libraries is not without difficulties, despite its advantages. Concerns like data privacy, morality, and the requirement for qualified staff continue to be major obstacles. Libraries must invest in staff training and implement strong data governance frameworks to overcome these issues, claim Ahmed and Khan (2022). Tella and Kadri (2021) showed that big data is indeed very big in academic libraries because there are evidences of its adoption and best practices in its use in academic libraries across the world. The study has created awareness on the part of academic libraries stakeholders including authorities, librarians and users on the relevance of big data and how big it is in academic library landscape.

Challenges in Implementing Big Data and Digital Information Management in University Libraries

One of the most notable obstacles is technological. In order to handle big data applications, many university libraries lack the requisite hardware, software, and reliable network infrastructures. In many institutions, advanced technical competence is sometimes unavailable due to the complexity of modern technologies (Neha, 2021). Inadequate technology infrastructure is one of the main challenges. In order to manage the massive amounts of data connected to Big Data and DIM, many university libraries, particularly those in developing nations, require high-speed internet, sophisticated servers, and enough storage systems (Okoro & Eze, 2021). Another major obstacle is library groups' resistance to change. Because they believe that new technology may interfere with their established processes, librarians and administrators may be hesitant to embrace them (Aina, 2022). Furthermore, the successful adoption of Big Data integration is impeded by the lack of a strategic vision and policies (Nguyen, 2021).

Additionally, institutional bureaucracy might impede the adoption of new techniques and decision-making. Big Data and digital information management implementation calls for a significant financial outlay for upkeep, training, and technology. University libraries sometimes struggle with a lack of finance, especially in areas where library budgets are severely underfunded or dependent on outside subsidies (Kumar & Rani, 2020). A lack of skilled personnel is a critical challenge. Big Data and DIM require librarians with expertise in data analytics, database management, and information technology. These skills gap not only limits the libraries' ability to leverage Big Data but also increases dependency on external consultants, which may not be sustainable. There are ethical questions raised by the use of big data in libraries, especially when it comes to user privacy. Resistance to change among staff and administrators, driven by fears of obsolescence or discomfort with new technologies, further impedes progress (Nguyen, 2021). Training programmes, where available, are often inadequate to address the complexities of big data and digital management systems (Khan & Raza, 2022).

Methodology

This study adopted a descriptive survey design of the correlational type, deemed appropriate for investigating the current state of Digital Information Management (DIM) practices and the extent of Big Data utilisation in university libraries without manipulating variables. The study population comprised all professional and paraprofessional librarians across three university libraries in Kwara State, Nigeria: University of Ilorin (86), Kwara State University (39), and Al-Hikmah University (12), giving a total of 137 respondents. Due to the manageable size, a total enumeration sampling technique was employed, allowing all members of the population to participate.

Data were collected using a structured questionnaire consisting of two sections: respondents' demographic information and items addressing DIM practices and Big Data utilisation. The instrument was validated through expert review by the researcher's supervisor and three lecturers in the Department of Library and Information Science. Reliability was established using the split-half method, which confirmed internal consistency of the items. Responses were coded and analysed using the Statistical Package for Social Sciences (SPSS) version 21. Descriptive statistics (frequency counts, percentages, means, and standard deviation) were used to summarize DIM practices and Big Data utilisation.

Data Analysis and Results

This section is concerned with the presentations of results, analysis and the interpretation of data gathered from the responses on the administered questionnaire for this study. The total number of one hundred and eighteen (118) copies were returned completely filled and found usable for the study. This indicates 86.1% response rate, which is considered appropriate for the study.

RQ 1: What is the current level of DIM practices in university libraries in Kwara State, Nigeria?

Table 1: Current Levels of Digital Information Management Practices in the Libraries

Current Levels	VE F(%)	E F(%)	ME F(%)	I F(%)	Mean (x̄)	SD Σ
Information Governance	38 (32.2)	38 (32.2)	24 (20.3)	18 (15.3)	2.81	1.05
Data Classification	9 (7.6)	70 (59.3)	26 (22.0)	13 (11.0)	2.63	0.78
Digital Asset Management	32 (27.1)	44 (37.3)	20 (16.9)	22 (18.6)	2.72	1.06
Content Management	15 (27.7)	61 (51.7)	42 (35.6)	0 (0.0)	2.77	0.66
Record Management	54 (45.8)	44 (37.3)	18 (15.3)	2 (1.7)	3.27	0.78
Data Storage & Retrieval	36 (30.5)	57 (48.3)	18 (14.4)	8 (6.8)	3.02	0.85
Information Security	31 (26.3)	45 (38.1)	36 (30.5)	6 (5.1)	2.86	0.87
Data Backup & Recovery	27 (22.9)	55 (46.6)	32 (27.1)	4 (3.4)	2.89	0.79
Digital Preservation	55 (46.6)	29 (24.6)	30 (25.4)	4 (3.4)	3.14	0.91
Compliance and Risk Management	18 (15.3)	44 (37.3)	43 (36.4)	13 (11.0)	2.56	0.88

