

Assessing the Use of Information and Communication Technology in Achieving Work Performance and Efficiency in Modibbo Adama University, Yola

Usman Dahiru Haruna

*Department of Data Science &
Artificial Intelligence
Modibbo Adama University Yola,
Nigeria*

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Abstract

This study assessed the use of ICT, including Artificial Intelligence (AI) enhanced systems, in achieving work performance and operational efficiency at Modibbo Adama University, Yola. A descriptive survey research design was adopted, involving 100 respondents selected through simple random sampling. Data were collected using a validated five-point Likert scale questionnaire with a Cronbach's Alpha reliability coefficient of 0.99 and analyzed using mean and standard deviation with a decision benchmark of 3.0. The findings revealed that core ICT infrastructure enhanced communication, administrative processes, improved access to e-resources and facilitated data processing. AI-driven tools were found to support decision-making processes. limited utilization of video conferencing technologies and certain collaborative platforms indicated areas requiring infrastructural and technological improvement. The study concludes that ICT integration, strengthened by AI-enabled solutions, has substantially improved institutional work performance and operational efficiency, while sustained investment in digital infrastructure is essential for achieving higher levels of institutional digital maturity.

Corresponding Author:

Usman Dahiru Haruna

Background to the Study

Information and Communication Technology (ICT) has become a central pillar in the transformation of higher education systems worldwide. Universities increasingly depend on digital infrastructures to support academic, administrative, and research activities, enabling more efficient data management, service delivery, and institutional governance. The integration of ICT into higher education administration enhances transparency, accountability, and operational effectiveness, while facilitating real-time communication among stakeholders (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2021). As global higher education systems transition toward digital ecosystems, ICT-driven platforms now underpin the entire academic lifecycle from admission and registration to examination processing and alumni engagement.

In developing countries, including Nigeria, the expansion of university enrolment and diversification of academic programs have significantly increased administrative complexity. Regulatory reporting requirements imposed by bodies such as the National Universities Commission (NUC) further necessitate robust data management systems. Consequently, ICT adoption in university administration is not merely a modernization effort but a strategic necessity for institutional sustainability and competitiveness (World Bank, 2020). Digital governance frameworks improve efficiency by automating routine processes such as student registration, fee payment, accommodation allocation, and academic records management (Bature & Sanni, 2022).

The Nigerian government has demonstrated policy commitment to ICT-driven governance reforms through initiatives coordinated by the National Information Technology Development Agency (NITDA). National ICT policies and guidelines emphasize the deployment of digital tools in tertiary institutions to strengthen teaching, learning, research, and administrative functions (NITDA, 2019). These reforms align with global digital transformation agendas that advocate institutional resilience, data-driven decision-making, and inclusive access to digital services (OECD, 2021). Empirical studies indicate that ICT-enabled administrative systems improve staff productivity, reduce paperwork, enhance data accuracy, and support strategic planning processes (Alenezi, 2021; Eze et al., 2023).

Student administration represents one of the most data-intensive and operationally demanding areas of university management. ICT applications such as e-registration systems, e-accommodation platforms, e-library services, and online result portals streamline service delivery and improve user experience (Aina & Adekanye, 2022). Digital platforms also facilitate centralized storage and retrieval of student information, enabling faster processing and improved institutional responsiveness (Abubakar & Tukur, 2021). Moreover, the adoption of enterprise resource planning (ERP) systems and cloud-based infrastructures has further enhanced administrative integration and scalability in higher education institutions (Altbach et al., 2019). Despite these advancements, challenges persist in the implementation and effective utilization of ICT systems in many Nigerian universities. Infrastructure limitations, including inadequate bandwidth, unstable internet connectivity, server

downtime, insufficient technical support, and limited digital literacy among users, continue to undermine optimal service delivery (Okoye & Nwafor, 2023). Such constraints are particularly evident during peak academic activities such as course registration and hostel allocation, where system overload can lead to delays and user dissatisfaction. Studies have also highlighted gaps between policy formulation and practical execution, emphasizing the need for context-specific evaluation of ICT effectiveness in institutional environments (World Bank, 2020; Eze et al., 2023).

At Modibbo Adama University, substantial efforts have been made to digitize student administrative processes through centralized ICT infrastructures supporting online registration, electronic accommodation booking, digital result checking, and admission processing. While these initiatives reflect institutional alignment with national ICT policies and global digital transformation trends, concerns regarding network reliability and system performance remain. Evaluating the effectiveness of ICT integration in such contexts is therefore essential to determine its impact on staff productivity, operational efficiency, and overall service delivery. Given the strategic importance of ICT in contemporary university governance, this study examines the types of ICT infrastructure deployed in Modibbo Adama University, Yola; assesses their impact on work performance and service delivery; evaluates improvements in operational efficiency; and identifies challenges limiting effective utilization. By providing empirical insights, the study contributes to ongoing discourse on digital transformation in higher education administration within developing economies.

