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Original Article

## Strategies for Enhancing the Adoption and Effective Application of Blockchain Technology in Academic Law Libraries in North-Central Nigeria

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### Keywords:

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Technology Adoption,  
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North-Central  
Nigeria.

**Purpose:** With the growing digitisation of law information sources, issues of authenticity, security, preservation and access continue to rise. Blockchain technology is claimed to be able to solve these problems and to bring trust and integrity to academic law libraries. But the adoption of blockchain in academic law libraries in developing countries is not very high. This study therefore investigated the possibilities of promoting the adoption and optimal utilisation of blockchain in academic law libraries in the North-Central region of Nigeria. **Methodology/Approach:** The study was a descriptive multiple case study research design using a mixed methods approach. The quantitative data were obtained from a census of 87 professional and paraprofessional library staff of the Ibrahim Badamasi Babangida University (IBBU), Lapai and the University of Jos (UNIJOS). Semi-structured interviews were used to gather qualitative data from 12 purposively selected key informants. Quantitative data were analysed using descriptive statistics and one-way ANOVA, whereas qualitative data were analysed using thematic analysis. Findings from both datasets were integrated through methodological triangulation. **Findings:** Six interrelated strategies were identified as critical for enhancing blockchain adoption and effective application in academic law libraries: institutional policy and governance, funding and financial support, ICT infrastructure development, capacity building and professional development, strategic partnerships and collaboration and awareness and change management. Among these, funding and financial support emerged as the most highly rated strategy (Mean = 3.40), followed by capacity building (Mean = 3.37) and ICT infrastructure development (Mean = 3.36). The findings indicate that successful blockchain implementation requires coordinated institutional governance rather than isolated technological interventions. **Originality/Value:** The study adds to existing research in the field of blockchain technology in LIS and suggests the Blockchain Adoption and Implementation Framework for Academic Law Libraries (BAIFALL), which is based on the Technology Acceptance Model, the Technology-Organisation-Environment (TOE) Framework and Lewin's Change Theory. BAIFALL provides universities, policy makers and library managers with

an avenue to adopt and implement a secure, sustainable and efficient management of legal information using blockchain technology.

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## INTRODUCTION

Digital transformation of higher education has impacted academic libraries' practices of creation, management, preservation and dissemination of information assets. The use of digital information and communication technologies (ICTs) has eased the journey of academic libraries from a print world to a digital world of digital delivery, institutional repositories, electronic legal information resources and digital records management. This change has enhanced the availability of information for use in academic and practice settings but also created new issues for data security, authenticity, privacy, integrity, preservation and trust in information, the last of which being as important as legal education and research to the effective administration of justice in general. Academic law libraries, as providers of authoritative data in the form of constitutions, statutes, judicial decisions, treaties, legislative documents, law reports and scholarly legal information, are distinctive in the setting of higher educational information services. Contrary to the many other forms of information, ensuring the authenticity and integrity of legal information throughout its continuing record lifecycle is non-negotiable. Authenticity, integrity and protection of digital information formats of legal information

is therefore a priority of governance and not simply a technical issue in academic law libraries, because even minor unauthorized changes to a court decision, statutory instrument, legal opinion, protocol, or other institutional legal document can result in legal uncertainty, academic integrity problems and ultimately a loss of public confidence in the justice system (Germain, 2019).

Blockchain technology is one of the most promising digital innovations to address these information governance challenges. Blockchain is a distributed ledger system for storing, verifying and maintaining digital transactions in a decentralised way and was first described and introduced by Nakamoto (2008) as the fundamental technology that provides the backbone of the Bitcoin. Its unique features, such as decentralisation, immutability, transparency, traceability and security through cryptographic means, make it suitable for applications demanding high levels of integrity and authenticity in digital record-keeping and transactions. Blockchain applications in LIS include digital preservation, verification of certificates, copyright and intellectual property rights management, smart contracts, secure scholarly communication, digital identity management, interlibrary resource sharing and

digital collection authentication (Chowdhury et al., 2020; Mettler, 2020; Rangarajan et al., 2023).

Given the sensitivity of legal information resources, blockchain systems may be used to manage legal information resources, verify their integrity, implement mechanisms for copyright and intellectual property protection and digital preservation, and establish more transparent access control mechanisms. It can be argued that many of the largest and most prominent institutions are currently working on applying blockchain technology to the management of legal information resources. Other experiments included using the blockchain to authenticate and store legal documents, such as done at the Stanford University Law Library (Kaal, 2020). While these earlier steps have this new information governance technology moving from theory to practice, it creates new opportunities and challenges for academic law librarians going forward.

In spite of the possibilities of blockchain technology, its use in academic law libraries worldwide has so far been rather limited, particularly in developing countries. Academic law libraries have been aware of the potential benefits of the blockchain, but have implemented it in an experimental and limited way, as suggested by prior research. In Nigeria, the use of blockchain technology in various institutions is only considered in the form of pilot projects, such as certificate verification, digital records storage and validating records, and few institutions have implemented the technology organisation-wide (Owraigbo, 2023; Fasola et al., 2024). Factors that have contributed to the current low adoption of blockchain technology include the absence of ICT infrastructure, inconsistent electricity supply, cost of implementation, lack of technical expertise on blockchain technology, low blockchain literacy, resistance to new technology and lack of institutional and national policy framework for implementation (Matlebjane & Ndayizigamiye, 2022; Anagu et al., 2024).

