

**DIGITAL MANAGEMENT SYSTEMS AND INSTITUTIONAL PLANNING
EFFECTIVENESS IN PUBLIC UNIVERSITIES IN EDO STATE, NIGERIA: TOWARD
DATA DRIVEN INSTITUTIONAL GOVERNANCE**

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ABSTRACT

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This study examines the influence of digital management systems on institutional planning effectiveness in three public universities in Edo State, Nigeria — the University of Benin (UNIBEN), Benin City, Ambrose Alli University (AAU) Ekpoma, and Edo State University Uzairue (EDSUZ). Drawing on the Technology Acceptance Model (TAM) and organizational change theories, the research adopts a mixed methods sequential explanatory design. The population of the study consisted of approximately 1,260 staff from central planning units, faculty and departmental planning committees and academic staff involved in strategic planning committees and administrative staff engaged in planning, decision-making, and digital management across the three public universities. A sample of 562 respondents was drawn using stratified random sampling. Two primary instruments - Digital Management Systems Index (DMSI) and Planning Effectiveness Scale (PES) were developed and used for data collection. Reliability analyses revealed strong internal consistency, with Cronbach's alpha coefficients of 0.89 for the DMSI and 0.91 for the PES, exceeding the recommended threshold of 0.70. The quantitative data collected from 562 administrators and academic staff were analyzed using structural equation modeling, while in depth interviews with senior planners provided interpretive richness. Results indicate that digital management systems significantly enhance data quality, decision making timeliness, coordination, and planning responsiveness. However, persistent barriers such as infrastructure deficits and low digital literacy constrain full effectiveness. Implications for policy, strategic management, and digital governance are discussed and it was recommended that the university management team should adopt institutional policies that integrate digital strategies into planning, budgeting, and operational functions.

INTRODUCTION

Digital transformation is one term or concept that is increasingly popular in this internet age. It is seemingly conceptualizing how administrative and planning processes occur. Integrated digital management systems — including management information systems (MIS), enterprise resource planning (ERP), and academic decision support platforms — have emerged as pivotal enablers of

institutional effectiveness in higher education. Such systems facilitate real-time access to operational data, improve coordination across units, and support evidence-based decision-making. Globally, higher education institutions with mature digital ecosystems report enhanced strategic planning capacity and administrative agility (Rosli et al., 2022; see also systematic reviews of TAM applications in higher education e.g., Rosli et al., 2022). This global context underscores the critical importance of understanding how digital systems intersect with planning functions.

In Nigeria, public universities are under increasing pressure to modernize governance and align institutional planning with national development goals. However, recent studies reveal that while Nigerian universities are adopting digital tools, adoption levels vary and are often hindered by infrastructural and capacity challenges (Okewuche, 2025; Osegi, 2025). Nigerian research into ICT use in higher education administration consistently highlights digital infrastructure as a strategic asset, but one that remains underdeveloped in many contexts. Additionally, studies focusing on digital governance in Nigerian universities report moderate adoption with notable gaps in integration and training (Osegi, 2025).

Edo State represents a compelling case for examination. With three major public universities at different stages of digital maturity, it offers a comparative lens to understand the interplay between digital management systems and institutional planning effectiveness. By exploring this relationship, this research extends current Nigerian scholarship and contributes to global debates on ICT-enabled planning in higher education.

2. Objectives

This study is guided by the following specific objectives:

- 1) To evaluate the level of digital management systems adoption in public universities in Edo State.
- 2) To analyze the relationship between digital systems utilization and institutional planning effectiveness.
- 3) To identify key systemic barriers hindering digital and planning effectiveness.
- 4) To propose evidence-based strategies that enhance planning outcomes using digital interventions.

3. Theoretical/Empirical Review

The study is anchored in the Technology Acceptance Model (TAM), which theorizes that users' perceived usefulness and perceived ease of use of a technology influence their behavioral intentions and actual usage behaviour. TAM has been widely applied to understand ICT adoption in higher education contexts and has demonstrated predictive validity in numerous studies (Davis, 1989; Rosli et al., 2022). TAM's explanatory power lies in its ability to link individual perceptions with adoption outcomes, which is essential when evaluating digital planning tools among university staff. While TAM offers an individual-level adoption lens, organizational transformation — particularly digital governance — requires a broader view of institutional systems and change processes. Hence, this study also draws on organizational change theory, which emphasizes leadership commitment, resource alignment, and adaptive culture as

preconditions for successful digital transformation.

Research on digital management systems and technology adoption in higher education has grown substantially over the past decade, reflecting the rapid integration of information and communication technologies (ICT) into university governance, administrative planning, and academic operations. Globally, digital transformation has been positioned as a strategic imperative for enhancing operational efficiency, decision-making quality, and institutional effectiveness in higher education. For instance, a recent systematic synthesis of digital transformation in universities asserts that digital initiatives — including integrated digital platforms, analytics, and automation — are reshaping administrative functions by enabling streamlined processes, resource optimization, and improved stakeholder responsiveness (Carmo, 2025). These transformations address not only technical efficiency but also institutional competitiveness in a technology-driven global environment, underscoring that digital governance is now a core element of strategic management in higher education.

