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The Impact of Information and Communication Technology on Knowledge Management Practice at Federal Polytechnic Kazaure and Jigawa State Polytechnic Dutse, Nigeria

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ABSTRACT: Information and Communication Technology (ICT) is an enormous financial investment and has a positive effect on Knowledge Management (KM) and individual work performance which thus benefit the organisation through strategic competitive advantage. The objectives of this research is to determine how ICT impacts on (KM) within federal Polytechnic Kazaure and Jigawa State Polytechnics Dutse, Jigawa State of Nigeria. The objectives would benefits ICT in Tertiary Institutions (TIs) in find out the barriers to implementing ICT and explore the key functions of (KM) at Tertiary Institutions. The research adopted descriptive method and data was collected from a sample of 364 through questionnaires, site observations and interviews from staff members of the selected Tertiary Institutions in Jigawa State, Nigeria. The questionnaire was used for analysis and interpreted using SPSS software. The findings indicated that ICT users have varied levels of competencies when it comes to ICT use. The findings also reveals that there is a need to establish general guidelines for ICT use in order to positively propel KM for competitive advantage of (TIs). The study recommends that the Tertiary Institutions should take a comparative approach to examine gaps in ICT use within the institution and suggest ways for improving ICT integration in knowledge management at tertiary institutions, such as training programs, investment in infrastructure, and policy reform which would address challenges related to infrastructure, data security, training and capacity building,. By investing in ICT, tertiary institutions would prosper in knowledge management practices, enhances the quality of education and contributing to broader development goals in Nigeria.

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KEYWORDS: Information and Communication Technology, Knowledge Management, Tertiary Institutions, System Management.

I. INTRODUCTION

In 21century, knowledge is not just one of the key resources and assets of the organization, but is a fundamental tool that enables the effective management of other resources in the organization. To a substantial extent, knowledge management (KM) is very significant in organizational decision making. Ezugwu, et al (2016) states that knowledge management gives organizations a competitive advantage in this dynamic environment. To this end, it is imperative for organizations to improve their work performance and uniqueness through the utilization of knowledge resources among other organizational resources. Knowledge has therefore, increasingly become a fundamental process in organizations and is a key ingredient for continuous change. The recent advancements in ICT systems have inevitably improved significantly the process of information gathering, repackaging and dissemination. These new technological systems replaced the traditional methods of knowledge management that were largely ineffective. Prior to the introduction of advanced technology, knowledge was recorded and stored in wooden drawers, shelves and cabinets, Furthermore, CDs, DVDs and pictures were used to manage information. Against this background, there is amble evidence to suggest that management of information and knowledge is not easy. The proliferation of knowledge necessitates radical changes in the way it ismanaged and preserved. Ahmed, (2009) states that traditional methods are very rudimental and have resulted in vast amounts of information being lost.

Problem of the Study

Despite significant advancement in Information and Communication Technology (ICT), many educational institutions in Nigeria continue to face substantial challenges in effectively managing knowledge resources. The integration of ICT in these processes remains inconsistent and often underutilized. One major problem is the lack of a coherent ICT infrastructure that supports seamless knowledge sharing, retrieval, and storage. The use of ICT tools for KM such as document management systems, digital repositories, and collaborative platforms remains limited, fragmented, or outdated. This undermines staff and students' ability to access, share, and build upon institutional knowledge effectively (Olatokun & Nwafor, 2012).

There exists a gap in ICT literacy among staff and students, which hinders the adoption of available technologies. Without adequate training and change management strategies, even well-designed ICT systems fail to achieve their KM objectives (Asemi & Safari, 2011). This challenge is compounded by institutional constraints such as limited funding, inadequate policy frameworks, and poor maintenance culture. ICT offers tools to enhance KM practices such as reducing knowledge silos, improving decision-making, and fostering innovation but the practical reality is often more complex. Therefore, there is a need to investigate the extent to which ICT tools are being utilized for knowledge management in some selected tertiary institutions in Jigawa State to understand the barriers, and to propose feasible strategies for enhancing the integration of ICT into KM practices. Such an inquiry is essential for maximizing the intellectual capital of these institutions, promoting academic excellence, and ensuring their competitiveness in a knowledge-driven society.