Field Survey, 2025 Note: Criterion x̄ = 2.50

Note: VE=Very Effective, E=Effective, ME=Moderately Effective, and I=Ineffective

Table 1 shows the current level of digital information management practices in the university libraries. The findings reveals that respondents record management ($\bar{x}$ = 3.27), digital preservation ($\bar{x}$ = 3.14), and data storage & retrieval ($\bar{x}$ = 3.02) are very effectively practiced. Similarly, data backup & recovery ($\bar{x}$ = 2.89), Information Security ($\bar{x}$ = 2.86), Information Governance ($\bar{x}$ = 2.81), content management ($\bar{x}$ = 2.77), digital asset management ($\bar{x}$ = 2.72), data classification ($\bar{x}$ = 2.63), and compliance and risk Management ($\bar{x}$ = 2.56) moderately effective. Apparently, the results imply that most digital information management practices are operational, but a few areas particularly compliance and risk management require further improvement to reach optimal levels.

RQ 2: To what extent is big data utilised in university libraries in Kwara State, Nigeria?

Table 2: Extent of Big Data Utilisation in the University Libraries

Extent of Utilisation	**HE F(%)**	**ME F(%)**	**LE F(%)**	**NE F(%)**	**Mean ($\bar{x}$)**	**SD Σ**
Circulation Data	29 (24.6)	63 (53.4)	7 (5.9)	19 (16.1)	2.86	0.97
User behavior data	35 (29.7)	32 (27.1)	24 (20.3)	27 (22.9)	2.63	1.14
Collection data	41 (34.7)	43 (36.4)	32 (27.1)	2 (1.7)	3.04	0.83
User feedback data	32 (27.1)	69 (58.5)	9 (7.6)	8 (6.8)	3.06	0.79
Library operations data	34 (28.8)	28 (23.7)	39 (33.1)	17 (14.4)	2.47	1.05
Digital repository data	36 (30.5)	43 (36.4)	37 (31.4)	2 (1.7)	2.96	0.83
Learning analytics data	21 (17.8)	32 (27.1)	48 (40.7)	17 (14.4)	2.48	0.95
Library event data	18 (15.3)	67 (56.8)	31 (26.3)	2 (1.7)	2.86	0.68

Field Survey, 2025 Note: Criterion $\bar{x}$ = 2.50

Note: HE = High Extent, ME = Moderate Extent, LE = Low Extent, and NE = Not Extent

Table 2 presents the extent of big data utilisation in the university libraries studied. The analysis shows that user feedback data ($\bar{x}$=3.06), collection data ($\bar{x}$=3.04), and digital repository data ($\bar{x}$=2.96) were highly extensively utilised. Correspondingly, circulation data ($\bar{x}$=2.86), library event data ($\bar{x}$=2.86), and user behavior data ($\bar{x}$=2.63) fall in the acceptable range, which suggest the moderate extent of utilisation. However, library operations data ($\bar{x}$=2.47) and learning analytics data ($\bar{x}$=2.48) were not extensively used and these fell below the benchmark. These findings suggest that while certain categories of big data are actively used in university libraries, others especially those supporting analytics and operational planning remain underutilised.

RQ 3: What are the challenges faced by university libraries in Kwara State in implementing big data and digital information management?

Table 3: Challenges Faced in Implementing Big Data and Digital Information Management for Service Provision

Challenges	SA F(%)	A F(%)	D F(%)	SD F(%)	Mean (x̄)	SD Σ
Limited financial resources hinder the implementation of big data and DIM in the library	22 (18.6)	75 (63.6)	19 (16.1)	2 (1.7)	2.99	0.65
The library faces challenges in acquiring the technical expertise needed for big data and DIM.	36 (30.5)	63 (53.4)	17 (14.4)	2 (1.7)	3.12	0.71
There are significant infrastructural gaps in implementing digital information management practices.	43 (36.4)	56 (47.5)	6 (5.1)	13 (11.0)	3.09	0.92
Resistance to change among library staff affects the adoption of big data technologies	28 (23.7)	58 (49.2)	30 (25.4)	2 (1.7)	2.94	0.75
Data privacy and security concerns pose a challenge to implementing DIM practices effectively	16 (13.6)	45 (38.1)	23 (19.5)	34 (28.8)	2.36	1.04

Field Survey, 2025 Note: Criterion x̄ = 2.50

Note: SA=Strongly Agree, A=Agree, D=Disagree, and SD=Strongly Disagree

Table 3 illustrates the challenges faced by the university libraries in implementing big data and digital information management (DIM) for service provision. The results indicate that the most prominent challenges include lack of technical expertise (x̄=3.12), infrastructural gaps (x̄=3.09), and limited financial resources (x̄=2.99), all of which were rated above the criterion x̄. Meanwhile, resistance to change among library staff was also identified as a concern (x̄=2.94). However, data privacy and security concerns received the lowest mean score (x̄=2.36), and this suggest that it is perceived as a less critical issue compared to other pitfalls. Generally, the findings stressed that technical capacity, infrastructure, and funding are the primary obstacles to effective big data and DIM implementation in university libraries.

