Adoption of Artificial Intelligence for the Transformation of Indigenous Knowledge into Digital Knowledge Systems in Jigawa State, Nigeria

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ABSTRACT

This study examined the adoption of Artificial Intelligence (AI) for transforming indigenous knowledge into sustainable digital knowledge systems in Jigawa State, Nigeria. The study was motivated by concerns that although indigenous knowledge remains valuable in agriculture, herbal medicine, and cultural heritage, much of it is preserved orally and is increasingly vulnerable to loss. The study adopted a sequential exploratory mixed-methods research design. The qualitative phase involved interviews with community elders and museum staff, while the findings informed the development of the quantitative questionnaire. The study population comprises 6 museum curators, 2 traditional rulers, 8 herbal medicine practitioners, 72 librarians, and 54 museum visitors. Of the 143 participants sampled, 106 provided useful responses. The qualitative phase used semi-structured interviews and structured thematic analysis to organize the findings, while for quantitative data, the researcher administered a survey and used descriptive statistics to interpret the results. The study adopts Socio-Technical Systems Theory, which assumes that the social and technical subsystems can transform indigenous knowledge into digital knowledge systems. The findings revealed that indigenous knowledge remains widely available in Jigawa State, particularly religious knowledge (100%), oral traditions and cultural histories (77%), and traditional farming knowledge (55%). However, preservation remains largely dependent on oral transmission (100%), with limited use of written records (43%). Respondents supported adopting technology for language translation (mean=3.63%) and documentation and preservation (mean=3.65). Major barriers included cultural and ethical concerns, inadequate government and institutional support, and limited digital skills. The study therefore proposed an AI-supported framework for transforming indigenous knowledge into Sustainable Digital Knowledge Systems in Jigawa State. It concluded that AI offers significant opportunities to preserve and improve access to indigenous knowledge guided by community participation and institutional support. The study recommended establishing an AI-supported digital repository for indigenous knowledge systems.

Keywords: Artificial Intelligence, Indigenous Knowledge, Digital Preservation, Digital Knowledge Systems, Jigawa State.

1.0 BACKGROUND TO THE STUDY

Indigenous knowledge underpins how local communities survive, differentiate their cultural identities, and adapt to their environments. In Jigawa State, this knowledge is expressed through local oral traditions (tales and fables) about farmers and their farming practices; local weather prognostic systems; different types of herbal medicines; local entertainments (plays, masquerades, and storytelling); and local systems of conflict resolution, mediation, and reconciliation. Elders orally transmit knowledge to younger members of society. Although oral traditions are documented, most local indigenous knowledge in Jigawa State remains undocumented. It is increasingly vulnerable to loss because of urbanization, migration, climate change, the digital divide, and the death of elderly knowledge bearers. Several recent studies have supported the need to digitally preserve oral traditions and other local indigenous knowledge systems because they preserve

ecological and historical memory (El Louadi, 2024; Tella, Jatto & Ajani, 2025).

Recent studies on the use of Artificial Intelligence (AI) by communities, libraries, researchers, and cultural institutions to document and preserve indigenous knowledge systems have indicated that AI has the potential to help preserve Indigenous knowledge systems, including local farming systems, and other cultural resources, and to make them more easily available to the general public, if appropriate safeguards and precautions are taken (Khan & Gope, 2025; Oveh, Aziken & Atomatofa, 2025; Tella, Jatto & Ajani, 2025).

Converting indigenous knowledge into digital knowledge systems turns indigenous oral, practical, and community-based knowledge into organized digital formats for storage and preservation, making it easier to access for teaching, learning, research, policy formulation, and community development. Documenting indigenous knowledge without adequate ICT infrastructure and suitable technology may not yield the desired results, as such knowledge may remain undocumented (Sani & Song, 2026). This is especially true in Jigawa State, where many indigenous communities have knowledge and practices that could be useful but lack adequate ICTs to document and preserve them.

While applying Artificial Intelligence (AI) to document indigenous knowledge, consideration should be given to the work of UNESCO on indigenous data sovereignty that highlights the need to design AI systems that uphold community control over indigenous data and its sovereignty, which includes, but is not limited to, ownership, consent, and control over indigenous knowledge (Deckker & Sumanasekara, 2025; Srinivas, 2026). Indigenous Knowledge is more than information; it is intertwined with a people's identity, spirituality, and communal rights. Therefore, any effort to utilize AI in Jigawa State should involve participatory approaches, ethical review, and benefit-sharing.

This study examines how Artificial Intelligence can transform indigenous knowledge into digital knowledge systems in Jigawa State. The study focuses on safeguarding the oral traditions and environmental knowledge of various indigenous communities, ensuring digital inclusion, and creating sustainable knowledge systems that support teaching, learning, research, and policy development.

2.0 STATEMENT OF THE PROBLEM

Indigenous knowledge in Jigawa State is primarily oral and practical, including agricultural practices and methods, weather forecasting, traditional medicine, animal husbandry and crafts, folktales, and community mechanisms for addressing social challenges. While this knowledge is rich in many ways and has potential for the conservation of cultures, adaptation to the environment, as well as development of local communities, it is mostly undocumented, thus at risk of being lost through the death of older adults, emigration of young people, and new digital technologies which shape the ways people today access knowledge. Indigenous knowledge is becoming endangered and threatened because of factors such as poor documentation and digitization, declining language varieties, and weak digital preservation (Sani & Song, 2026; Deckker & Sumanasekara, 2025).

