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Determination of Relationship Between the Application of ICT and Decision-Making Federal Universities of Northern Nigeria

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Abstract

This study examines how Federal Universities of Northern Nigeria use ICT to make decisions. Technology in data storage, analytics, and decision support systems has transformed decision-making, according to the introduction. We examine how ICT improves decision-making through data gathering, analysis, and communication. The hypothesis is that ICT use does not affect decision-making in these universities. The correlational study included 2,114 workers from all Northern Nigerian Federal Universities. The sample procedure selected states from each geopolitical zone and seven federal institutions from each state. Data was collected using a questionnaire on ICT in Effective Planning (QAICTEP). The null hypothesis was tested using Pearson's Product Moment Correlation coefficient (PPMCC). The respondents' age, experience, and qualifications were diverse. Male respondents outnumbered female respondents 75% to 25%. The null hypothesis was rejected since the PPMCC analysis showed a positive correlation (r = 0.609) between ICT application and decision-making. The conclusion shows that ICT use improves decision-making. ICT infrastructure investments, training, enhanced Decision Support System integration, and strong data governance regulations are recommended. at conclusion, this study sheds light on strategic ICT integration and decision-making at Federal Universities in Northern Nigeria, emphasising the need to improve decision-making quality and efficiency.

Keywords*: Application of ICT, Decision Making, Information and Communication Technology, Northern Nigeria, University.*

Introduction

Information and communications technology (ICT) has transformed decision-making across private and public sector organizations over the past few decades. As Jim and Chen note, advancements in data storage, analytical capabilities, and decision support systems have enabled more evidence-based and data-driven decision making. ICT encompasses technologies like databases, analytics, modeling, dashboards and intelligent systems that empower more informed and strategic choices [10].

At the core, ICT enhances decision making by enabling the collection, analysis and communication of more comprehensive data [15]. Databases allow massive amounts of structured information to be stored, accessed and analyzed [16]. Analytics and modeling techniques help decision makers identify patterns, test scenarios and predict outcomes using that data [9]. Visualizations like dashboards then communicate model outputs and analytical insights in intuitive formats to guide determinations [12].

These capabilities support various decision-making mechanisms. Descriptive analytics using reports, queries and drilling down on databases helps understand what has happened and diagnose issues [10]. Predictive analytics forecasts what could happen in the future, while

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prescriptive analytics suggests optimal decisions or actions [15]. Some systems automate certain decision workflows through programmed algorithms and rules [16].

By leveraging these techniques, ICT facilitates more rigorous analysis of alternatives, trade-offs and risks integral to organizational decisions [13]. Quantitative data and analytical models offset cognitive biases, emotions or gut feelings that can skew human judgments [9]. The enhanced evidentiary base and transparency from ICT also foster greater confidence in and consistency of decisions [12]. Thereby supporting improved institutional strategy, policy and operations.

Hypothesis

Ho_1: There is no significant relationship between the application of ICT and decision making in Federal Universities of Northern Nigeria.

Methodology

The researcher used a correlational research design for this investigation [20]. A non-experimental research method known as correlational analysis measures two variables decision making and evaluates the statistical relationship (also known as the correlation) between them with little to no effort to control unrelated variables. [20], a correlation test uses statistics to identify whether there is a propensity for two (or more) variables or two sets of data to change in a predictable way.

All Federal Universities in Northern Nigeria make up the population for this study. The population is ten thousand five hundred and seventy-seven (10,577) staff. The rule of thumb for estimating sample size from a particular population were used to extract twenty percent (20%) from the whole population for this study, which includes selected employees from Federal Universities in Northern Nigeria. And the sample size is two thousand one hundred and fourteen (2,114) staff.

The technique for sampling the study's sampled states will be chosen using the Dip-Hand sampling method of [21], and respondents will be chosen from each department in the selected states using the proportionate sampling method. The following method was employed:

North Central (6 states), Northeast (6 states), and Northwest (7 states) are the three geopolitical zones that make up Northern Nigeria's 19 states. There will be three students assigned to different sampled states. Each student represented a different zone, and the names of each state were written on pieces of paper and placed in a container for the zone-representing student to choose from.

Students from the Northwest chose three times, while those from the North Central and Northeast each chose twice. Due to the additional variances in one state, three states from the Northwest region, two from the Northeast region, and two from the North Central region will be chosen. Seven federal institutions from each of the chosen states will serve as a representative sample of those states.

The seven federal institutions in each state will be sampled using a proportional sampling method, and respondents were chosen from the four colleges and departments.