Though existing studies have made important contributions in understanding the awareness,

acceptance, readiness and adoption factors of blockchain technology in academic libraries, they have not adequately addressed the empirically based strategies for translating the awareness of blockchain technology in academic libraries into sustainable institutional adoption. Also, the studies have not particularly looked into the strategies needed to improve the uptake of blockchain technology in academic law libraries in North-Central Nigeria or proposed an integrated governance structure appropriate to academic law libraries. As the current literature does not offer any useful support to the university administrators, policy makers and library managers who are interested in exploring the calculated, long-term adoption and utilisation of the technology, the objective of this paper is to identify and explore a framework for the adoption of blockchain technology and its effective utilisation in academic law libraries in North-Central Nigeria.

The study presents, based on empirical evidence gathered from two academic law libraries, the interventions in institutional, technological, organisational and human capacity that should be carried out to successfully implement and adopt blockchain technology in academic law libraries. Based on the identified interventions, a Blockchain Adoption and Implementation Framework for Academic Law Libraries, or BAIFALL, is proposed. The BAIFALL model is based on the Technology Acceptance Model, the Technology-Organisation-Environment Framework and Lewin's Change Theory and seeks to inform the sustainable adoption and implementation of blockchain technology in academic law libraries. A result of the analysis of the literature on digital transformation, information governance and digital preservation in Library and Information Science, the framework seeks to support universities, policy makers and librarians in better securing, authenticating, preserving and managing digital legal information.

## LITERATURE REVIEW

### Blockchain Technology and Its Emerging Applications in Libraries

The blockchain has been called one of the most transformative new digital technologies of the 4th industrial revolution, offering solutions to record, cryptographically secure, preserve and share digital information. Blockchain technology, which was originally suggested by Nakamoto (2008) as the mechanism enabling Bitcoin, is now known as Distributed Ledger Technology (DLT) that is capable of recording transactions in a decentralised way, via consensus algorithms. Blockchains are well suited for situations where the authenticity, integrity, transparency and retention of information is crucial, as they provide several properties, including the use of cryptographic methods, distributed storage and an append-only operation mode.

The application of blockchain technology and its potential applications have garnered a growing interest in library and information science (LIS) during the last decade. Potential applications of blockchain technology for library operations have been documented in several aspects such as Decentralised Cataloguing, Digital Rights Management, Institutional Repositories, interlibrary loan, scholarly communication, Digital preservation, Document certification, Copyright management and Access control (Miraz & Ali, 2018; Chowdhury et al., 2020; Rangarajan et al., 2023). The collection of the work showcases the possibilities of blockchain for enhancing trust, transparency and accountability in the handling of digital information resources.

Moreover, academic law libraries would be an ideal fit for blockchain, as these libraries are important to ensure the security of legal information, confidentiality and integrity. Blockchain could also be used to ensure the legality of information, and smart contracts would be used for managing rights and access control to the legal information. Distributed ledger technology could enable closed archives which are tamper-proof, or provide legally verifiable

chains of custody for legal information. The Stanford University Law Library has written on the application of blockchain technology and has considered storing and managing legal information on the blockchain (Kaal, 2020), showing that legal information practice is using or considering blockchain applications.

While there has been an increase in academic interest, very few academic libraries have embraced it, and most academic literature has been centred on use case/value and technical feasibility, with case studies of large-scale adoption by universities, especially in developing countries, being light. Therefore, the institutional context for blockchain to be adopted in academic libraries is still unconfirmed.

### Determinants and Barriers to Blockchain Adoption in Academic Libraries

The driving factors for technology adoption are technology, organisation, environment and human-related factors. Existing studies agree that institutional readiness, organisational commitment, technical capability and governance structure are the drivers for successful blockchain technology adoption.

Five factors had the most meaningful influence on blockchain adoption in academic library settings according to empirical studies: management support, organisational readiness, perceived usefulness, information and communication technology (ICT) infrastructure and institutional support (Cletus et al., 2024; Akintunde & Amuda, 2024). The results show that blockchain adoption requires organisational investment and organisation-wide leadership beyond its potential for technical innovation.

Previous studies have identified a number of barriers to implementing blockchain in developing countries. The most important obstacles mentioned are lack of information and communication technology (ICT) infrastructure, lack of electricity, lack of technical capacity, lack of financial resources, resistance to change, lack of awareness and the absence of institutional policies for the implementation of blockchain

(Matlebajane & Ndayizigamiye, 2022; Fasola et al., 2024; Anagu et al., 2024). The barriers have differing effects; for example, financial constraints may inhibit investments in infrastructure, while weak governance and institutional inertia prevent institutions from investing in technologies that would have long-term benefits.

A common theme is that while librarians recognise the possible benefits of blockchain technology, it has not yet been implemented at most institutions. These findings suggest that implementation cannot rely purely on the promotion of the technology, but that the solutions must be implemented institutionally through a combination of technical, organisational, financial and governance solutions that interplay with one another.

### **Technology Adoption Frameworks and Strategic Responses**

The three theories that were adopted in the study are the Technology-Organisation-Environment (TOE) Framework (Tornatzky & Fleischer, 1990), the Technology Acceptance Model (TAM) (Davis, 1989) and Lewin's Change Theory (Lewin, 1951). The theories may be used differently to address the study of technology adoption, but are not mutually exclusive.

The TOE Framework is an explanation of the organisational adoption of technology on three levels: technology, organisation and environment. The TOE Framework is applied to the adoption of blockchain technology to describe the process of adoption through the interactions between the technological traits and availability; institutional resources; management support; governance characteristics; regulatory landscape; and organisational capabilities. Accordingly, the framework offers a suitable means to comprehend the institutional conditions influencing the acceptance of blockchain technology in academic law libraries.

While TOE focuses on the organisational level, TAM focuses on the level of the individual user. The TAM states that users are more likely to

utilise a new technology if they think it is useful and easy to use (Davis 1989). In an academic library setting, librarians' adoption of blockchain is more likely if they have professional competency, self-efficacy and a positive perception of technology's role in library services. The emphasis should be placed on acquiring building technology, not only technical skills.