Among other applications, Artificial Intelligence can help document indigenous knowledge and translate, classify, store, and retrieve it through, for example, speech-to-text and other machine-learning technologies. Indications suggest that AI can strengthen indigenous knowledge preservation, provided it includes active community participation, adherence to cultural protocols, and respect for intellectual property rights (Tella, Jatto & Ajani, 2025; Perera, 2025; Sani & Song, 2026). However, existing evidence shows that very few, if any, efforts have used AI technologies to digitize indigenous knowledge systems in Jigawa State.

Jigawa State is home to many indigenous knowledge systems relevant to different aspects of the environment, including agriculture and other cultural pursuits. Much work has focused on the need to preserve indigenous knowledge (Khan & Gope, 2025; Perera et al., 2025). However, little to no work has examined the adoption of AI technologies in Local Nigerian contexts, including Jigawa State, and how these technologies affect the transformation of indigenous knowledge into digital systems that are accessible, preserved, and usable.

3.0 RESEARCH OBJECTIVES

The main objective of this study is to examine the adoption of Artificial Intelligence to transform indigenous

knowledge into digital knowledge systems in Jigawa State, Nigeria. The specific objectives are to:

1. Explore the categories of indigenous knowledge available among selected communities in Jigawa State;
2. Examine the methods used in documenting indigenous knowledge in Jigawa State;
3. Identify the opportunities associated with the adoption of Artificial Intelligence in transforming indigenous knowledge into digital knowledge systems;
4. Determine the extent to which Artificial Intelligence adoption transforms the documentation of indigenous knowledge in Jigawa State;
5. Identify the challenges affecting the adoption of Artificial Intelligence for the documentation of indigenous knowledge in Jigawa State;
6. Develop an AI-supported framework for transforming indigenous knowledge into sustainable digital knowledge systems in Jigawa State.

4.0 LITERATURE REVIEW

4.1 Theoretical Framework of the Study

This study uses Socio-Technical Systems Theory, originally developed by Eric Trist and Ken Bamforth (1951) in their research on work organization in British coal mines and further developed by other researchers at the Tavistock Institute. Socio-Technical Systems Theory holds that an organization's effectiveness depends on two interrelated sub-systems: the social sub-system and the technical sub-system. The social sub-system includes people and social relations within a community, e.g. skills, relationships, values and culture. The technical sub-system comprises tools, technology, and other elements of the social and physical environment. Socio-technical systems theory applies to this study because transforming indigenous knowledge into digital knowledge systems combines social factors (e.g., community participation) and technology integration. The social sub-system involves categorizing local knowledge and documentation practices, and involving knowledge holders. The technical sub-system involves using AI to document indigenous knowledge. Therefore, this theory demonstrates how AI can facilitate community participation in digitization of local knowledge. The theory also provides a basis for analyzing how innovation and technology jointly facilitate social participation to sustain the preservation of indigenous knowledge in Jigawa State.

4.2 Forms and Availability of Indigenous Knowledge

Indigenous knowledge refers to local, contextual community knowledge developed through long-term interaction between people and their locality and environment. Indigenous knowledge takes multiple forms, such as oral literature, customary medicine and healing practices, farming and food preservation, weather forecasting, conflict resolution and environmental management. African cultural knowledge is passed on through oral literature, including tales, proverbs, riddles, fables, songs, poems, and lyrical compositions (El Louadi, 2024). Moreover, African cultural knowledge is embedded in social and cultural practices (customs, norms and traditions). Oral literature also articulates the social and cultural continuity of a given community (Sani & Song, 2026). It helps explain the community’s social and political norms and practices. Understanding the tenets of local literature, oral history, traditions, customs, and practices is therefore critical. Cultural knowledge serves a social function by articulating and passing on the community's social and cultural norms (i.e., interactions among community members).

Indigenous knowledge is the totality of everything the community knows (i.e., customs, traditions, practices), including local practices that contribute to survival (rural development). It also helps explain the community’s relationship with the environment. In recent years, a growing number of studies support the role of indigenous knowledge in promoting sustainability, including local sustainability practices (Tella, Jatto & Ajani, 2025).

4.3 Current Methods of Documentation and Preservation

Oral documentation of Indigenous knowledge is widespread throughout Africa, which raises concerns about its preservation. Indigenous communities use different methods to document and preserve knowledge. The methods include storytelling, apprenticeship, family training, festivals, proverbs, songs, rituals, and communal practice. However, they are fragile and vulnerable to loss because they depend heavily on memory. They may also fail to document new knowledge. According to El Louadi (2024), African knowledge systems have evolved to include written and digital forms, but representation of some communities in digital preservation systems remains weak. According to Babagana and Kemboi (2024), digital preservation of Indigenous knowledge systems in Africa has policy gaps, and Indigenous voices are seldom represented in preservation frameworks and strategies. In Nigeria, the digital preservation of cultural materials is weak (Koiki-Owoyele et al., 2020). Oral knowledge is vulnerable to permanent loss without digitization.