Objectives of the Study

i.To examine the current state of ICT infrastructure and tools used for knowledge management in Federal Polytechnic Kazaure and Jigawa State Polytechnic Dutse.

ii. To investigate the level of awareness, skills, and usage of ICT tools among staff and students in relation to knowledge management in Federal Polytechnic Kazaure and Jigawa State Polytechnic Dutse.

iii. To identify the challenges hindering effective ICT integration into knowledge management practices in Federal Polytechnic Kazaure and Jigawa State Polytechnic Dutse.

i**v.** To explore the relationship between ICT usage and knowledge sharing, storage, and retrieval practices in Federal Polytechnic Kazaure and Jigawa State Polytechnic Dutse.

v. To propose strategic recommendations for improving ICT enabled knowledge management in Nigerian tertiary institutions.

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Research Questions

i. What ICT tools and infrastructure are currently in use for knowledge management in Federal Polytechnic Kazaure and Jigawa State Polytechnic Dutse?

ii. How knowledgeable and skilled are the staff and students in terms of using ICT for knowledge management purposes in Federal Polytechnic Kazaure and Jigawa State Polytechnic Dutse?

iii. What are the major barriers effecting ICT based knowledge management in Federal Polytechnic Kazaure and Jigawa State Polytechnic Dutse?

iv. How does ICT usage influence knowledge creation, sharing, storage, and retrieval among staff and students in Federal Polytechnic Kazaure and Jigawa State Polytechnic Dutse?

v. What practical and policy measures can enhance the role of ICT in knowledge management in Nigerian tertiary institutions?

Significance of the Study

This study provides empirical evidence on the role and effectiveness of ICT in managing institutional knowledge, helping school administrators design better ICT driven KM systems. The findings offer insights into the gaps in policy and infrastructure and guide the formulation of strategies to support digital transformation in the educational sector. It highlights the specific needs and challenges of Nigerian tertiary institutions, which can inform the development of more user-friendly and fit-for-purpose ICT solutions for knowledge management. The study also contributes to the limited body of knowledge on ICT and KM in Nigerian higher education, especially in technical and vocational institutions, and opens up avenues for further research.

Scope and Limitations of the Study

The study is limited to Federal Polytechnic Kazaure and Jigawa State Polytechnic Dutse. The study concentrates on the role of ICT in facilitating key knowledge management activities, knowledge creation, storage, retrieval, and sharing. The research also considers tools such as institutional portals, email systems, digital libraries, content management systems (CMS), cloud platforms, and collaborative software (e.g., Google Workspace, Microsoft Teams). Due to the tight schedules in the academic calendar and access restrictions, the data collection phase was limited in duration. Some staff and students were unwilling to provide full information due to privacy concerns or institutional policies. Differences in ICT infrastructure between the two institutions affected the consistency in the process of comparisons.

II. LITERATURE REVIEW

Knowledge management (KM) refers to the systematic process of creating, capturing, storing, and sharing knowledge within an organization to enhance its effectiveness (Nonaka & Takeuchi, 1995). In the context of higher education institutions, KM encompasses the development and dissemination of academic, administrative, and institutional knowledge. The adoption of KM practices is critical for fostering innovation, improving institutional memory, and enhancing learning outcomes (Rowley, 2000). Many Nigerian polytechnics still face challenges in implementing structured KM frameworks, often relying on informal methods of knowledge sharing, which are inefficient and unsustainable (Olatokun & Nwafor, 2012).