Another model of technology acceptance is Lewin's Change Theory, which considers the adoption process an organisational change initiative. The model describes a three-step transition process in which the organisation first unfreezes an existing behaviour, then changes via planned transformation and finally refreezes by institutionalising the new behaviour. Therefore, awareness-raising, pilot projects, top-down leadership, institutional policy and continuous professional development can be thought of as integrated change management activities rather than seen as distinct interventions for the implementation of blockchain in education.

Recommendations for staff training, infrastructure development, policy formulation, funding strategies and stakeholder sensitisation have been made (Omame & Alex-Nmecha, 2021; Tella et al., 2022). These recommendations are general and made from conceptual analysis. Further research is required to understand how these strategies might work together in academic law libraries and how they are related to a governance model that can guide their adoption in institutions and integrate them into a coherent governance framework capable of guiding institutional implementation.

## **METHODOLOGY**

### **Research Design**

This study used a descriptive multiple-case study design with a mixed-method data collection approach to determine strategies for improving the adoption and utilisation of blockchain technology in academic law libraries in North-Central Nigeria. The mixed-methods approach was considered appropriate because it enabled the integration of quantitative and qualitative

evidence, thereby providing a more comprehensive understanding of the complex organisational, technological and human factors influencing blockchain adoption than either approach could achieve independently.

A descriptive multiple-case study design is particularly suited to this research, as the topic of blockchain is a contemporary organisational phenomenon that should be studied in its real-life institutional context (Yin, 2018). Compared to experiments, case study research helps to understand how contextual factors influence organisational behaviour, decision-making and technology adoption (Yin, 2018). The cross-case comparison provided by the addition of two academic law libraries gave the study's findings credibility, transferability and analytical generalisation.

### **Study Area and Case Selection**

This study was conducted in two academic law libraries at Ibrahim Badamasi Babangida University (IBBU), Lapai and University of Jos (UNIJOS), both in the North-Central geo-political zone of Nigeria. These universities were purposively selected for the study because they both have Faculties of Law, academic law libraries and ICT-enabled library services that provide the right institutional environment for the adoption of blockchain technology.

Furthermore, they are both part of the public university system despite serving different institutional contexts. Therefore, their selection subsequently allowed for meaningful comparison of the experiences of the organisations, their technological readiness and challenges with implementing the technology, leading to greater robustness of the results of the study.

### **Study Population and Sampling**

The population included all professional and paraprofessional staff working in the academic law libraries sampled. Professional librarians were part of the study as they were involved in the management of information in libraries and the implementation of digital services and policies.

Paraprofessional staff were also part of this study due to its involvement in the day-to-day tasks of libraries and providing services through technology. Census sampling was also employed for the quantitative aspect of the study. All 87 library staff members were included in the study, thereby eliminating sampling error and ensuring that the opinions of all the study population were included in the analysis. The informants selected for the qualitative data collection were 12 people in total, comprising University Librarians (Directors of Library Services), Deputy University Librarians, Senior Law Librarians and Information and Communication Technology (ICT) staff, using purposive sampling. The participants were chosen based on their strategic positions in the fields of library administration, library technology management and institutional decision-making, with the aim of obtaining valuable and detailed information about blockchain implementation through their experience.

### **Data Collection Methods**

Structured questionnaires and semi-structured interview guides were used as complementary instruments for data collection. The questionnaire generated quantitative data on respondents' perceptions regarding barriers to blockchain adoption and strategies for enhancing its implementation. Semi-structured interviews were used to obtain further information beyond the questionnaire, such as organisational experience, institutional issues, policy challenges and practical recommendations that could be made. The two methods together provided methodological triangulation, a way of allowing data obtained from both the quantitative and qualitative methods to confirm each other and thus add to the study's validity and reliability. In addition, observations and document analyses were carried out to understand the existing ICT environment, institutional policies and digital infrastructure of the participating libraries to contextualise the interpretation of the research findings.

## Data Analysis

The quantitative data were analysed descriptively using frequencies, percentages, weighted means and standard deviations to summarise the respondents' perceptions on blockchain adoption strategies. The mean scores were interpreted based on a 4-point Likert scale with decision points as follows: 3.50 – 4.00 (Strongly Agree – Very High Extent); 2.50 – 3.49 (Agree – High Extent); 1.50 – 2.49 (Disagree – Low Extent); and 1.00 – 1.49 (Strongly Disagree – Very Low Extent).

One way Analysis of Variance (ANOVA) was used to establish differences between institutional and functional types for the different attributes of the dependent variables. The qualitative data from the interviews were analysed thematically, using Braun and Clarke's (2006) six-step framework for thematic analysis of qualitative data. The interview transcripts were read several times until the researcher developed an understanding of the data. The data were open-coded, and then the open codes were clustered. The clusters of open codes were then considered to derive the major themes. Then these major themes were considered in relation to the quantitative results to assess how they converged, complemented or diverged, to afford an integrated interpretation of the results.

## Trustworthiness and Ethical Considerations

In order to increase the credibility and reliability of the study, methodological triangulation was used by incorporating the results of the questionnaire, interview, observation and document analysis. To ensure accuracy of the participants' responses, member checking was performed during interviews, and the use of multiple data sources helped to improve the validity of the study by evidence corroboration.

Ethical approval for the study was obtained from the relevant institutional authorities prior to data collection. Participation was voluntary, informed consent was obtained from all participants and

respondents were assured of confidentiality and anonymity. Data were used solely for academic purposes, and participants were informed of their right to withdraw from the study at any stage without penalty.

## RESULTS

The findings are organised around six strategic themes that emerged from the integrated analysis of questionnaire responses, interview data, observation records and document analysis. These themes directly address the barriers in Table 2 and represent the empirical basis of the BAIFALL framework. Quantitative evidence for each barrier is listed in Table 1.