4.4 Adoption of Artificial Intelligence

Artificial Intelligence (AI) adoption refers to using intelligent digital tools to assist with tasks ranging from capturing and transcribing information to classifying, storing, retrieving, and analyzing it. In the case of indigenous knowledge, AI may help record oral traditions and documents related to endangered languages and cultural practices, and collate and classify traditional knowledge on Medicinal Plants, flora, and fauna. Tella, Jatto and Ajani (2025) contend that AI and other digital technologies may protect indigenous knowledge through digital repositories, smart platforms, and AI-based analysis and summary tools, provided cultural protocols and intellectual property rights are properly considered. Perera et al. (2025) note that AI can help document indigenous knowledge and traditions. AI may also help indigenous communities achieve other developmental goals, such as learning indigenous languages. In the context of indigenous community development, efforts must adopt AI technology in the most culturally appropriate and participatory ways, and ensure it is used for a range of relevant community development purposes.

4.5 Transformation into Digital Knowledge Systems

Digital knowledge systems transform oral and practical indigenous knowledge and community-based knowledge into digital formats and make these organised forms of knowledge searchable, retrievable and usable for education, research and policy formulation. Digital knowledge systems may include institutional repositories, searchable databases, digital museums and archives, e-libraries, metadata systems and other digital repositories. AI can help digital repositories and archives search, query, retrieve, and organize indigenous knowledge, making it usable in diverse formats. It can integrate, preserve, document, and revitalize diverse forms of cultural knowledge to support sustainable development. El Louadi (2024) highlights the importance of the digital visibility of indigenous knowledge and notes that, for cultural survival and a presence in cyberspace, digitizing indigenous cultural knowledge, languages, and scripts is essential. In Africa, digital preservation is centred on decolonizing knowledge because it allows communities to describe their own values, beliefs, and histories (Babagana & Kemboi, 2024). It helps preserve and provide access to indigenous knowledge in formats that respect community control and restrictions. It also supports the use of indigenous knowledge in education.

4.6 Challenges of AI Adoption

Several obstacles limit AI use in preserving indigenous knowledge. These include poor internet connectivity, low digital literacy, high technology costs, unstable/limited power supply, lack of trained personnel, inadequate institutional support, ethical issues, language barriers, and fears about data ownership and cultural misuse. Digital infrastructure in many African countries, including Nigeria, remains inadequate, especially in rural areas where most indigenous knowledge is held. Oveh, Aziken & Atomatofa (2025) suggest that unless Nigeria invests in digital infrastructure and education, it will not be able to use AI and associated digital technologies to conserve its culture. Therefore, transforming indigenous knowledge using AI, other digital technologies, and related allied fields will require adequate infrastructure, financial and human resources, community participation, and ethical considerations.

5.0 METHODOLOGY

The study will employ a sequential exploratory mixed-methods research design. The study will explore the nature, forms, and documentation practices of indigenous knowledge in Jigawa State and subsequently examine the potential of Artificial Intelligence (AI) to transform indigenous knowledge into digital knowledge systems.

The study population comprises 2 traditional rulers, 8 herbal medicine practitioners, 72 librarians, and 54 museum visitors, making a total of 136 respondents. During the qualitative phase, the researcher used purposive sampling to select 2 traditional rulers and 8 herbalists knowledgeable about indigenous knowledge and its documentation. The researcher reached the herbalists through snowball sampling, in which each sample member recommended other knowledgeable custodians of indigenous knowledge. For the quantitative phase, the researcher used stratified sampling to select librarians and museum visitors, ensuring the study captured diverse views on adopting AI and digital knowledge systems. The qualitative phase used semi-structured interviews and structured thematic analysis to organize the findings, while for quantitative data, the researcher administered a survey and used descriptive statistics to interpret the results.

Three specialists in Library and Information Science and Educational Measurement and Evaluation conducted face and content validation of the instrument. The questionnaire was subjected to a reliability test using Cronbach's alpha, yielding a reliability coefficient of 0.89 after a pre-test with 16 library staff of Federal University Library and 6 visitors of National Museum Birnin-Kudu.

6.0 ETHICAL APPROVAL AND INFORMED CONSENT

Ethical approval was obtained from the appropriate authority of Garu Museum, Jigawa State, before data collection commenced. Participants were informed about the study's purpose, procedures and voluntary nature. Informed consent was obtained from all participants before their involvement. Confidentiality and anonymity were maintained, and participants were assured that they could withdraw from the study at any stage.

7.0 RESULTS AND FINDINGS

The study sampled 143 respondents, of whom 106 returned usable responses.

Table 1: Categories of Respondents

Categories of Respondents	**Sample**	**Returned Useful**	**Response rate**
Community Elders	2	2	100%
Museum Curators	6	4	66.60%
Librarians (FUD and Jigawa State Polytechnic Libraries)	72	61	84.70%
Visitors to Garu EMIRS Palace Museum, Dutse	54	31	57.40%
Herbal medicine practitioners and storytellers	8	8	100%
Total	**143**	**106**	**74%**

Source: Fieldwork data.

The even distribution of respondents indicates that the study captured the right groups involved in indigenous knowledge systems, including documentation and possible digital transformation. The high participation of the museum curators, herbal medicine practitioners, and storytellers, who form the core of indigenous knowledge documentation, further strengthened the study.

7.1 Thematic Analysis of Interview Findings

Since the research employed a sequential exploratory mixed-methods design, data collection began with the qualitative phase. Thematic analysis was conducted on the qualitative data. Responses from interview

participants were coded by respondent category and location. We grouped and coded museum curators as RMC, herbal medicine/storytelling participants as RHS, and community elders as RCE. The analysis followed the research questions and grouped findings around current realities and the implications of AI in Jigawa State.