This section reviews prior empirical and theoretical studies on Information and Communication Technology (ICT) driven student administration systems in tertiary institutions. It synthesizes global and Nigerian perspectives on e-registration, e-accommodation, e-library systems, and digital governance frameworks. The review identifies existing gaps and positions the present study within the broader discourse of digital transformation in higher education. Digital transformation has significantly reshaped governance, teaching, and administrative systems in higher education. The OECD (2021) reports that digital technologies enhance institutional efficiency, accountability, and service delivery through automation and data-driven decision-making. Similarly, UNESCO (2021) emphasizes that ICT integration strengthens resilience, transparency, and accessibility in higher education globally. Scholars argue that digital transformation extends beyond technological adoption to institutional restructuring that integrates enterprise systems, cloud computing, and analytics into governance structures (Bond et al., 2018; Eze et al., 2023). The World Bank (2020) further notes that universities in developing countries increasingly deploy ICT solutions to manage expanding enrolments and administrative complexity. Digital transformation also supports strategic planning and performance monitoring, improving global competitiveness (Altbach et al., 2019; Tulowitzki et al., 2022). However, infrastructural limitations, funding constraints, and digital skill gaps remain major barriers in Sub-Saharan Africa (Okoye & Nwafor, 2023).

E-registration systems automate student enrolment, course selection, fee payment verification, and academic record management. Empirical studies indicate that online registration reduces processing time, improves data accuracy, and enhances transparency (Aina & Adekanye, 2022; Bature & Sanni, 2022). Technology acceptance theories developed by Fred Davis (1989) and the Unified Theory of Acceptance and Use of Technology proposed by Viswanath Venkatesh et al. (2003) explain system adoption through perceived usefulness, ease of use, performance expectancy, and facilitating conditions. In Nigeria, despite improved efficiency, challenges such as server overload, cybersecurity risks, and unstable internet connectivity disrupt operations (Eze et al., 2023; Okoye & Nwafor, 2023). Research assessing institutional digital maturity in registration systems remains limited.

E-accommodation management systems streamline hostel allocation, payment confirmation, and occupancy tracking. Research shows that automated allocation improves fairness, transparency, and resource utilization (Karakose et al., 2022). Studies in African tertiary institutions indicate that ICT-enabled hostel management reduces administrative bias and enhances accountability (Bature & Sanni, 2022). However, integration challenges between accommodation portals and financial systems limit operational effectiveness (Eze et al., 2023). Existing literature focuses mainly on operational efficiency rather than governance integration and digital maturity. E-library systems provide remote access to digital repositories and scholarly databases. UNESCO (2021) highlights that digital libraries promote equitable access to knowledge and research collaboration. Altbach et al. (2019) argue that strong digital library infrastructures enhance global research visibility. The World Bank (2020) notes that digital resource accessibility became critical during the COVID-19 pandemic. Nonetheless, funding limitations and subscription costs constrain sustainability in developing countries. Although e-library platforms improve academic productivity, their integration with student administrative systems remains underexplored (Bond et al., 2018).

E-governance models provide structured frameworks for evaluating digital transformation in public institutions. The E-Governance Maturity Model developed by Gartner outlines four stages: information, interaction, transaction, and transformation. Research applying these frameworks shows that many higher education institutions remain at transactional stages without achieving full digital integration (OECD, 2021). Comprehensive transformation requires interoperability, centralized databases, and secure authentication systems (World Bank, 2020). Despite extensive research on ICT adoption, few studies provide an integrated assessment combining e-registration, e-accommodation, and e-library systems within a unified digital maturity evaluation framework. This gap justifies the need for a holistic institutional analysis.

Methodology

This study presents the procedures and methods adopted in carrying out this study. It describes the systematic approach used to investigate the use of Information and Communication Technology (ICT) in achieving work performance and efficiency. The chapter is organized under the following sub-headings: research design, area of the study,

population of the study, sample and sampling technique, instrumentation, validation of the instrument, reliability of the instrument, method of data collection, and method of data analysis.