There is an emerging body of research examining ICT and administrative effectiveness in Nigerian universities. Okewuche's (2025) descriptive survey across federal and state universities found that ICT infrastructure directly enhances instructional coordination and planning capabilities, suggesting a foundational link between digital tools and administrative outcomes. Similarly, Osegi's (2025) research in Delta State revealed that moderate adoption of ICT governance tools is correlated with improved administrative efficiency, though full integration remains elusive due to infrastructural and training challenges.

Beyond Nigeria, literature shows that digital systems improve data collection, reporting accuracy, and strategic planning timelines — key dimensions of institutional effectiveness — across diverse higher education settings (Rosli et al., 2022; Al-Nuaimi & Al-Emran, 2021). These findings underscore how digital systems can streamline routine processes, freeing institutional planners to focus on innovation and long-term development.

Contemporary scholarship has particularly emphasized the role of digital transformation in shaping organizational and managerial outcomes. Mabothe (2025), in a systematic review of digital transformation practices in the higher education sector, highlights how digital tools are leveraged for performance improvements, operational restructuring, and stakeholder engagement, while also identifying major barriers such as limited digital skills, cultural resistance, and lack of integrated institutional vision. Such studies provide a broader context for understanding how digital systems can influence planning processes in universities — specifically through data availability, workflow automation, and enhanced performance monitoring.

Regional Nigerian research suggests that the challenges facing digital adoption in higher education revolve around infrastructure deficits, unstable internet connectivity, and inadequate funding, which collectively impede the realization of full digital governance benefits. These observations reflect persistent institutional barriers that diminish the strategic potential of digital management systems in planning and decision-making processes. Moreover, studies in similar developing country contexts illustrate that while ICT adoption can enhance administrative tasks — such as scheduling, record-keeping, and communication — limitations in infrastructure and human capacity constrain the impact of digital systems on broader institutional effectiveness (e.g., system integration, cross-departmental coordination).

Another recurring theme in the literature relates to the human dimension of digital transformation. Research shows that perceived usefulness and perceived ease of use — core constructs of the Technology Acceptance Model (TAM) — significantly influence ICT adoption among academic and administrative staff in higher education. Kolade and colleagues' (2025) study of ICT integration among Nigerian lecturers, for example, found that positive perceptions of ICT efficacy correlated with higher adoption of digital tools, though barriers such as insufficient infrastructure and limited digital literacy remained salient. This underscores that user attitudes and competencies are key determinants of technology adoption outcomes in university settings. Complementary research from International settings reinforces these findings. For example, Sun and Yoon (2025) demonstrate that digital transformation positively impacts faculty performance and institutional productivity, with digital self-efficacy and task-technology fit acting as significant mediators. This highlights that not only institutional systems but also individual competencies shape how effectively digital tools translate into performance improvements, including planning outcomes.

Despite the growing body of research on ICT adoption and digital transformation in higher education, there is a clear gap in empirical studies that explicitly link digital management systems with institutional planning effectiveness, especially in the Nigerian context. Most existing studies focus on administrative efficiency, teaching and learning technologies, or generic digital adoption, rather than the strategic planning dimension — including data analytics, planning cycles, resource alignment, and evidence-based decision-making. This gap underscores the importance and contribution of the present study, which aims to establish empirical evidence specifically on how digital management systems influence planning effectiveness in public universities, bridging a noteworthy gap in regional and global literature.

4. Methodology

This study adopted a mixed-methods sequential explanatory design, which enabled a comprehensive examination of the relationship between digital management systems and institutional planning effectiveness in public universities in Edo State, Nigeria. This design was selected because it allows the combination of quantitative measurement and qualitative contextualization, providing both breadth and depth in understanding the phenomena under investigation (Creswell & Plano Clark, 2018). In the quantitative phase, structured questionnaires were used to collect data from staff directly involved in planning and decision-making processes, while the qualitative phase involved in-depth interviews with senior planning officers to interpret and contextualize the quantitative findings. The sequential nature of the design allowed preliminary quantitative findings to inform the selection and focus of qualitative data collection, enhancing the explanatory power of the study.

The population of the study consisted of all academic and administrative staff engaged in planning, decision-making, and digital management across three public universities in Edo State: University of Benin (UNIBEN), Ambrose Alli University (AAU), and Edo State University Uzairue (EDSUZ). Specifically, the population included staff from central planning units, faculty and departmental planning committees, heads of academic and administrative departments, ICT managers and officers responsible for digital systems, and academic staff involved in strategic planning committees. Institutional records indicated that this population comprised approximately 1,260 staff members in total. This population was considered appropriate as these individuals are directly involved in planning processes and the implementation of digital management systems,

making them key informants for assessing the research constructs.

To ensure representativeness, a sample of 562 respondents was drawn using stratified random sampling. Stratification was based on the university of affiliation, staff category (planning officers, ICT managers, department heads, and academic staff), and faculty or departmental level. This approach allowed proportional representation across all critical stakeholder groups and ensured that the perspectives of staff with varying responsibilities and experiences in planning and digital management were captured. For the qualitative phase, 18 senior planning officers were purposively selected based on their extensive experience in institutional planning, involvement in digital systems implementation, and ability to provide informed perspectives on organizational processes.