Role of ICT in Enhancing Knowledge Management

ICT has emerged as a key enabler of KM by providing tools and platforms for creating, storing, and sharing knowledge. Technologies such as content management systems (CMS), databases, email, intranets, e-libraries, and cloud-based collaboration platforms facilitate easy access and retrieval of knowledge (Asemi & Safari, 2011). In academic institutions, ICT supports various KM activities including virtual learning environments, digital repositories, and research networks (Okunoye et al., 2007). ICT can enhance both explicit knowledge (e.g., documented materials, lecture notes) and tacit knowledge (e.g., skills, experience) through communication tools like forums, webinars, and online communities (Alavi & Leidner, 2001).

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ICT Infrastructure and Utilization in Nigerian Tertiary Institutions

Studies have shown that many Nigerian tertiary institutions suffer from poor ICT infrastructure, inadequate funding, and lack of skilled personnel (Ajayi et al., 2008). These issues limit the capacity of such institutions to implement effective KM systems. Furthermore, inconsistent power supply, poor internet connectivity, and outdated hardware/software continue to undermine efforts to modernize knowledge sharing processes (Eke, 2011). In Polytechnics like those in Kazaure and Dutse, ICT adoption is often constrained by weak institutional policies, limited training programs, and resistance to change among staff and students (Ojedokun & Owolabi, 2003).

Theoretical Framework

The theoretical framework for this study is based on the Technology Acceptance Model (TAM) (Davis, 1989), Knowledge-Based View (KBV) and Nonaka and Takeuchi's Knowledge Creation Theory (1995).

1. Technology Acceptance Model (TAM)

TAM, developed by Davis in 1989, posits that the adoption of new technologies is influenced by perceived usefulness (PU) and perceived ease of use (PEOU). In the context of tertiary institutions, TAM can explain how IT tools and systems are accepted by both staff and students for knowledge management purposes. The theory has the following relevance: It helps to explain the extent to which IT systems are embraced by users for managing knowledge. It focuses on how easy and beneficial users find the IT platforms in knowledge creation, sharing, and storage within the institution. It provides a framework to measure IT' effectiveness in enhancing KM through user acceptance.

2. Knowledge-Based View (KBV)

The Knowledge-Based View (KBV) emphasizes that knowledge is a key strategic resource and a source of competitive advantage for organizations, including educational institutions. This theory focuses on the processes of knowledge creation, sharing, storage, and utilization. The theory has the following relevance: The theory helps to assess how IT enhances knowledge management by facilitating collaboration, improving access to resources, and creating a repository of institutional knowledge. IT systems serve as enablers of KM processes by allowing for efficient storage and retrieval of knowledge within the institution.

3. SECI Model

The SECI model, developed by Nonaka and Takeuchi, (1995) explains knowledge management through four processes which are: Socialization, Externalization, Combination, and Internalization. The theory has the following relevance: Information technology can be used to support all stages of the SECI model, especially in formalizing tacit knowledge into explicit knowledge that can be stored and shared digitally within tertiary institutions. Information technology tools such as learning management systems (LMS), collaboration platforms, and databases help facilitate these processes and enable students, lecturers, and administrators to manage knowledge effectively.

Empirical Review

Empirical studies on the impact of Information and Communication Technology (ICT) on Knowledge Management (KM) in tertiary institutions provide valuable insights into the practical realities, successes, and limitations of ICT integration in educational settings. This section reviews several relevant studies conducted in Nigeria and other developing countries to highlight trends, gaps, and implications for your research.

Olatokun and Nwafor (2012) conducted a study on the impact of ICT on knowledge sharing in Nigerian universities. The research involved 200 academic staff across four public universities using a structured questionnaire. The findings revealed that ICT, particularly email, internet access, and institutional intranets, significantly enhanced the speed and efficiency of knowledge sharing among staff. A study by Eze et al. (2018) compared ICT adoption in public and private universities in Nigeria. It found that private universities had better infrastructure and faster adoption of ICT tools for KM, but both sectors faced similar human capital challenges. The study recommends capacity-building initiatives as a top priority. A survey conducted by Mutula & Wamukoya (2009) across five Kenyan universities indicated that though institutions invested in ICT tools, the lack of strategic alignment with KM goals led to limited effectiveness which means ICT tools such as repositories, portals, and e-learning platforms were

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found to be underutilized due to policy constraints and a lack of awareness.