Theme One: Forms of Indigenous Knowledge Common in the Communities

The findings revealed that indigenous knowledge in Jigawa State exists in different forms, particularly in agri-

culture, traditional medicine, oral history, cultural festivals, local architecture, traditional leadership systems, weather prediction, and conflict resolution.

RMC All: Some of the historical objects in our museum have meanings and stories that are not fully documented. **RMC 01:** *"If the people who understand their history are no longer available, important information about those objects could be lost."*

RCE 01: *"Our indigenous knowledge is part of our everyday lives. It includes how we cultivate crops, preserve seeds, manage the soil, and identify traditional signs of changing weather."*

RCE 2: *"Before modern agricultural methods became common, our people depended on knowledge passed down by their parents about food preservation and the treatment of certain illnesses."*

RHS 1: *"Traditional medicine is an important part of our indigenous knowledge. We know local herbs, their preparation, their uses, and the methods of administering them."*

RHS 04: *Often, the system for preserving Indigenous knowledge remains informal, fragile, and reliant on oral traditions. However, this system keeps information within the community. It has risks, as information can be lost when elders in the community die and when young people are not interested in the community's body of knowledge.*

The findings indicate that indigenous knowledge in Jigawa State is both cultural and environmental. It is cultural because it preserves identity, language, history, and social values.

Theme Two: Methods of Preserving and Transmitting Indigenous Knowledge

The study found that indigenous knowledge is mainly preserved and transmitted orally.

RMC 02: *"The museum preserves indigenous knowledge through the collection and display of cultural objects, photographs, descriptions and explanations provided to visitors."*

RCE 01: *"We teach our children through storytelling and practical demonstrations. They learn by watching what we do and gradually practicing these activities themselves."*

RCE 02: *"Most of the knowledge we possess was not learnt from books. We acquired it from our parents and grandparents through observation, participation, and continuous guidance."*

RHS 04: *"Traditional medicine is passed from one generation to another. A younger person learns by staying with an experienced practitioner, observing the preparation of herbs and gradually understanding their applications."*

RHS 05: *"Museums and libraries can support the preservation of indigenous knowledge through documentation, written records, archival materials and digital storage.*

The analysis shows that the preservation system is still largely informal and fragile. Oral transmission remains useful because it keeps knowledge within the community, but it is also risky because knowledge can disappear when elders die.

Theme Three: Indigenous Knowledge at Risk of Being Lost

The study found that several forms of indigenous knowledge risk disappearing.

RMC 04: *"Some of the historical objects in our museum have stories and meanings that are not fully documented. If the people who understand their history are no longer available, important information about those objects could be lost."*

RCE 1: *"The absence of proper documentation makes indigenous knowledge vulnerable. Information that exists only in the memory of individuals can disappear when those individuals are no longer alive."*

RCE 2: *"When an elderly person dies without passing on what they know, that knowledge may disappear permanently because there may be nobody else who understands it."*

RHS 01: *"Traditional medicine is gradually losing attention among younger people. Many are no longer interested in learning how to identify medicinal plants and prepare traditional remedies."*

This finding is significant because of the rapid social and technological changes that are occurring in Nigeria. Young people increasingly depend on mobile phones and social media; the loss of Oral Traditions and other cultural learning systems would further undermine the ability to maintain cultural continuity and develop local Solutions to their Problems.

Theme Four: Existing Efforts to Document Indigenous Knowledge

The findings showed that existing efforts to document indigenous knowledge in Jigawa State are very few and fragmented. Some documents are physically preserved but not searchable, not widely accessible, and not supported by full Metadata.

RMC 1: *"We have some records of the objects in the collections of Garu Museum, including their descriptions and historical significance."*

RCE 2: *"Some objects are physically preserved and displayed, but the stories, traditional explanations, and cultural meanings associated with them are not fully recorded."*

RHS 1: *"Our libraries preserve books and other documentary materials. Nevertheless, much of the indigenous knowledge held by local communities is not available in formal library collections."*

RHS 5: *"Most of what we know is still preserved in our memories and passed down through our families. Very little of it has been written down or recorded for future generations."*

The findings show that while some institutional and individual documentation efforts exist, they remain insufficient for complete preservation. The absence of coordinated documentation systems limits the accessibility and lasting sustainability of indigenous knowledge.

Theme Five: Challenges Affecting Documentation and Preservation

The findings showed multiple challenges affecting indigenous knowledge documentation and preservation in Jigawa State.

RMC 3: *"The digitization of indigenous knowledge requires computers, scanners, recording equipment, trained staff, and reliable electricity."*

RCE 1: *"Some elders are unwilling to share certain knowledge because they are afraid that people may misuse it or fail to respect the traditions and values attached to it."*

RCE 2: *"Young people are not willing to learn from the older generation."*

RHS 1: "Some traditional knowledge is not easily shared because they believe it is for their family members and are afraid of losing ownership."

RHS 4: *"Some cultural materials require special conservation conditions. Without adequate facilities and technical support, it becomes difficult to preserve them for a long period."*

The findings demonstrate that the challenges are both institutional and community-based. While inadequate

funding and technological infrastructure affect formal institutions, concerns about ownership and cultural sensitivity influence community knowledge holders' willingness to participate in documentation initiatives.

Theme Six: Possible Role of AI in Recording and Retrieving Indigenous Knowledge

The findings revealed that respondents recognized several possible benefits of AI after the researchers explained its functions.