The departments and faculties that will be used for the study will be chosen using a Dip-Hand sampling approach. A process known as accidental sampling will be utilized to distribute or allocate copies of the questionnaire to responders.

The questionnaire on application of ICT in Decision Making (QAICTDM) created by the researcher, will be the instrument utilized for the study. The instrument was divided into three parts. The instrument's initial section asks for background information on the respondent status. ICT applications will be covered in the instrument's second section, and management practices and ICT will be covered in its third component. Section C of the instrument will be

divided into seven sections titled effective planning using ICT.

A four-point Likert Rating Scale with the options strongly agree, agree, disagree, and strongly disagree was used to structure the surveys. These will each receive a 4, 3, 2, 1 grade. The pilot study's self-developed questionnaire also covered the use of ICT and effective planning, with reliability coefficient of 0.81. Descriptive statistics of frequency counts and percentages will be used. At a significance level of 0.05, Pearson's Product Moment Correlation coefficient (PPMCC) will be employed to evaluate each of the formulated null hypotheses. Using SPSS version 29, a statistical tool for social science.

Results

Table 1. Demographic Characteristics of the Respondents

AGE		**Frequency**	**Percent**
Valid	20-30	496	23.6
	31-40	350	16.6
	41-50	379	18.0
	51-60	527	25.0
	61 above	352	16.7
YEARS OF EXPERIENCE			
Valid	1-10	525	25.0
	11-20	371	17.6
	21-30	505	24.0
	31 above	703	33.4
QUALIFICATION			
Valid	BSC/BED/BA	175	8.3
	MSc/MA	700	33.3
	PhD	1229	58.4
SEX			
Valid	**Male**	**1578**	**75.0**
	Female	526	25.0

Table 1 indicates the demographic characteristics presented in the age distribution shows a wide range, from young adults in their 20s to older adults over 60 years old. The most frequently observed age group was 51-60 years (25%). About a quarter were also relatively young, aged 20-30 years (23.6%). The sample appears normally distributed across middle age groups, with 16.6% aged 31-40, 18% aged 41-50, and 16.7% aged 61 and above. This broad distribution will allow for comparisons across different age cohorts to determine if age relates to key outcome variables. For example, previous research found healthcare engagement increases with age, so analysis can evaluate if this relationship holds true in the current data. The good representation across age ranges increases generalizability. However, the sample does not reflect national population demographics, which skews younger.

The sample is skewed towards more experienced respondents, with 33.4% having 31+ years of experience. Still, good representation exists across the less experienced groups: 25% have 1-10 years, 17.6% have 11-20 years, and 24% have 21-30 years of experience. The higher proportion of veteran respondents is logical if sampling targeted subject experts. The widespread allows for analysis of differences based on years of professional experience, which may link to domain knowledge and opinions. For instance, attitudes towards healthcare reforms could vary between newcomers and veterans. The limitation is the sample's experience distribution does not match the general population.

The respondents are highly educated overall, with 58.4% holding doctorate degrees and 33.3% having master's qualifications. Only 8.3% have bachelor's degrees and no other categories are represented. This degree distribution aligns with a specialized expert sample but limits generalizability to the broader public. However, the education levels enable examining views by degree type. For example, previous studies found higher education is associated with more progressive attitudes. The current data can test if this relationship endures across master's and PhD respondents. Still, inclusion of more participants with less formal education could have provided better perspective.

The sample has a disproportionate gender ratio, with 75% male and just 25% female respondents. This 3:1 imbalance could result from sampling methods or reflect male dominance in certain professions or positions surveyed. However, the skewed distribution may introduce gender bias in the results. The minority representation of women limits subgroup analysis and comparisons. A more balanced gender ratio would better represent the general population. Additional steps to include more women respondents could have enhanced the integrity and generalizability of the findings.

Table 1. Pearson Product Moment Coefficient of Relationship between Application of ICT and Decision-Making Federal Universities of Northern Nigeria

Variables	**Mean**	**Std. Dev**	**N**	**Df**	**R**	**Prob**	**Decision**
Application of ICT	3.25326	0.54623	2104	2102	0.609*	0.0001	Rejected
Decision making	3.01512	0.701851	2104				

df=2102, r=0.609, Prob=0.0001

Table 2 showed that there is no significant relationship between the application of Information and Communication Technology (ICT) and decision making in Federal Universities of Northern Nigeria. To test this hypothesis, a Pearson Product Moment

Coefficient of correlation was calculated using the same data set as before. The results presented shows that there is a significant positive correlation (r = 0.609*) between the application of ICT and decision making in Federal Universities of Northern Nigeria. This means that as the level of ICT application increases, the level of decision making also increases. The positive r value indicates that higher use of ICT is associated with improved decision-making abilities. The very low p-value (p=0.0001) means this correlation is highly statistically significant and unlikely due to chance. Therefore, we would reject the null hypothesis Ho2, as there is a significant positive relationship between ICT application and decision making.