Before presenting the strategy and barrier findings, the demographic and professional profile of the 87 respondents is summarised. Respondents were drawn from IBBU, Lapai (18, 20.7%) and UNIJOS (69, 79.3%), and comprised 36 (41.4%) professional librarians and 51 (58.6%) paraprofessional staff. By job role/designation, University/Principal Librarians made up 9.2%, Librarian II/Assistant Librarians 32.2%, Senior Library Officers 25.3% and Library Officers/Library Assistants 33.3%. In terms of professional experience, 30 respondents (34.5%) had 0-5 years of experience, 25 (28.7%) had 6-10 years, 20 (23.0%) had 11-15 years and 12 (13.8%) had over 15 years, indicating a sample weighted toward early- and mid-career staff but with meaningful representation of long-serving professionals. Educationally, respondents held a mix of library and information science qualifications (17.2% Diploma, 20.7% Bachelor's, 13.8% Master's and 3.4% PhD) and law qualifications (11.5% Certificate/Diploma in Law, 20.7% LLB, 5.7% LLM and 2.3% PhD in Law), with a further 4.6% reporting other qualifications, reflecting a workforce with relevant grounding in both librarianship and legal information management. The data collection instrument did not capture respondent sex or age.

**Table 1: Strategies for Enhancing the Adoption and Effective Application of Blockchain Technology in Academic Law Libraries in North Central Nigeria (n = 87)**

| S/N                          | Strategy                                       | Statement                                                                        | SA (4)<br>Fq (%) | A (3)<br>Fq (%) | Mean        | Decision  |
|------------------------------|------------------------------------------------|----------------------------------------------------------------------------------|------------------|-----------------|-------------|-----------|
| 1                            | Policy and Governance                          | University/government policy development is necessary to sustain blockchain use. | 41<br>(47.1%)    | 29<br>(33.3%)   | 3.33        | SA        |
| 2                            | Funding and Financial Support                  | Adequate funding is necessary to support blockchain use in libraries.            | 45<br>(51.7%)    | 28<br>(32.2%)   | 3.40        | SA        |
| 3                            | ICT Infrastructure Development                 | Improved ICT infrastructure will facilitate blockchain application.              | 40<br>(46.0%)    | 32<br>(36.8%)   | 3.36        | SA        |
| 4                            | Capacity Building and Professional Development | Training and capacity building will improve blockchain adoption.                 | 42<br>(48.3%)    | 30<br>(34.5%)   | 3.37        | SA        |
| 5                            | Strategic Partnerships and Collaboration       | Partnerships with technology companies are key to blockchain adoption.           | 35<br>(40.2%)    | 33<br>(37.9%)   | 3.23        | A         |
| 6                            | Awareness and Change Management                | Awareness campaigns will enhance acceptance of blockchain in libraries.          | 37<br>(42.5%)    | 30<br>(34.5%)   | 3.26        | A         |
| <b>Average Weighted Mean</b> |                                                |                                                                                  |                  |                 | <b>3.33</b> | <b>SA</b> |

**Source:** Field Survey, 2025. SA = Strongly Agree; A = Agree.

**Table 2: Barriers to Blockchain Adoption in Academic Law Libraries (n = 87)**

| S/N                          | Challenge                                                      | SA Fq (%)     | A Fq (%)      | D Fq (%)      | SD Fq (%)    | N  | Mean        |
|------------------------------|----------------------------------------------------------------|---------------|---------------|---------------|--------------|----|-------------|
| 1                            | High implementation cost is a major challenge.                 | 40<br>(46.0%) | 30<br>(34.5%) | 10<br>(11.5%) | 7<br>(8.0%)  | 87 | 3.32        |
| 2                            | Lack of technical expertise is a barrier to adoption.          | 35<br>(40.2%) | 32<br>(36.8%) | 15<br>(17.2%) | 5<br>(5.8%)  | 87 | 3.17        |
| 3                            | Poor infrastructure (electricity, internet) hinders use.       | 38<br>(43.7%) | 33<br>(37.9%) | 11<br>(12.6%) | 5<br>(5.8%)  | 87 | 3.24        |
| 4                            | Staff or management resist adopting new technologies.          | 28<br>(32.2%) | 30<br>(34.5%) | 20<br>(23.0%) | 9<br>(10.3%) | 87 | 2.90        |
| 5                            | Limited awareness of blockchain benefits in law libraries.     | 32<br>(36.8%) | 28<br>(32.2%) | 19<br>(21.8%) | 8<br>(9.2%)  | 87 | 2.98        |
| 6                            | Lack of government or institutional policies hinders adoption. | 34<br>(39.1%) | 31<br>(35.6%) | 15<br>(17.2%) | 7<br>(8.0%)  | 87 | 3.09        |
| <b>Average Weighted Mean</b> |                                                                |               |               |               |              |    | <b>3.12</b> |

**Source:** Field Survey, 2025. Decision scale: 3.50-4.00 Strongly Agree; 2.50-3.49 Agree; 1.50-2.49 Disagree.

### Strategy 1: Institutional Policy and Governance

The absence of institutional and government policy frameworks was a significant barrier (Mean = 3.09; 74.7% agreement), and policy development was rated as a strongly agreed-upon

strategy (Mean = 3.33; 80.4% agreement). Key informants consistently described the lack of formal policy direction as the root cause of implementation inertia.