RMC 1: *"If the oral explanations associated with our cultural objects could be recorded and stored digitally, it would help preserve the knowledge and cultural objects."*

RCE 1: *"If technology can record the voices of our elders and preserve their stories, it will help younger generations learn about the knowledge and experiences of their ancestors."*

RCE 2: *"The technology could help preserve traditional farming knowledge by recording how we identify planting seasons, preserve seeds, and interpret signs of changing weather."*

RHS 2: *"It would be useful if traditional knowledge about medicinal plants could be properly recorded and stored so that future generations would not lose the information."*

The results show that AI can transform traditional indigenous knowledge from an oral, dispersed form into organized, structured digital knowledge. However, this transformation must be gradual, participatory, and locally controlled.

7.2 Themes Used in Developing the Quantitative Phase

The six themes reveal the major issues surrounding indigenous knowledge documentation and preservation in Jigawa State.

Table 2: Major Themes

S/N	Theme	Findings from the Qualitative Phase
1	Forms of indigenous knowledge	Agriculture, traditional medicine, oral history, crafts, cultural practices and environmental knowledge.
2	Preservation and transmission	Primarily oral transmission, storytelling, apprenticeship and institutional documentation.
3	Knowledge at risk	Traditional medicine, folktales, farming practices, crafts, songs and oral histories.
4	Existing documentation efforts	Limited museum records, library materials, personal records and individual research projects.
5	Challenges	Inadequate funding, poor infrastructure, youth disinterest, cultural restrictions and limited institutional support.
6	Potential role of AI	Digitization, transcription, translation, classification, indexing and retrieval.

7.3 Descriptive Analysis of the Quantitative Phase

Following the qualitative phase, the themes and major findings that emerged from the interviews informed the development of the quantitative questionnaire. The instrument was designed to measure the availability and forms of indigenous knowledge, its preservation practices, documentation challenges, and the potential application of artificial intelligence.

Decision

The decision rule used a mean benchmark of 2.50 and a percentage threshold of 50%. Items with a mean score of 2.50 and above or a percentage above 50% were accepted, while items below these respective thresholds were rejected in the descriptive analysis.

Objective One

Table 3: Forms and Availability of Indigenous Knowledge

S/N	Statement	Available	Not Available	Decision
1	Indigenous knowledge is practiced in my community.	92 (100%)	0 (0%)	**Available**
2	Traditional farming knowledge is common	51 (55%)	41 (45%)	**Available**
3	Herbal medicine knowledge is passed down	44 (48%)	48 (52%)	Not Available
4	Oral traditions, stories and cultural histories	71 (77%)	21 (23%)	**Available**
5	Indigenous knowledge about leadership structure	45 (49%)	47 (51%)	Not Available
6	Religious knowledge	92 (100%)	0 (0%)	**Available**

Table 3 shows that indigenous knowledge is extensive in the communities, as all respondents (100%) acknowledged it. Religious knowledge (100%) and oral traditions, stories, and cultural histories (77%) were also prominent. Traditional farming knowledge (55%) was less pronounced, while herbal medicine transmission (48%) and indigenous leadership knowledge (49%) were the least pronounced. This shows that although indigenous knowledge is important to the community, its prevalence varies by knowledge area. Relatively low levels of herbal medicine and leadership knowledge may indicate declining intergenerational transmission and preservation, and may warrant documentation and support by appropriate institutions.

Objective Two

Table 4: Current Methods of Documentation and Preservation

S/N	Statement	Yes	No	Decision
7	Most IK in Jigawa State is preserved orally.	92 (100%)	0 (0%)	**Accepted**
8	My community has written records of IK	40 (43%)	52 (57%)	Rejected
9	Audio and video recordings are used to preserve IK	41 (45%)	51 (55%)	Rejected
10	Libraries and cultural institutions preserve IK	71 (77%)	21 (23%)	**Accepted**
11	Computers are used in preserving IK	45 (49%)	47 (51%)	Rejected
12	Digital Technology is used in preserving IK	10 (11%)	82 (89%)	Rejected

Table 4 indicates that oral transmission remains the dominant preservation method, as all respondents (100%) affirmed its use. Although 77% acknowledged the role of libraries and cultural institutions, only 43% reported the existence of written records, while 45% confirmed the use of audio-visual recordings. Furthermore, 49% acknowledged computer usage, whereas only 11% confirmed the use of digital technology. This suggests that indigenous knowledge preservation in Jigawa State remains largely traditional, with limited adoption of digital documentation methods.

Objective Three

Table 5: Adoption of Artificial Intelligence

S/N	Statement	SA	A	U	D	SD	Mean	Decision
13	AI tools can record and transcribe oral IK	33	42	2	8	7	3.93	**Accepted**
14	AI translation tools can convert local knowledge into accessible languages.	21	48	4	6	13	3.63	**Accepted**
15	AI can support the classification and organization of IK	8	12	5	54	13	2.43	Rejected
16	AI-based search systems can make IK easier to retrieve.	19	51	1	12	9	3.64	**Accepted**
17	Improve documentation and preservation of IK	23	43	1	21	4	3.65	**Accepted**

Table 5 supports AI adoption in indigenous knowledge preservation. Most respondents agreed that AI translation tools could make indigenous knowledge accessible in different languages (mean=3.63) and supported AI-based search systems and their potential to improve preservation (mean=3.65). Similarly, respondents agreed that AI tools for recording and transcribing oral knowledge are useful (mean=3.93). However, the respondents rejected AI for classification and organization (mean=2.43). These findings indicate a favourable attitude towards integrating AI into indigenous knowledge management in Jigawa State.