Discussions

There is significant relationship between the application of ICT and decision making in Federal Universities of Northern Nigeria. Information and communication technology (ICT) adoption in higher education institutions globally has transformed decision-making processes. There is a significant relationship between ICT application and decision-making in federal universities in Northern Nigeria. Learning management systems for e-learning [3]. Library management systems for automating library functions [8]. Student records management information systems [7]. Financial management information systems for accounting, payroll etc. [5]. Websites for information dissemination and service delivery [19]. Despite challenges, ICT application has increased steadily over the years in these institutions [6]. Academic planning and curriculum design [14]. Recruitment, promotion and discipline of staff [7]. Infrastructure development and resource allocation [2]. Budgeting and financial control [5]. Policy formulation on admission, fees, etc. [14]. Student welfare and administration [3]. Relationship between ICT Application and Decision Making. ICT provides accurate and timely data for informed decision-making [6]. ICT enables proper collation, analysis and modeling of data [5]. ICT facilitates forecasting, projections and scenario planning [2]. ICT allows benchmarking with other institutions for realistic goal-setting [8]. ICT enhances stakeholder participation in the decision process through information access [7]. ICT promotes transparency, accountability and data-driven decision culture [19]. ICT aids in monitoring and evaluation of decision outcomes [3].

Federal Universities in Northern Nigeria have made notable strides in integrating ICT into their operations. ICT applications encompass a wide array of functions, including student management systems, research data analysis, digital libraries, e-learning platforms, and administrative systems [1]. This technological infusion has streamlined administrative processes, empowered data analysis capabilities, and facilitated decision-making at multiple levels within the institutions. A critical facet of ICT's contribution to decision-making is the enhanced accessibility and analysis of data. ICT tools provide universities with the ability to efficiently collect, store, and analyze vast amounts of data. This data can range from student performance metrics to financial and resource allocation data [18]. The availability of data analytics tools and reporting systems empowers university decision-makers with the information necessary to make data-driven, informed choices.

ICT has played a crucial role in streamlining administrative processes within Federal Universities of Northern Nigeria. Tasks such as admission and registration, staff management, and resource allocation have seen substantial improvements through ICT applications [4]. These streamlined processes translate into more efficient decision-making as administrators have more time and resources to focus on strategic planning. Effective decision-making often hinges on transparent and efficient

communication among various university departments and stakeholders. ICT tools, such as email, video conferencing, and collaborative software, have significantly improved communication and collaboration capabilities [11]. This fosters a better exchange of ideas and information among decision-makers, which ultimately aids in more informed and timely decisions. Many Federal Universities in Northern Nigeria have implemented Decision Support Systems (DSS) that leverage ICT to provide real-time information and analytics to decision-makers. DSS enables administrators to access critical data and information on-demand, facilitating quicker, well-informed decisions [17].

Conclusion

Based on the results and analysis presented in this study, the following conclusions can be drawn there is a significant positive relationship between the application of ICT and decision-making effectiveness in Federal Universities of Northern Nigeria. The Pearson correlation analysis showed a moderately strong positive correlation ($r = 0.609$, $p < 0.05$) between ICT application and decision-making ratings. This indicates that greater use and integration of ICT facilitates improved decision-making capacity.

Recommendations

Implementation of these recommendations can contribute to the optimization of ICT in decision-making processes within Federal Universities of Northern Nigeria, ultimately enhancing efficiency, transparency, and the overall quality of decisions made by university authorities.

1. Invest in upgrading and expanding ICT infrastructure within Federal Universities. Ensure reliable and high-speed internet connectivity, modern computer systems, and software applications that support various aspects of decision-making processes.
2. Implement regular training programs for university staff and decision-makers to enhance their ICT skills. This includes training on using decision support systems, data analytics tools, and other ICT resources relevant to effective decision-making.
3. Integrate advanced Decision Support Systems (DSS) that leverage data analytics, artificial intelligence, and machine learning. These systems can provide real-time insights, forecasting, and scenario analysis to support informed decision-making.
4. Establish robust data governance policies and practices to ensure the quality, security, and accessibility of data. Efficient data management is critical for accurate and timely decision-making.

Conflict of Interest

There were no conflicts of interest in this work.

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