Discussion of the Findings

The finding of the study revealed that the current level of digital information management practices in selected university libraries in Kwara State include record management, digital preservation, data storage & retrieval, data backup & recovery, Information Security, Information governance, content management, digital asset management, data classification, and compliance and risk management are very effective. The finding of the study is similar with the consistency of numerous literature that demonstrates a global recognition of core digital management functions including record management, digital preservation, backup & recovery, classification, and compliance across diverse university library environments such as (Rafiq, 2024) who emphasized the technical and policy-oriented measures undertaken to secure, preserve, and ensure future access to digital records.

Similarly, Omosekejimi and Eda (2024) highlight practical application of metadata and retrieval tools within Nigerian and Pakistani institutions. Their studies patterns validate the result of the selected university libraries in Kwara State on effective digital information management systems. Moreover, Rhima (2023a), Nadia *et al*. (2025a) extend this validation by emphasising not only the technical but also strategic dimension like infrastructure, governance frameworks, risk management compliance, and institutional collaboration. Rhima (2023b) noted the effective use of storage media and governance protocols as it is reinforced in the findings such as backup, retrieval, and compliance. Nadia *et al*. (2025b) systematic review stressed the integration of policies, governance, and technological safeguards across digital asset management. Hence, the findings of the study is at variance with Shah *et al*. (2025), who found that librarians' abilities to support data access and sharing is substantial and deficits such as absence of leadership backing, lack of formal policies, and insufficient cooperation across departments hindered the implementation of effective data management plans.

The finding of the study showed that the extent of big data utilisation in selected university libraries in Kwara State include user feedback data, collection data, digital repository data, circulation data, library event data, and user behavior data are extensively utilised. The finding of the study corresponds with Silwattananusarn and Kulkanjanapiban (2022) who revealed that extensive utilisation of user feedback, collection data, digital repository data, circulation data, event data, and user behavior metrics resonate with how library circulation and behavior data inform collection decisions and academic support.

Similarly, Akanbiemu (2024), and Ajani *et al*. (2024) affirmed the integration of user feedback, repository analytics, and behavior tracking into library operations parallel with the findings of the study. Moreover, Ponera and Kyumana (2024a), De Silva (2021), as well as Liu and Zhang (2023) illustrated the use of social media signals, event attendance, and repository logs to enhance personalisation, service provision, and collection planning extensively. While Ponera and Kyumana (2024b) noted tool sophistication are part of a global trend toward leveraging big data analytic to blend user-generated and operational datasets to optimise library services and inform strategic decision-making.

Conclusion

The findings of the study revealed that DIM practices such as record management, digital preservation, and data storage and retrieval were effectively implemented, while compliance and risk management remained weak. Similarly, big data utilisation was notable in user feedback, collection data, and digital repositories, but underutilised in library operations and learning analytics. Overall, the study concludes that while university libraries in Kwara State studied are making progress in adopting digital information practices and integrating certain aspects of big data, significant gaps remain in technical capacity, governance frameworks, and advanced analytics. Addressing these limitations is essential to fully harness the potential of digital transformation for improved library services.

Recommendations

Based on the findings of this study which lead to the conclusion reached, the following recommendations were made.

i. The library managements should organise regular training and professional development programmemes to enhance librarians' competencies in data analytics, digital preservation, and information governance.
ii. The university libraries should provide modern ICT facilities, robust servers, and reliable internet connectivity to support Big Data processing and secure DIM practices.
iii. The library managements should establish clear policies on data governance, compliance, and risk management to ensure consistency and accountability in digital practices.
iv. The university libraries should foster collaborations among themselves, their ICT units, and external partners to share resources, expertise, and best practices in big data and DIM.
v. The library authorities should integrate learning analytics and operational data into library systems to better support teaching, learning, and institutional planning.
vi. The library managements should advocate for increased budgetary allocation to sustain investments in digital transformation and ensure continuity of innovations.

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AUTHORS' PROFILES

Yusuf Umar holds a Bachelor of Library and Information Science (B.LIS) degree, graduating with First Class Honours. He has practical professional experience as a Casual Librarian in a hospital library, where he contributed to information organisation, user support services and access to health information resources. He is currently an Assistant Librarian at Kwara State University, Malete, where he is involved in academic library services, teaching support, and research-related activities. Umar also has experience in library instruction and has taught undergraduate courses in Library and Information Science, including areas related to national libraries, collection development, serials management, and information services. His research interests and areas of specialisation include Big Data, Digital Libraries, Digital Information Management, Library Education, Collection Development, and Library Management. He has conducted and completed several academic research projects focusing on digital transformation, big data utilisation, community engagement, and service provision in university libraries. In addition to his academic and professional engagements, Umar has demonstrated leadership within the university community and professional circles, contributing to academic development, scholarly writing and library advancement initiatives.

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