Objective Four

Table 6: Transformation into Digital Knowledge Systems

S/N	Statement	Agree	Disagree	Decision
18	IK should be converted into digital formats.	92 (100%)	0 (0%)	**Accepted**
19	Digital repositories can preserve IK for future generations.	64 (70%)	28 (30%)	**Accepted**
20	Digitized IK can support teaching and research	55 (60%)	37 (40%)	**Accepted**
21	Digital knowledge systems can improve access to IK	71 (77%)	21 (23%)	**Accepted**
22	AI-supported digital systems can make IK more sustainable.	90 (98%)	2 (2%)	**Accepted**
23	Digital systems can transform the traditional heritage of the state	92 (100%)	0 (0%)	**Accepted**

Table 6 indicates support for transforming indigenous knowledge into digital knowledge systems. All respondents (100%) agreed that indigenous knowledge should be converted into digital formats and that digital systems could transform the state's traditional heritage. Similarly, 98% supported AI-supported digital systems for sustainable preservation, while 77% believed digital systems could improve access to indigenous knowledge. Furthermore, 70% recognized the value of digital repositories, and 60% agreed that digitized knowledge could support teaching and research.

Objective Five

Table 7: Challenges of AI Adoption

S/N	Statement	Affecting	Not Affecting	Decision
24	Poor internet access limits AI adoption for IK preservation.	53 (58%)	39 (42%)	**Affecting**
25	Lack of digital skills affects the use of AI tools.	64 (70%)	28 (30%)	**Affecting**
26	High technology costs hinder AI-based documentation.	40 (43%)	52 (57%)	Not Affecting
27	Cultural and ethical concerns affect the digitization of IK	91 (99%)	1 (1%)	**Affecting**
28	Lack of government and institutional support limits AI adoption.	90 (98%)	2 (2%)	**Affecting**

The findings show that several challenges affect AI adoption for indigenous knowledge preservation in Jigawa State. Cultural and ethical concerns were the most prominent, with 99% of respondents identifying them as a challenge. Similarly, 98% identified inadequate government and institutional support, while 70% cited a lack of digital skills and 58% reported poor internet access. However, 57% indicated that high technology costs were not a major challenge. The findings suggest that cultural considerations, institutional support, digital literacy, and internet access are key factors influencing AI adoption for indigenous knowledge documentation and preservation.

8.0 PROPOSED FRAMEWORK

In line with the philosophical underpinning of Socio-Technical Systems Theory, and based on the study's findings that indigenous knowledge is still preserved orally and digital preservation systems remain weak, a framework is needed to guide the museum documentation and preservation process. Therefore, the proposed framework presents a community-centred and AI-supported model for transforming indigenous knowledge into sustainable digital knowledge systems in Jigawa State. The Socio-Technical Systems Theory assumes that when the social sub-system (curators, visitors, librarians) and the technical sub-system (tools, technology, and other elements) interrelate, they can transform indigenous knowledge into digital knowledge systems.