The quantitative results, which showed the relevance of institutional policy and governance

were confirmed by the data obtained from the interviews conducted. The interview participants also cited a lack of institutional and national policy frameworks as a challenge to implementing blockchain technology in academic law libraries. One of the participants said:

*“The university and government have not given clear directions for the use of blockchain technology in a library. Therefore, it is hard to make progress.” (Interviewee 7, UNIJOS)*

This part of the interview shows that in the eyes of some, there is a role for institutional and governmental policy in the adoption of blockchain in academic law libraries. The participant's response suggests that, despite recognising the potential benefits of blockchain technology, implementation efforts remain constrained by the absence of clear policy directives and regulatory frameworks. Without formal policies, libraries lack strategic guidance on resource allocation, governance structures, implementation procedures and accountability mechanisms necessary for adopting emerging technologies. This finding further indicates that blockchain adoption is not solely a technological undertaking but also an organisational and policy-driven process requiring leadership commitment and institutional support. At the university level, therefore, it is necessary to establish clear laws and policies that create conducive conditions for the adoption of the blockchain in academic law libraries. Another participant said:

*“Again, it is important to remind people that the role of institutional and governmental policy support is paramount. Libraries will be able to rely on the confidence of using the blockchain technology, if there are clear policies from universities and government.” (Interviewee 1, IBBU)*

This interview excerpt underscores the importance of policy frameworks as a catalyst for institutional confidence and innovation. The participant suggests that clear policies from both universities and government would provide

strategic direction, reduce uncertainty and encourage academic law libraries to invest in blockchain technology. Policy frameworks also indicate institutional commitment, which can foster confidence in the adoption of new technologies by stakeholders and provide guidance on how to implement them. The finding implies that effective blockchain adoption extends beyond technological readiness to include supportive governance structures that promote informed decision-making, resource mobilisation and long-term sustainability. Hence, policy development must be considered as a strategic enabling measure to create an environment where the successful implementation of blockchain technology in academic law library becomes possible.

The ICT policies in both institutions contained in the reviewed documents were found to be general with no specific governance, guidelines or mechanisms for the uptake of blockchain technology. This finding implies that policy and governance are necessary to make blockchain work in academic libraries. This discovery suggests that policy and governance are among the core needs for the successful implementation of blockchain in academic law libraries. This finding indicates that policy and governance represent a foundational requirement for successful blockchain implementation in academic law libraries. Without clear institutional mandates and policy direction, efforts to secure funding, develop staff competencies through training and invest in the necessary technological infrastructure may lack adequate justification and strategic support. Therefore, the absence of dedicated blockchain-related policies creates a significant barrier to coordinated planning and sustainable adoption of the technology.

## **Strategy 2: Funding and Financial Support**

High implementation cost was the most strongly agreed-upon barrier (Mean = 3.32; 80.5% agreement) and adequate funding the highest-rated strategy (Mean = 3.40; 83.9% agreement). Respondents identified financial requirements encompassing infrastructure acquisition, software

procurement, technical personnel and maintenance as exceeding the capacity of most academic law libraries.

*“Blockchain is not cheap. Infrastructure, software and skilled personnel are too costly for most law libraries.” (Interviewee 2, IBBU)*

The participants also noted that insufficient funding continues to be a major impediment in the implementation of blockchain in academic law libraries in practice. The cost implications associated with acquiring blockchain infrastructure, licensing or developing appropriate software and recruiting or training personnel with the required technical expertise were perceived to be beyond the financial capacity of many law libraries.

This finding suggests that even where institutions recognise the potential benefits of blockchain technology, limited financial resources may hinder practical implementation. Sustainable adoption would therefore require dedicated funding mechanisms, institutional prioritisation and strategic investment in both technological infrastructure and human capacity development. A UNIJOS participant added:

*“Adequate funding is essential, else blockchain will stay an idea on paper. Libraries need special budgetary provision to invest in new technologies.” (Interviewee 4, UNIJOS)*

Participants further emphasised that inadequate funding remains a critical constraint to the practical adoption of blockchain technology in academic law libraries. The findings indicate that, although libraries may recognise the potential value of blockchain for improving information management processes, insufficient financial allocation limits their ability to move beyond conceptual discussions to actual implementation. Therefore, without deliberate budgetary prioritisation and institutional investment, blockchain adoption is likely to remain aspirational rather than operational within academic law libraries.

Oname and Alex-Nmecha (2021) similarly argue that adequate funding from parent institutions is a prerequisite for sustainable technology practice. The implication is that blockchain infrastructure must be reframed as an essential institutional investment rather than discretionary spending, with dedicated multi-year budget lines comparable to staffing or collection acquisition funds.

### Strategy 3: ICT Infrastructure Development

Poor ICT infrastructure was the second most strongly agreed-upon barrier (Mean = 3.24; 81.6% agreement) and infrastructure improvement the third highest-rated strategy (Mean = 3.36; 82.8% agreement). Blockchain operates through distributed consensus mechanisms that are architecturally dependent on reliable digital infrastructure at every node: unreliable internet connectivity interrupts ledger synchronisation and unstable power supply corrupts transaction processing.

*“Any technology that can be implemented may be hindered by unreliable power and inadequate ICT infrastructure.” (Interviewee 5, UNIJOS)*

Participants identified poor quality of ICT infrastructure and lack of power supply as key technological obstacles to blockchain use in academic law libraries. The results indicate that, for the implementation to be successful, there has to be a stable technological environment in place, such as reliable electricity, strong network connectivity and good ICT infrastructure, in addition to the availability of blockchain technology. Consequently, institutions with limited ICT capacity may experience difficulties in integrating blockchain into their information management practices, regardless of their interest in adopting the technology.