Ajayi, et al (2008) examined ICT deployment in Nigerian Polytechnics. Using descriptive statistics from data collected from five Polytechnics in Southwest Nigeria, they found that ICT tools were more commonly used for administrative tasks than for collaborative knowledge creation or learning. The study emphasized the importance of training, supportive policies, and local content development to bridge the knowledge gap. Ogbomo & Ogbomo (2012) investigated KM practices among academic staff in Delta State University. The study used a mixed-methods approach and concluded that challenges such as insufficient ICT infrastructure and poor ICT literacy were reported. According to Ngoepe & Ngulube (2013), South African universities that adopted structured digital repositories and integrated knowledge portals experienced increased knowledge reuse and retention. The study used case studies and interviews, highlighting that institutional culture and leadership support were key drivers of ICT-enabled KM success.

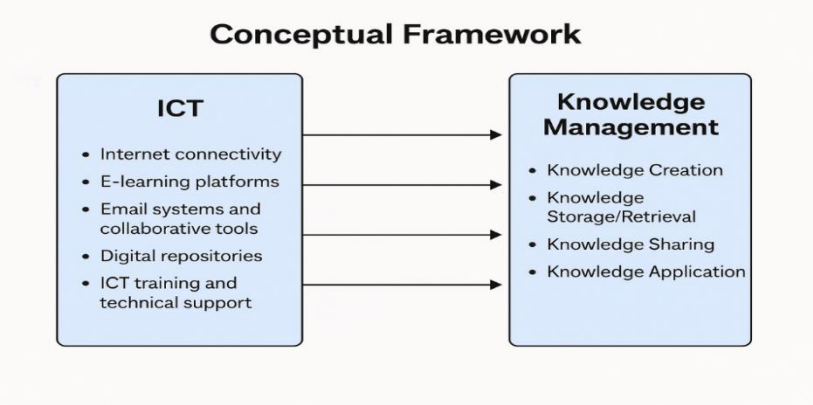
Conceptual Framework

The conceptual framework for this study is anchored on the interrelationship between Information and Communication Technology (ICT) and Knowledge Management (KM) processes. It illustrates how various ICT tools and platforms influence the creation, storage, sharing, and application of knowledge within tertiary institutions.Below are the key components of the conceptual framework.

1. ICT Tools and Infrastructure as Independentvariables: whichincludes the hardware, software, networks, and digital platforms used within the Polytechnics.

2. Knowledge Management Process as dependentvariables:which includethe creation, storage, sharing, and application of knowledge used within the Polytechnics.

3. Mediating Variables:which includes ICT literacy and competency of staff and students, Organizational culture and policies, and Technical support and training.



III. RESEARCH HYPOTHESES

H1: There is a significant relationship between ICT availability and knowledge creation in tertiary institutions.

H2: ICT positively influences the effectiveness of knowledge sharing among academic and administrative staff.

H3: ICT competence among users enhances knowledge application for decision-making and innovation.

IV.RESEARCH METHODOLOGY

Descriptive research and enquiring technique using a well-structured questionnaire was used for data collection. This is because the study is descriptive in nature. Two tertiary institutions in Jigawa state were

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selected. A total of 364 sample size were randomly selected and was analysed using Krejcie and Morgan, (1970) formula table, out of the total population of 7,399 for both institutions, Federal Polytechnic Kazaure and Jigawa State Polytechnic Dutse. The participants were drawn from academic staff and students. Data was obtained from academic /non-academic staff, 100 drawn among lecturers/administrative staff from the different tertiary institution as well as 264 full time students from the two tertiary institutions. Acombination of stratified and purposive sampling techniques was employed. Stratified sampling was used to ensure adequate representation of different groups within the target population. The population was first divided into distinct strata based on institutional type (federal, state,), staff category (academic and non-academic), and students.