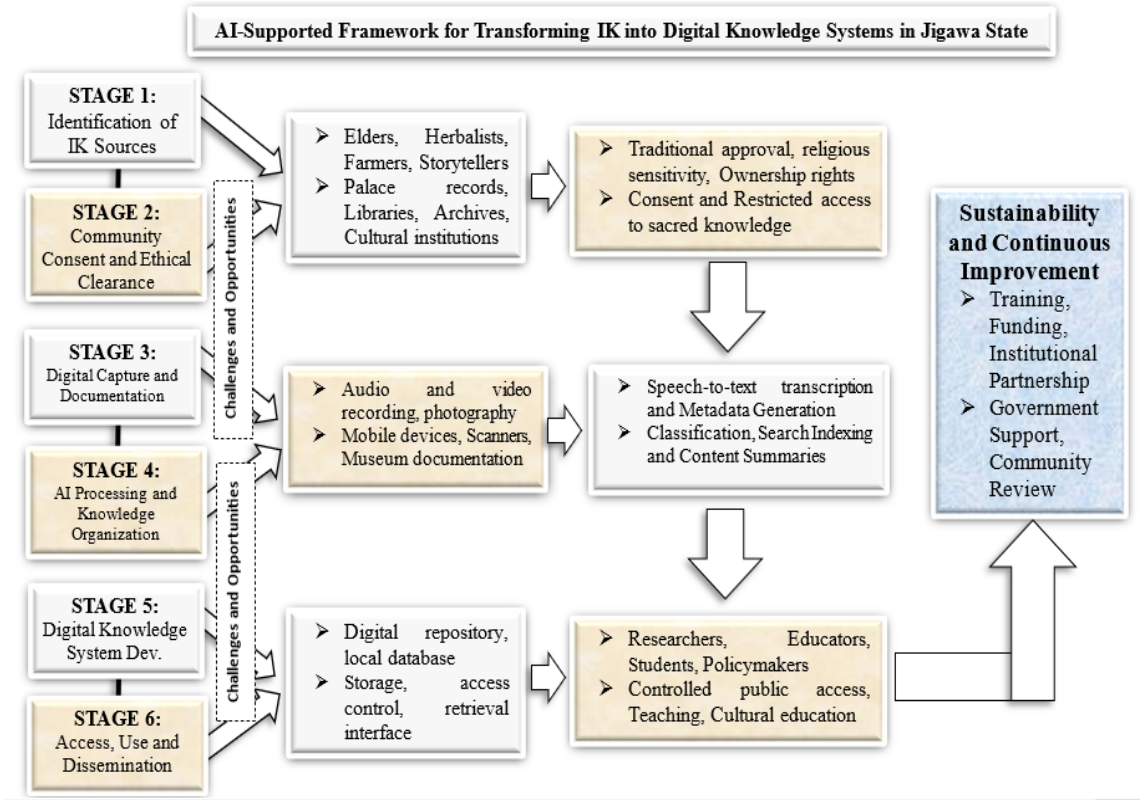


Fig. 1: AI-Supported Framework for Digital Knowledge Systems

Stage 1: Identification of Indigenous Knowledge Sources

The first stage of the framework identifies indigenous knowledge sources. Findings in Jigawa State showed that the social subsystem comprises community elders, traditional herbal medicine practitioners, storytellers, artisans, and cultural institutions that hold indigenous knowledge. This stage utilizes libraries, museums, and government agencies to locate where indigenous knowledge is maintained and by whom. For example, traditional healers may maintain knowledge of herbal medicine, and palace museum staff and traditional title holders may maintain knowledge of royal history. Understanding where knowledge is maintained is essential so efforts can be directed toward preserving it, if it is deemed worth preserving. Preserving indigenous knowledge helps safeguard peace and security as proposed by the Socio-Technical Systems Theory.

Stage 2: Community Consent and Ethical Clearance

The second stage comprises community consent and ethical clearance. Cultural, ethical, and religious concerns are among the major challenges in digitizing indigenous knowledge. Some knowledge may be sacred, family-owned, or spiritually sensitive and may be restricted to a particular group or class of persons. Therefore, before recording or digitizing any indigenous knowledge, the owners must give consent, as must the community and relevant authorities. At this stage, consider religious sensitivity, intellectual ownership, and benefit-and-access control. This stage also provides the basis for analyzing how innovation and technology can be used jointly to facilitate social participation to sustain the preservation of indigenous knowledge within the community.

Stage 3: Digital Capture and Documentation

The third stage involves digitally capturing and documenting indigenous knowledge. This is the technical sub-system (tools, technology, and other elements) proposes by the Socio-Technical Systems Theory. Findings show that indigenous knowledge is mostly preserved orally and, to some extent, in writing, audio and video formats. This stage involves using digital gadgets such as phones, audio recorders, and video cameras to capture and document indigenous knowledge. Researchers may record oral stories; photograph and describe herbal preparations and other activities; photograph and document museum collections; and capture descriptions of indigenous knowledge.

Stage 4: AI Processing and Knowledge Organization

The framework envisages using Artificial Intelligence (AI) in the fourth stage. Findings showed that respondents favoured using AI for transcription and translation and for searching, retrieving, and preserving indigenous knowledge; however, they were not fully in favour of using AI to classify and organize indigenous knowledge. This suggests a need for training and awareness. In this respect, AI in transcription and translation will produce summaries, generate and improve metadata, and classify knowledge, enabling easier search, retrieval, and preservation.

Stage 5: Digital Knowledge System Development

The fifth stage involves developing a digital knowledge system. Artificial Intelligence (AI) should process documented indigenous knowledge, and the knowledge should be stored in organized systems, digital repositories, e-libraries, and digital museums. The findings showed that local communities' cultural materials were not adequately documented or accessible in libraries and archives. Hence, a structured digital repository is needed. The developed system should include integrated search, metadata, and different access levels, and be backed up and restricted to authorized users.

Stage 6: Access, Use and Knowledge Dissemination

The sixth stage focuses on access and use. One of the main reasons for converting indigenous knowledge into digital knowledge systems is to store it in a format that is accessible for educational and research purposes. The study found that respondents supported using digitized indigenous knowledge to enhance education, research, policy formulation, and other engagements. Therefore, digital knowledge systems should be designed to be accessible to students, teachers, researchers, policymakers, and other community stakeholders.

Expected Outcome of the Framework: Sustainability and Continuous Improvement

The system's main objective is to sustain and improve it. Study findings indicated that one of the main reasons for not implementing the system was the lack of a sustainable, reliable, and secure internet connection. Other reasons included the cost of technology, Ethics and morality concerns, and lack of sufficient support from the Government and other institutions. It will be used to preserve indigenous knowledge, oral traditions and museum collections. The system will ensure that indigenous knowledge is not lost while preserving cultural ownership.

9.0 DISCUSSION OF FINDINGS

Insights from Socio-Technical Systems Theory strengthened the findings by showing that preserving indigenous knowledge requires the right blend of social and technical systems. The findings show that AI and digital tools can transform digital documentation and storage, digital translation, and digital repository systems. However, community values, cultural practices, knowledge holders, and institutional support are equally pivotal to developing sustainable digital knowledge systems in Jigawa State.