An IBBU librarian corroborated this:

*“Blockchains will not run on slow machines. A good infrastructure of Information and Communication Technology (ICT) and stable power supply is required for these*

*technologies in the library.” (Interviewee 2, IBBU)*

Participants emphasised that the successful implementation of blockchain technology requires a strong and reliable ICT infrastructure base. The findings reveal that existing limitations in technological capacity may hinder academic law libraries from adopting and sustaining blockchain-based information management systems. As one participant explained,

*“You cannot run blockchain on weak systems. Therefore, institutions seeking to implement blockchain must first strengthen their ICT environments to ensure effective deployment, operation and long-term sustainability of the technology.”*

Observation data confirmed these constraints directly. While both institutions possessed foundational digital infrastructure, observable indicators of blockchain-capable systems were absent. The framework treats infrastructure failure as a governance failure, requiring institutional investment plans that specifically address blockchain's distributed architecture requirements.

#### **Strategy 4: Capacity Building and Professional Development**

Limited technical expertise was a major barrier (Mean = 3.17; 77% agreement), and training and capacity building a highly endorsed strategy (Mean = 3.37; 82.8% agreement). Most librarians lacked formal training in blockchain technology, making practical adoption impossible even where institutional interest existed.

*“Most librarians are not trained in blockchain or advanced digital technologies. Without training, adoption will remain theoretical.” (Interviewee 3, IBBU)*

A UNIJOS respondent added:

*“If librarians are trained and see how blockchain improves their work, resistance will reduce and adoption will increase.” (Interviewee 8, UNIJOS)*

TAM explains this precisely: perceived ease of use is a primary determinant of technology acceptance, and practitioners who lack technical competence will perceive blockchain as threatening regardless of their awareness of its potential value (Davis, 1989). Capacity building therefore operates simultaneously as a skills intervention and as an acceptance governance mechanism, requiring systematically mandated and continuously evaluated professional development programs rather than ad hoc training events.

#### **Strategy 5: Strategic Partnerships and Collaboration**

Partnerships with technology companies were endorsed by 78.1% of respondents (Mean = 3.23). Individual institutions operating under documented resource constraints cannot independently develop and sustain advanced blockchain governance. Collaboration with ICT professionals, technology vendors and professional library associations was identified as the mechanism for accessing expertise, sharing implementation costs and building knowledge networks.

*“Libraries should not work alone. Partnering with ICT experts and library associations will make adoption easier and more realistic.” (Interviewee 5, UNIJOS)*

Emmanuel et al. (2023) similarly emphasise inter-institutional collaboration as enabling access to resources and governance expertise unavailable to individual libraries in isolation. The TOE framework's environmental context dimension directly supports this strategy: building professional networks and external support structures addresses the collaborative dimension of adoption that individual institutional readiness alone cannot provide.

#### **Strategy 6: Awareness and Change Management**

Limited awareness and resistance to change were significant barriers (Mean = 2.98 and 2.90 respectively), and awareness campaigns a strategy

endorsed by 77% of respondents (Mean = 3.26). Lewin's Change Theory (1951) provides the implementation model: the unfreezing stage requires structured awareness programs that present blockchain as an enhancement of existing LIS responsibilities; the driving stage involves facilitated pilot experiences that build practical confidence; the refreezing stage embeds blockchain governance into professional norms through policy and institutional recognition.

*“Some staff are familiar with the old systems and are reluctant to use new technologies that they are not familiar with.” (Interviewee 1, IBBU)*

Participants identified resistance to change and limited familiarity with emerging technologies as important human factors that may hinder blockchain adoption in academic law libraries. The findings suggest that some library staff remain more comfortable with existing information management systems and may be reluctant to embrace new technologies that they perceive as complex or unfamiliar.

Therefore, targeted capacity-building initiatives, including sensitisation programmes, continuous training and opportunities for hands-on engagement, are necessary to reduce resistance and promote acceptance of blockchain-based systems.

One of the participants of UNIJOS remarked:

*“The more the users and staff are aware and understand the positive outcomes of blockchain, the more likely they will be to embrace and use it in the library.” (Interviewee 7, UNIJOS)*

Awareness of the benefits and possible applications of Blockchain technology is crucial for the promotion of acceptance by library clients and staff, participants stressed. The results suggest that the use of blockchain technology is not an obligation, but also a perceived benefit of the technology to improve the services and information management practices in the library. This finding implies that fostering stakeholder

engagement, awareness and effective communication are key strategies for mitigating uncertainty and promoting trust in blockchain applications. Therefore, there is a need to prioritise sensitisation programs and participatory methods that will allow the staff and users to understand the value, relevance and practical application of the technology to the use of blockchain in institutions.

## DISCUSSION

The findings are theoretically grounded and can serve as a basis for analysis of the governance conditions for the adoption of blockchain in academic libraries. The six strategies outlined in this study are neither mutually independent practices, but rather are within a framework of integrated governance, with the success of one strategy dependent upon the success of the other(s). Thus, any deficiencies in any one part can stifle the overall adoption process.

The central role of institutional policy and governance emerging from the findings is consistent with Sanjay and Hasan (2021), who conducted a systematic review of the blockchain applications in Library and Information Science and found that institutional mandates, resource commitment and coordinated policy development are the necessary conditions to move from experimental interest to the practical implementation of blockchain. The findings demonstrate that policy and governance serve as the foundation upon which other adoption strategies are constructed. In the absence of formal governance structures, institutions may struggle to justify budgetary allocations, establish staff development programmes, upgrade ICT infrastructure, or create sustainable partnerships. Without formal governance mechanisms, institutions may face challenges in securing funding, developing staff development initiatives, investing in ICT resources and building partnerships. Therefore, policy and governance should not be regarded as merely one strategy among several, but rather as a contextual approach that gives legitimacy, direction and institutional commitment to the other strategies.

