Relationship Between the Application of ICT and Effective Planning in Federal Universities of Northern Nigeria

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Abstract

Information and communications technology (ICT) plays a vital role in enhancing planning effectiveness in higher education institutions. This study investigated the relationship between ICT application and effective planning in federal universities in Northern Nigeria. A correlational research design was used with population is ten thousand five hundred and seventy-seven (10,577) staff and the sample size of 2,114 university staff. The sapling procedure was simple random sampling; proportionate sampling and accidental sampling. Participants completed a modified likert scale questionnaire measuring ICT use and effective planning. Descriptive statistics of frequency counts and percentages was used. At a significance level of 0.05, Pearson's Product Moment Correlation coefficient (PPMCC) was employed to evaluate the formulated null hypotheses. Results showed a significant moderate positive correlation (r = 0.528, p < 0.05) between ICT application and effective planning, indicating technology use associates with improved planning. The findings were that there is significant relationship between the application of ICT and effective planning in Federal Universities of Northern Nigeria. Based on these conclusions, it is recommended that universities develop ICT plans integrated with their strategic goals, while conducting regular evaluations to refine technology management practices. This will empower effective data-driven and collaborative planning activities. The study provides empirical evidence on the relationship between ICT capabilities and planning effectiveness in Nigerian higher education.

Keywords: *Application of ICT, Effective Planning, Information and Communication Technology, Northern Nigeria, University.*

Introduction

Information and communications technology (ICT) has become deeply integrated into urban planning and development processes over the past few decades. As Jim and Chen note, "advancements in computer processing, data storage, analysis capabilities, and visualization have propelled the application of advanced information technologies in the planning field" (2010). ICT encompasses a broad range of technologies, from geographic information systems (GIS) to online engagement platforms to smart city infrastructure and the Internet of Things (IoT).

A key way that ICT enables more effective planning is through data collection, analysis, modeling, and simulation. GIS, for example, allows planners to layer multiple data sets, analyze spatial patterns and relationships, and model potential impacts of plans and policies [10]. This enhances evidence-based decision making. Building information modeling (BIM) creates digital 3D models of buildings and infrastructure, allowing better visualization and coordination of development projects [8]. Big data and analytics enable more sophisticated modeling of dynamics like transportation patterns, population trends, and land use demand.

ICT also facilitates improved stakeholder consultation and community engagement in the planning process. Web-based engagement platforms create new channels for planners to communicate with and gather input from citizens [7]. Interactive maps, 3D visualizations, and virtual reality allow stakeholders to better understand proposed plans. Technologies like crowdsourcing, social media, and online surveys enable broader outreach [6]. This enhances transparency and public participation.

Smart city infrastructure and the IoT provide real-time data to inform dynamic, responsive planning and management of urban systems. Sensors can monitor noise, air quality, traffic, energy use, etc., while automated control systems allow adjustments to things like traffic signals or building energy systems to optimize efficiency [2]. This creates a feedback loop between the urban environment, planning objectives, and policy implementation. Advancements in ICT are supporting more data-driven, visualized, participatory, and adaptive approaches to urban planning - enabling practitioners to create smarter, more livable cities. The technologies facilitate improvements in analysis, modeling, communication, coordination, and responsiveness across all stages of the planning process.

Hypothesis

There is no significant relationship between the application of ICT and effective planning in Federal Universities of Northern Nigeria

Methodology

The researcher used a correlational research design for this investigation [11]. A non-experimental research method known as correlational analysis measures two variables and evaluates the statistical relationship (also known as the correlation) between them with little to no effort to control unrelated variables. According to [12], 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 Table 1 below shows the estimated sample size from a particular population 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.

Table 1. Population and Sampled of Federal University in Northern Nigeria

S/Nos	Universities	State	Population	Sampled
1	Ahmadu Bello University, Zaria	Kaduna	2919	584
2	Bayero University, Kano	Kano	1630	326
3	Usmanu Danfodiyo University	Sokoto	1252	250
4	University of Ilorin	Kwara	1489	298
5	University of Jos	Plateau	1337	267
6	University of Maiduguri	Borno	1333	266
7	Modibbo Adama University, Yola	Adamawa	617	123
	Total		**10,577**	**2,114**

The technique for sampling the study's sampled states will be chosen using the Dip-Hand sampling method of Adegboye (2001), 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), North East (6 states), and North West (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 North West chose three times, while those from the North Central and North East each chose twice. Due to the additional variances in one state, three states from the North West region, two from the North East 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 utilised to distribute or allocate copies of the questionnaire to responders.