V. RESULT AND DATA ANALYSIS

For the purpose of data analysis, statistical Package for Social Sciences (SPSS) software V. 22.0 was employed to assess the reliability and validity of the study instrument and the data analysis.

Table 1: Respondents Demographic Characteristics of Federal Polytechnic Kazaure

S/NO.	NAME/ITEM	STAFF/STUDENTS NUMBER
1.	Academic Staff	212
2.	Non-Academic Staff	144
3.	Male Students	437
4.	Female Students	231
	TOTAL	**668**

Source: Field Survey, 2025.

Table 2: Respondents Demographic Characteristics of Jigawa State Polytechnic Dutse

S/NO.	ITEM	STAFF/STUDENTS NUMBER
1.	Academic Staff	237
2.	Non-Academic Staff	97
3.	Male Students	3,994
4.	Female Students	2,047
	TOTAL	**6,375**

Source: Field Survey, 2025.

Table 3: What are the benefits of ICT facilities and knowledge management in TIs?

S/N	ITEM	A	SA	DA	SDA
1.	Do you have any internet enable device such as PC, Laptop or mobile internet support gadget?	**10**	**75**	**9**	**6**
2.	Do you have active email address? For educational purpose?	**15**	**70**	**5**	**10**
3.	Do you know how to operate ICT device or equipment effectively to access the internet?	**12**	**59**	**20**	**9**
4.	Do you often use ICT device or machines for educational purpose?	**20**	**60**	**13**	**7**
5.	Do you prefer online learning/training to conventional classroom learning?	**18**	**55**	**15**	**12**

Source: Field Survey, 2025.

It is obvious that 70% of the respondents agreed that they have email address, 75% of the respondents agreed they have PC, laptop or mobile internet support gadget, 59% of the respondents affirmed that they can effectively operate ICT devices to access the internet, 60% of the respondents often used ICT device for education purposes, and 55% preferred online learning/training to conventional classroom learning.

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Table 4. What are the key functions of knowledge management and ICT equipment in TIs?

S/N	ITEM	A	SA	DA	SDA
1.	Inability to effectively operate ICT devices makes e-learning tedious.	**5**	**80**	**5**	**10**
2.	Some staff and students do not know how to use ICT tools for learning purpose.	**20**	**60**	**10**	**10**
3.	Inequality of access to technology is an earlier challenge to ICT base learning in tertiary institution.	**15**	**65**	**11**	**9**
4.	Students of tertiary institutions in Nigeria are not allowed to have easy access to available internet facilities in school.	**15**	**55**	**16**	**14**
5.	Students spend most of their time online engaging and making new friends rather than spend it doing their assignment.	**20**	**80**	**-**	**-**

Source: Field Survey, 2025.

The responses concerning the use of ICT learning tools by staff and students from the above table reveals that (80%) of the respondents strongly agree that students are not allowed access to internet facilities in tertiary institutions. 60% of the respondents strongly agreed that inability to effectively operate ICT make e-learning tedious, 65% of the respondents strongly agreed that inequality of access to technology is a prior challenge to ICT base learning in tertiary institution, 80% of the respondents strongly agreed that students spend most of their time online engaging and making new friends rather than spend it doing their research and assignments. Whereas, 55% of the respondents strongly agreed that most staff and students are not allowed to access the available internet services in their institutions.

Table 5: What are the challenges of implementing ICT tools and knowledge management in TIs?

S/N	ITEM	A	SA	DA	SDA
1.	Students are restricted from using available ICT tools in tertiary institution.	**67**	**25**	**7**	**-**
2.	ICT learning facilities and equipment in tertiary institutions are not often replaced with latest technology.	**15**	**55**	**30**	**-**
3.	Tertiary institutions lack adequate ICT tools to support online learning	**12**	**68**	**17**	**3**
4.	Inadequate financial provision hinders improvement in ICT earning.	**30**	**55**	**15**	**-**
5.	Available ICT equipment and facilities are not well maintained.	**20**	**70**	**10**	**-**

Source: Field Survey, 2025.