The result obtained that funding is a critical factor in the adoption of technology in academic libraries (Mean = 3.40) is consistent with the finding in the academic library technology adoption literature in Nigeria (Omekwu, 2007; Owraigbo 2023). The results show that the problem is neither a lack of appreciation of the importance of financial resources, but a higher level of undervaluation at the institutional and policy level of the investment in library technologies. It corresponds with the Technology–Organisation–Environment (TOE) model, which proposes that the most important factors to determine the technology adoption are the organisational resources. Organisations that have sufficient financial and managerial resources can be better prepared to acquire and implement, as well as sustain, technological innovations (Tornatzky & Fleischer, 1990). To this end, blockchain has to be made more "visible" in terms of its value proposition and have to be a conscious decision to invest in blockchain institutions.

The results on the ICT infrastructure also emphasise the importance of technological readiness prior to the introduction of blockchain. This study makes a unique contribution to understanding the specific implications of electricity supply, internet connectivity and ICT infrastructure as persistent challenges in Nigerian higher education institutions on the use of blockchain. Compared with traditional digital systems, blockchain requires continuous availability of the network, distributed data synchronisation and a reliable computing environment to function properly. Thus, infrastructure instability is a barrier that cannot be overcome with software acquisition. The results indicate that more feasible avenues for adoption in academic law libraries in Nigeria are in the form of permissioned blockchain models that minimise the need for computing power and hybrid models that offer a balance between institutional control and network resilience (Chingath & Babu, 2020).

The focus on capacity building is aligned with the Technology Acceptance Model (TAM) that

suggests that the key factors influencing technology acceptance are perceived ease of use and perceived usefulness of the technology (Davis, 1989). The results suggest that, to ensure the successful adoption of blockchain technology, the confidence and competence of the staff member is crucial, as a lack of knowledge of how blockchain functions can perpetuate the sense of complexity, hindering the acceptance of blockchain technology. In line with the findings of Udumuku et al. (2024) which indicates that blockchain training has been found to build trust and acceptance of blockchain systems in the Nigerian library environment. Capacity development efforts should not just be about providing technical instruction and training, but should also aim to instill confidence among professionals that blockchain offers additional value that can be integrated with and augmented for current library and information management practices.

The findings on awareness creation and change management also illustrate the social and cultural nature of technology adoption, which is not a purely technical or financial issue. The focus on blockchain benefits indicates the significance of the perceptions of the stakeholders, the institutional culture and the readiness of the users in determining the outcomes of blockchain adoption. The results of this finding are congruent with Alomary and Woollard (2015), who argued that perceived usefulness, organisational culture and user preparedness affect technology acceptance. Furthermore, where library professionals have developed established routines around existing systems, introducing a transformative technology such as blockchain requires deliberate change management strategies rather than relying on passive technology diffusion. This is aligned with Lewin's (1951) change management model that focuses on preparing the stakeholders, making the change and reinforcing the new behaviour.

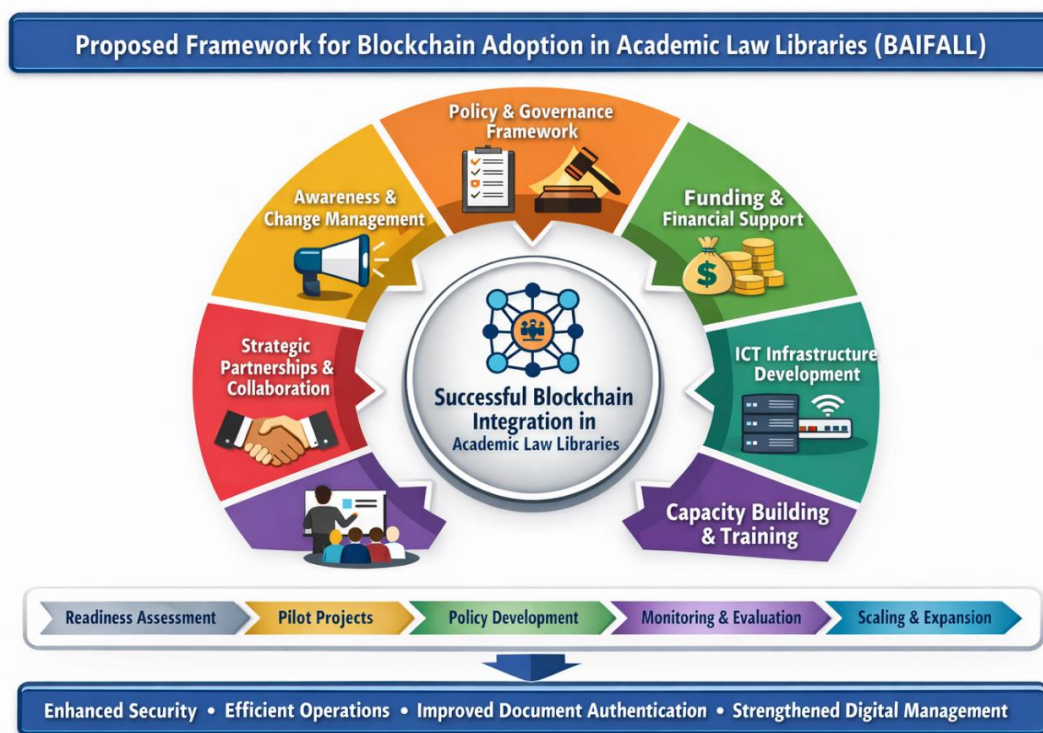
Altogether, the six strategies reported in this research work act as a blockchain adoption governance architecture in academic law libraries.

Institutional policy provides strategic direction and legitimacy; funding enables investment in infrastructure and human capacity; ICT infrastructure creates the technical foundation for implementation; capacity building promotes effective utilisation; partnerships expand institutional capabilities; and change management supports long-term acceptance and sustainability. The BAIFALL framework developed from these findings therefore provides a structured and context-sensitive model for guiding blockchain adoption within academic law libraries in North-Central Nigeria.