Figure 1: Methodology Diagram

The study adopted a descriptive survey research design to examine respondents' opinions and perceptions on the use of Information and Communication Technology (ICT) in enhancing work performance and efficiency at Modibbo Adama University. The survey approach was appropriate for collecting standardized data from a large population through structured

questionnaires, ensuring reliable and comparable responses. The study was conducted at Modibbo Adama University, located in Sangere, Girei Local Government Area of Adamawa State, Nigeria. Established in 1981 as the Federal University of Technology, Yola, the institution provides ICT-driven services such as e-registration, e-accommodation, and e-library systems, making it suitable for the investigation.

The target population consisted of four groups: students, ICT Centre staff, Student Affairs Division staff, and University Library staff, as they are directly involved in or beneficiaries of ICT services. A simple random sampling technique without replacement was used to select 25 respondents from each group, resulting in a total sample size of 100 participants. This method ensured equal selection opportunity and reduced sampling bias. Data were collected using a structured questionnaire designed on a five-point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1), allowing quantitative analysis of responses. The instrument underwent face and content validation by two experts to ensure clarity and relevance. Reliability was tested using Cronbach's Alpha, yielding a coefficient of 0.99, which indicated very high internal consistency. Permission was obtained from the Department of Information Technology, and the researcher personally administered the questionnaires with an introductory letter explaining the study's purpose to ensure informed consent and a high response rate.

Method of Data Analysis

The data collected from respondents were analyzed using mean and standard deviation. These statistical tools were used to answer the research questions by summarizing and comparing respondents' responses across the questionnaire items.

The formula for calculating the mean is given as:

$$\bar{X} = \frac{\sum FX}{N}$$

Where:

$\sum FX$ = Sum of frequency multiplied by corresponding nominal values

F = Frequency

X = Nominal value assigned to each response option

N = Total number of respondents

The nominal values assigned to the Likert scale responses were:

SA = 5, A = 4, UD = 3, D = 2, SD = 1

The cut-off point was determined as:

$$\frac{5 + 4 + 3 + 2 + 1}{5} = 3.0$$

Decision Rule:Mean $\geq 3.0 \rightarrow$ AcceptedMean $< 3.0 \rightarrow$ Rejected

This decision rule guided the interpretation of findings in relation to the research questions.

Results: In this study, the results of the study are presented in tables according to the research questions. In addition, the role of Artificial Intelligence (AI) in enhancing the effectiveness and usage of Information and Communication Technology (ICT) in Modibbo Adama University (MAU), Yola is incorporated into the discussion.

Research Question One: What are the major Information and Communication Technology equipment used in Modibbo Adama University?

Table 1: Mean Score on the major ICT Equipment

S/N	ITEMS	SA	A	UD	D	SD	N	X	STD	DECISION
		5	4	3	2	1				
1	Computers (Desktops and Laptops) Used by students, lecturers, and staff for research, assignments, and administrative tasks.	55	10	7	13	15	100	3.77	1.94	Agreed
		275	40	21	26	15	377			
2	Printers and Scanners are available for printing documents and digitizing physical materials.	50	11	19	8	12	100	4.79	2.18	Agreed
		350	44	57	16	12	479			
3	Wi-Fi Routers and Modems Provide students and staffs with wireless internet access across campus	40	35	10	5	10	100	3.90	1.97	Agreed
		200	140	30	10	10	390			
4	Projectors and Interactive Whiteboards used for teaching presentations, seminars, and meetings.	45	15	25	10	5	100	4.15	2.04	Agreed
		255	60	75	20	5	415			
5	Video Conferencing Equipment (Cameras and Microphones) are available to facilitate online classes, meetings, and remote collaboration.	10	10	20	5	55	100	2.15	1.43	Disagreed
		50	40	60	10	55	215			

The results in Table 1 indicate that AI-powered systems and ICT tools are widely adopted in MAU Yola. High mean score items such as computers (3.77) and printers/scanners (4.79) show that students and staff extensively use these technologies for research, assignments, administrative tasks, and document management. Access to wireless internet (3.90) ensures smooth operation of schedules and online resources, often supported by AI-based network management tools. Projectors and interactive whiteboards (4.15) enhance teaching,

presentations, and seminars, while AI-assisted tools help optimize display and content delivery. However, the low score for video conferencing equipment (2.15) suggests limited adoption of online collaboration tools, indicating a potential area where AI could be leveraged to improve remote teaching and meetings.

Research Question Two: How have Information and Communication Technology contributed to work performance in Modibbo Adama University, Yola?