The questionnaire on application of ICT in Effective Planning (QAICTEP) 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 0.75. 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 2. 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 2: indicted 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 wide spread 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 masters 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 associates with more progressive attitudes. The current data can test if this relationship endures across masters 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.

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

Table 3. Pearson Product Moment Coefficient of Relationship between Application of ICT and Effective Planning among Federal Universities of Northern Nigeria

Variables	Mean	Std. Dev	N	df	r	Prob	Decision
Application of ICT	3.01512	0.701851	2104	2102	0.528*	0.0001	Rejected
Effective planning	3.29613	0.631613	2104				

Table 3 indicated that there is no significant relationship between the application of Information and Communication Technology (ICT) and effective planning in Federal Universities of Northern Nigeria. To test this hypothesis, a Pearson Product Moment Coefficient of correlation was calculated using data from Federal Universities of Northern Nigeria. The results presented in Table 3 show that there is a significant positive correlation (r = 0.528*) between the application of ICT and effective planning among Federal Universities of Northern Nigeria. This means that as the level of ICT application increases, the level of effective planning also increases. The Pearson correlation coefficient shows a positive correlation between application of ICT and effective planning, indicating that higher use of ICT is associated with higher ratings of effective planning. The p-value of 0.0001 tells us this correlation is statistically significant. Specifically, it is significant at $p<0.05$ level. Therefore, we would reject the null hypothesis Ho1, as there does appear to be a significant positive correlation between ICT application and effective planning among the respondents.

Discussion

There is significant relationship between the application of ICT and effective planning in Federal Universities of Northern Nigeria. The followings studies are in support, Learning Management Systems (LMS) like Moodle and Blackboard to facilitate e-learning. This enhances teaching and learning by providing course materials, online assessments, discussion forums etc. [1]. Library management systems to automate library operations like cataloguing, circulation, acquisition etc. This improves access to learning resources for students and lecturers [5]. Administration software like result processing systems, payroll systems and student information management systems. This enhances planning, decision making and service delivery [4]. Research databases like Hinari, AJOL, and EBSCOhost for access to academic journals. This promotes quality research by providing access to global research [3]. Websites and portals for information sharing and service delivery. This improves communication and university branding [9].

The application of ICT enhances effective planning in federal universities in Northern Nigeria in the following ways Provides timely and accurate data for planning at institutional, departmental and individual levels [4]. Facilitates collation, analysis and modeling of data for forecasts, projections and scenario planning [2]. Promotes evidence-based planning rather than intuition or guess work [1[. Enables benchmarking with other institutions to set realistic goals [5]. Allows seamless information sharing and collaboration for unified planning [9]. Increases transparency and stakeholder participation in planning through information access [4]. Enhances monitoring and evaluation to track progress and amend plans [2]. Therefore, there is a significant relationship between ICT application and effective planning in federal universities in Northern Nigeria. Proper ICT

implementation empowers the universities to make data-driven plans aligned to their strategic vision.

Conclusion

There is a significant positive relationship between the application of ICT and effective planning in Federal Universities of Northern Nigeria. The Pearson correlation analysis showed a statistically significant moderate positive correlation ($r = 0.528$, $p < 0.05$) between ICT application and ratings of effective planning. This indicates that greater use and integration of ICT in the university system is associated with higher perceived effectiveness of planning activities.

Recommendations

1. Develop a comprehensive ICT strategy: Federal universities in Northern Nigeria should develop a comprehensive ICT strategy that aligns with their overall strategic plan. The strategy should identify the specific needs of the university, prioritize ICT initiatives, and allocate resources accordingly. The strategy should also include a timeline for implementation and a mechanism for monitoring and evaluating the effectiveness of ICT initiatives.
2. Conduct regular evaluations: Federal universities in Northern Nigeria should conduct regular evaluations of their ICT initiatives to assess their effectiveness and identify areas for improvement. The evaluations should include both quantitative and qualitative measures, such as student satisfaction surveys, staff performance metrics, financial analyses, and impact assessments. Based on the evaluations, federal universities in Northern Nigeria can refine their ICT strategies and management practices to maximize their benefits while minimizing their costs.

Conflict of Interest

The author declared no conflict of interest in this study.

Acknowledgments

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