Responses indicated that 67% of the respondents agree that ICT tools in Nigerian tertiary institutions are not made available to the students. 55% of the respondents strongly agree that ICT learning facilities and equipment in tertiary institutions are not often replaced with latest the technology. 68% of the respondents strongly agree that tertiary institutions lack adequate ICT tools to support online learning. Whereas, 55% of the respondents strongly agree that inadequate financial provision hinders improvement in ICT learning and 70% strongly agree that available ICT equipment and facilities are not well maintained.

Table 6: How can knowledge management be improved through ICT based learning in TIs?

S/N	ITEM	A	SA	DA	SDA
1.	ICT based learning can overcome barriers of geographical location to teaching and learning.	**18**	**52**	**20**	**10**

2.	The aim and objectives of tertiary education can be achieved more efficiently with ICT based learning.	**25**	**75**	**-**	**-**
3.	Tutors and learners in tertiary institutions can easily evaluate themselves using ICT based educational tools.	**20**	**68**	**12**	**-**
4.	ICT based learning can provide flexibility and remove inequality because it can be accessed anytime, anywhere and by anyone.	**25**	**75**	**-**	
5.	With ICT based learning, innovative and creative learning and teaching is possible.	**25**	**55**	**20**	**-**
6.	ICT promotes collaborations among research institutions.	**18**	**72**	**10**	**-**

Source: Field Survey, 2025.

Responses above indicates that 72% strongly agreed that ICT promotes collaborations among research institutions, 68% strongly agreed that tutors and learners in tertiary institutions can easily evaluate themselves using ICT based educational tools and the same is true for those who strongly agreed that ICT based learning can provide flexibility and remove inequality because it can be accessed anytime, anywhere and by anyone. 75% strongly agreed that ICT based learning can provide flexibility and remove inequality because it can be accessed anytime, anywhere and by anyone. 75% of the respondents strongly agreed that the aim and objectives of tertiary education can be achieved more efficiently with ICT based learning. 55% of the respondents strongly agreed that with ICT based learning, innovative and creative learning and teaching is possible and 52% of the respondents strongly agreed that ICT based learning will eliminate the issue of geographical location to teaching and learning.

VI. RESEARCH FINDINGS

Findings revealed the needs of the stakeholders in tertiary institutions to give attention concerning the use of ICT facilities and equipment in carrying out learning and teaching activities. The participants, through their responses, indicated that the awareness, knowledge for the use of ICT facilities for learning is highly needed among staff and students. The attitudes of staff and students to the use of ICT are not impressive. There are challenges of using available ICT tools in tertiary institutions as majority of the respondents reveals that they do not have access to the use of internet made available by their institutions for their teaching and learning activities.

VII. CONCLUSION

Users have varied levels of competencies when it comes to ICT use. There is a need to establish general guidelines for ICT use in order to positively propel KM for competitive advantage of (TIs). The adoption of KM practices is critical for fostering innovation, improving institutional memory, and enhancing learning outcomes. Many Nigerian polytechnics still face challenges in implementing structured KM frameworks, often relying on informal methods of knowledge sharing, which are inefficient and unsustainable.

VIII. RECOMMENDATIONS

1. Staff and students in tertiary institutions should be encouraged to acquire the necessary skills to operate and use ICT facilities and equipment in carrying out e-learning.

2. The management of tertiary institutions in Jigawa state should endeavour to grant access to students to the available internet network on campus. This will motivate students to do their assignment using e materials online.

3. Out of date ICT facilities and equipment should be replaced with modern technology.

4. The government should endeavour to provide funds to tertiary institutions for the purchase of ICT equipment. Also, the management of tertiary institutions in Nigeria should be able to generate fund internally and channel some percentage to funding ICT facilities.

5. The culture of maintenance should be adopted by management of tertiary institutions to ensure that the available ICT facilities and equipment are always in good working conditions.

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