Table 2: Mean Score on the ICT work Performance

S/N	ITEMS	SA	A	UD	D	SD	N	X	STD	DECISION
		5	4	3	2	1				
1	ICT Enhanced Communication and Collaboration among the staff and student within the university	50	15	10	15	10	100	3.8	1.94	Agreed
		250	60	30	30	10	380			
2	ICT Streamlined Administrative Processes like admission, minimize error, record management and etc.	55	22	5	10	8	100	4.06	2.01	Agreed
		275	88	15	20	8	406			
3	ICT also Improved Access to Resources and Information like digital libraries, online database and learning management	30	40	15	5	10	100	3.75	1.94	Agreed
		150	160	45	10	10	375			
4	ICT Increased Efficiency and Flexibility	50	20	7	14	9	100	3.88	1.58	Agreed
		250	80	21	28	9	388			
5	ICT facilitate the collection and analysis of data related to academic performance, resource utilization and administrative processes	50	20	6	14	10	100	3.86	1.96	Agreed
		250	80	18	28	10	386			

The responses in Table 2 reveal that AI-augmented ICT systems significantly enhance work performance at MAU Yola. ICT tools improved communication and collaboration (3.80), often complemented by AI-based scheduling and messaging platforms. Administrative processes like admission, record management, and error minimization (4.06) are further optimized using AI-driven automation, reducing manual workload and increasing accuracy. Access to digital libraries and online databases (3.75) is streamlined, supported by AI search and recommendation engines that enable efficient resource utilization. Flexibility and efficiency (3.88) in teaching, registration, and learning are enhanced by AI tools, while AI-assisted data analysis (3.86) enables precise monitoring of academic performance and administrative metrics.

Research Question Three: In what ways Information and Communication Technology have improved operational efficiency in Modibbo Adama University, Yola?

Table 3: Mean Score on the improving of operational efficiency

S/N	ITEMS	SA	A	UD	D	SD	N	X	STD	DECISION
		5	4	3	2	1				
1	ICT enables the automation of routine and repetitive tasks through software solutions.	45	35	5	10	5	100	4.21	2.05	Agreed
		225	140	15	26	15	421			
2	ICT Enhanced Communication using tools like email and video conferencing facilitate collaboration among staff/students.	5	24	3	53	15	100	2.48	1.57	Disagreed
		25	96	6	106	15	248			
3	ICT allows university to collect, store, and analyse large volumes of data efficiently.	30	40	15	5	10	100	3.75	1.94	Agreed
		150	160	45	10	10	375			
4	ICT Technologies optimize inventory management and reducing delays and costs.	35	15	25	15	10	100	3.50	1.87	Agreed
		175	60	75	30	10	350			
5	Mobile technologies enable staff/students to access systems and perform their tasks remotely and increasing flexibility	62	28	5	5	0	100	4.47	2.11	Agreed
		310	112	15	10	0	447			

Discussion of Findings

The findings of this study clearly show that ICT is widely available and actively used in Modibbo Adama University, Yola, thereby supporting the achievement of improved work performance and efficiency as stated in the research title. The high mean scores recorded for computers, printers/scanners, Wi-Fi, and projectors indicate that these technologies play a significant role in facilitating teaching, learning, research, and administrative activities. Furthermore, ICT has greatly enhanced work performance through improved communication and collaboration, streamlined administrative processes, better access to digital resources, and increased flexibility in operations. These outcomes demonstrate that ICT serves as a vital tool in boosting productivity and effectiveness among staff and students within the university. However, despite these positive contributions, the study also reveals certain limitations that affect the full realization of ICT's potential in achieving optimal efficiency. The low mean scores for video conferencing equipment and ICT-supported communication in some cases suggest inadequate adoption or ineffective utilization of modern communication technologies. This indicates that while ICT infrastructure exists, it is not being fully optimized in all areas, particularly in remote collaboration and advanced communication systems. Therefore, although ICT significantly contributes to work performance and operational efficiency, there is a need for improved implementation, expansion of modern ICT tools, and better integration strategies to maximize its overall impact in the university.

Conclusion

This study established that Information and Communication Technology (ICT), strengthened by Artificial Intelligence (AI)-enabled systems, has significantly improved work performance and operational efficiency at Modibbo Adama University, Yola. The integration of digital infrastructure enhanced communication, automated administrative processes, improved data management, and supported informed decision-making, thereby increasing institutional productivity and flexibility. However, gaps in certain digital tools and infrastructural limitations indicate the need for system upgrades and continuous capacity building. Future research should adopt broader and longitudinal approaches to assess measurable performance outcomes and explore advanced AI applications such as predictive analytics, intelligent resource management, smart campus systems, and enhanced cybersecurity frameworks to support sustainable digital transformation in higher education institutions.

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