Findings suggest indigenous knowledge is widely practiced in Jigawa State, particularly in religious knowledge (100%) and oral traditions, stories and cultural histories (77%). Other findings suggest that indigenous knowledge is embodied in traditional medicine and farming methods and cultural and community histories and traditions, but at lower rates (48% and 49%, respectively) than religious and oral knowledge. Findings suggest that some forms of Indigenous knowledge are declining, supporting Sani and Song (2026), who stressed that Indigenous knowledge and oral expression are major means of preserving cultural and local knowledge. It also upholds El Louadi (2024), who asserted that Africa's cultural heritage is worth preserving.

The findings suggest that in most cases, oral tradition is the dominant means of preservation, as all respondents (100%) affirmed that oral tradition is the major means of preservation. Fewer respondents (77%) believed that printed materials and cultural institutions also play a role in preservation. Like Koiki-Owoyele, Alabi and Egbunu (2020), other findings suggest that although digital preservation in Nigerian Libraries, Archives and Museums is still uneven, several African communities remain largely inadequately preserved.

Respondents appreciated AI's potential for tasks such as recording, transcribing, and translating indigenous knowledge. Respondents showed high acceptance of AI-based translations (mean=3.63) and search systems (mean=3.64). Respondents rejected acceptance of using AI to classify and organize indigenous knowledge (mean=2.43). This suggests that AI-based classification and organization may require technical sorting and organizing of indigenous knowledge systems. The results provide further evidence for pinpointing areas for integrating AI into indigenous knowledge systems and support engaging the community in integrating AI and natural language processing for indigenous knowledge systems documentation and translation.

The results strongly advocate digitizing indigenous knowledge. All participants (100%) favoured digitizing indigenous knowledge, and 98% supported using AI in digital systems to support the preservation of indigenous knowledge. During the qualitative phase, participants recognized the opportunities AI has for recording, storing and retrieving indigenous knowledge. The results show that El Louadi (2024) affirms the necessity of digital legacy for preserving Indigenous Languages and Cultural heritage and provides evidence for Babagana and Kemboi's (2024) assertion that digital conservation allows for the preservation and representation of African Knowledge Systems and Histories.

While respondents expressed willingness to use AI to preserve indigenous knowledge digitally, the barriers are clear. Most importantly are ethno-cultural barriers to AI adoption and a lack of governmental and institutional commitment (both at 98%). These were followed by deficiencies in respondents' digital skills (70%) and internet connectivity (58%). The results align with Sani and Song (2026) on poor ICT infrastructure and its consequence: undocumented indigenous knowledge remains so. The results also relate to Babagana and Kemboi (2024) regarding the absence of digital preservation policies and the representation of indigenous people. The results show that community participation is important for structuring AI-based systems to preserve indigenous knowledge and for gaining cultural understanding for integration with the community's

value system and ownership. The findings indicate that community adoption of AI depends on government and institutional commitment, ethical considerations, and access to digital and ICT infrastructure. Engaging elders and knowledge holders is essential to record and digitally preserve their knowledge.

The research found that in Jigawa State, indigenous knowledge is an important aspect of communal life. It is evident in religion, folklore, farming, and ethnobotany. Most of the time, it is preserved through oral tradition and documented inadequately (e.g., audiovisual and digital documents). The research found great potential in adopting AI and other digital technologies to document, translate, and store indigenous knowledge. The AI-Supported Framework encourages converting indigenous knowledge into digital formats. The ultimate goal is to develop indigenous knowledge systems aligned with the community's sustainability needs.

10.0 THEORETICAL AND PRACTICAL IMPLICATIONS

Theoretically, the study contributes to understanding indigenous knowledge preservation by showing how traditional knowledge systems can integrate with emerging digital technologies. It highlights the relevance of community participation in ensuring that AI-based preservation respects cultural values, ownership, and local knowledge structures. Practically, the findings provide evidence for government agencies, libraries, museums, and cultural institutions in Jigawa State to develop structured digital preservation programs. Such initiatives should include oral documentation, digital repositories, indigenous language technologies and training in digital skills. Government and institutional support, reliable internet infrastructure, and ethical guidelines are also necessary. Most importantly, community elders and knowledge holders should participate in decisions concerning the recording, access, use, and long-term preservation of their knowledge.

11.0 CONCLUSION

The study concludes that indigenous knowledge remains an important part of community life in Jigawa State, particularly in religious practices, oral traditions, agriculture and traditional medicine. However, its preservation is still largely dependent on oral transmission, with limited written, audiovisual, and digital documentation. The findings demonstrate strong acceptance of artificial intelligence and digital technologies for documenting, translating, storing, and retrieving indigenous knowledge. Nevertheless, cultural and ethical concerns, inadequate institutional support, limited digital skills, and poor internet access may hinder successful implementation. The developed AI-Supported Framework proposes an approach to transforming indigenous knowledge into sustainable digital knowledge systems. Therefore, effective preservation requires ethical technology adoption, community participation, and sustained institutional commitment.

12.0 RECOMMENDATIONS

1. The Jigawa State Government should establish an AI-supported digital repository to document and retrieve indigenous knowledge.

2. Traditional knowledge holders and cultural groups should be actively involved in documenting and approving knowledge for digitization to ensure informed consent and cultural sensitivity.

3. Libraries, museums, and cultural institutions should organize training programs to equip staff and community members with digital documentation and AI-related skills.

4. Government should develop policies and provide sustainable funding for indigenous knowledge documentation, digital preservation, and responsible AI adoption.

5. Museums should collaborate with technology developers and language experts to develop AI-supported transcription and translation tools for local languages.

13.0 CONFLICT OF INTEREST

There is no conflict of interest.

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