### The BAIFALL Framework: A Strategic Implementation Model

This research proposes a framework, called “Blockchain Adoption and Implementation Framework for Academic Law Libraries” (BAIFALL), based on the identified strategic priorities. It is guided by Davis' (1989) Technology Acceptance Model and Tornatzky and Fleischer's (1990) Technology-Organization-Environment (TOE) framework at the individual, organisational and environmental level. The framework combines them into one implementation architecture when it comes to the problem of information, communication and technology (ICT) governance.

**Figure 1: Blockchain Adoption and Implementation Framework for Academic Law Libraries**



**Source:** Dogara (2026). Adapted from Davis (1989), Tornatzky and Fleischer (1990) and Lewin (1951).

At the centre of the framework is a single governing objective: the successful, sustainable integration of blockchain technology into academic law library information management. This objective is supported by six interrelated strategic components operationalised through a five-stage implementation pathway.

#### Component 1: Policy and Governance

This component establishes the institutional and regulatory architecture within which all other components operate. It requires universities and regulatory bodies to enact formal blockchain technology policies that define mandates, assign accountability, specify compliance standards and establish review mechanisms. From a theoretical

perspective, this component addresses all three dimensions of the TOE Framework simultaneously. It provides organisational clarity and mandate; shapes the environmental conditions under which blockchain is deployed; and it defines the technological standards that infrastructure procurement must satisfy. The Policy and Governance component is, in this sense, the master key of the BAIFALL governance architecture.

### **Component 2: Funding and Financial Support**

This component establishes dedicated technology budgeting for blockchain as a governance requirement with the same institutional standing as staffing or collection acquisition budgets. Multi-year blockchain budgets must cover infrastructure acquisition, software licensing, technical personnel, training programs, maintenance and evaluation. This reframing signals that blockchain infrastructure is not optional innovation spending but essential institutional investment, and it creates the planning horizon, accountability and resource predictability that sustainable technology governance requires.

### **Component 3: ICT Infrastructure Development**

Blockchain technology operates through distributed consensus mechanisms that are architecturally dependent on reliable digital infrastructure at every participating node: unreliable internet connectivity interrupts ledger synchronisation, unstable power supply corrupts transaction processing, and outdated server capacity limits the computational resources available for cryptographic operations, making infrastructure inadequacy a fundamental governance constraint. The BAIFALL framework treats ICT infrastructure as a governance responsibility, treating infrastructure failure as a governance failure.

### **Component 4: Capacity Building and Professional Development**

This component establishes a formally mandated, institutionally resourced program of blockchain competency development for all library staff. This component is based on the Technology Acceptance Model in which perceived ease of use is viewed as a predictor of technology adoption intention (Davis 1989). Library professionals who lack technical competence with blockchain systems will experience the technology as difficult and threatening regardless of their awareness of its potential value, producing the resistance to change. Capacity building is therefore simultaneously a skills intervention and an acceptance governance mechanism, addressing both the technical competence gap and the attitudinal barriers that arise from it.

### **Component 5: Strategic Partnerships and Collaboration**

Individual academic institutions operating under the resource constraints documented in this study cannot develop and sustain advanced blockchain governance. This structural obstacle is acknowledged in the Strategic Partnerships and Collaboration component, which describes the inter-institutional collaboration that academic institutions must broker to access the resources, skills and governance expertise unavailable to them in isolation. From this perspective, the BAIFALL model addresses the environmental context of technology adoption by advocating for building inter-institutional relationships, the professional community and the networks of external support for longer-term technology governance.

### **Component 6: Awareness and Change Management**

This component implements a three-stage organisational change process drawing on Lewin's Change Theory. The unfreezing stage involves structured awareness programs that communicate blockchain's relevance to existing professional responsibilities in law librarianship. The driving stage involves facilitated pilot implementation

experiences that build confidence through practice. The refreezing stage embeds blockchain governance into professional norms through policy integration, performance expectations and institutional champions. User education programs targeting library patrons, including law students, faculty and legal practitioners, constitute an additional demand-side dimension of this component.

### The Five-Stage Implementation Pathway

The six governance components of the BAIFALL framework are operationalised through a five-stage (institutional readiness assessment, pilot implementation, capacity development, policy development and formalisation and monitoring, evaluation and scaling) implementation pathway that translates governance architecture into sequenced, evaluable institutional action. While the stages are sequenced for clarity, the pathway is iterative in practice: findings from later stages may require revisiting earlier governance decisions, and all six components remain active throughout the entire pathway rather than being activated only in the stages where they are most prominent.

### CONCLUSION

This study demonstrates that blockchain adoption in academic law libraries in North-Central Nigeria is constrained not by a lack of awareness or interest but by a systematic governance deficit: the absence of the institutional frameworks, financial mandates, technical capacities and cultural conditions required to translate recognised potential into operational practice. Six empirically validated strategies have been identified that, taken together, constitute an integrated approach to overcoming this deficit.

Blockchain adoption depends not merely on technological readiness but on governance, institutional commitment, stakeholder collaboration, capacity building and strategic implementation. A library that possesses blockchain technology without the governance architecture to mandate, resource and institutionalise its use will not achieve sustainable

adoption. The BAIFALL framework is this study's major contribution: by integrating six strategic components into a coherent five-stage implementation pathway grounded in TAM, the TOE framework and Lewin's Change Theory, it provides academic law libraries, university administrators, policymakers and ICT professionals with a practically grounded roadmap for transforming blockchain from an aspiration into a governance reality. Future research should test the BAIFALL framework in other Nigerian higher education law libraries and across Sub-Saharan African academic library contexts to assess generalizability and identify adaptations required by different institutional and regulatory environments.

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