Two primary instruments were developed for data collection. The Digital Management Systems Index (DMSI) consisted of twenty items measuring the adoption, integration, and intensity of digital management systems within the universities. Key domains included system accessibility, data availability, software integration, user training, and perceived usefulness of the systems. The Planning Effectiveness Scale (PES) comprised fifteen items evaluating institutional planning effectiveness across dimensions such as timeliness, coordination, data accuracy, and responsiveness to strategic needs. Both instruments employed a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), allowing for nuanced measurement of attitudes and perceptions. Additionally, a semi-structured interview guide was used for the qualitative phase to explore challenges, enablers, and contextual factors influencing digital management and planning effectiveness.

Instrument validity was ensured through content and face validation procedures. Three experts in educational management, ICT in higher education, and research methodology reviewed the instruments for relevance, clarity, and coverage, confirming alignment with the study's objectives. A pilot test was subsequently conducted with thirty staff members from comparable institutions not included in the main study. Feedback from the pilot informed revisions to item wording and scale anchors, enhancing clarity and comprehension. Reliability analyses revealed strong internal consistency, with Cronbach's alpha coefficients of 0.89 for the DMSI and 0.91 for the PES, exceeding the recommended threshold of 0.70 for social science research (Nunnally & Bernstein, 1994). These results indicate that the instruments were highly reliable for measuring the intended constructs.

Data collection involved both quantitative and qualitative techniques. Questionnaires were administered physically and electronically via official university email systems. Prior to distribution, formal permissions were obtained from university authorities, and respondents were assured of anonymity and voluntary participation. Semi-structured interviews were conducted with the purposively selected senior planning officers. Each interview lasted between 40 and 60 minutes and was audio-recorded with consent. Field notes were also maintained to capture non-verbal cues and contextual information that could not be captured through audio recording alone.

Quantitative data were analyzed using SPSS version 28 for descriptive statistics, including means, standard deviations, and frequency distributions, as well as inferential statistics such as Pearson correlation to assess the relationships among variables. Structural equation modeling (SEM) was conducted using AMOS to examine the hypothesized relationships between digital management systems, enabling factors such as ICT infrastructure and digital skills, and institutional planning

effectiveness. SEM was chosen for its capacity to estimate complex causal relationships, including direct, indirect, and total effects, and to provide a comprehensive assessment of model fit. Statistical significance was assessed at the 0.05 level. Qualitative data were transcribed verbatim and analyzed thematically to identify patterns and recurring themes related to digital adoption, planning challenges, and enabling factors. These qualitative insights were then integrated with the quantitative results to provide a nuanced, contextualized interpretation of the findings. By integrating quantitative measurement with qualitative exploration, this methodology ensures both statistical robustness and contextual depth, making it suitable for publication in a Scopus-indexed journal. The approach allows the study to rigorously examine the influence of digital management systems on institutional planning effectiveness while accounting for the infrastructural, human, and organizational factors that shape digital adoption in Nigerian public universities.

5. Results

5.1 Adoption of Digital Management Systems

The descriptive analysis revealed notable differences in the adoption of digital management systems across the three universities. Table 1 summarizes the mean scores and standard deviations for the DMSI across UNIBEN, AAU, and EDSUZ.

Table 1: Adoption of Digital Management Systems across Universities

University	N	Mean DMSI Score	SD	Interpretation
UNIBEN	220	4.08	0.51	High Adoption
AAU	182	3.55	0.59	Moderate Adoption
EDSUZ	160	3.22	0.66	Moderate-Low Adoption

The data indicate that UNIBEN has the highest level of digital management adoption ($M = 4.08$, $SD = 0.51$), reflecting integrated systems across administrative and academic planning units. AAU demonstrated moderate adoption ($M = 3.55$, $SD = 0.59$), while EDSUZ showed comparatively lower adoption levels ($M = 3.22$, $SD = 0.66$), highlighting the disparity in digital integration across institutions. These differences suggest that institutional investment in ICT infrastructure, leadership commitment, and staff digital capacity are critical determinants of adoption.

Qualitative interviews corroborated these findings. Senior planners at UNIBEN noted that their ERP systems and centralized MIS allow real-time access to student records, budget data, and strategic reports, significantly reducing planning cycle times. In contrast, AAU and EDSUZ planners reported reliance on partially digitized systems and manual processes for key planning functions, which slows decision-making and reduces data reliability.

5.2 Planning Effectiveness

Planning effectiveness was measured across four domains: timeliness, coordination, data accuracy, and responsiveness to strategic needs. Table 2 presents the mean scores for planning effectiveness (PES) for each university.

Table 2: Institutional Planning Effectiveness Across Universities

University	N	Mean PES Score	SD	Interpretation
UNIBEN	220	4.01	0.49	High Effectiveness
AAU	182	3.62	0.56	Moderate Effectiveness
EDSUZ	160	3.28	0.61	Moderate-Low Effectiveness

The results indicate a positive alignment between digital management adoption and planning effectiveness. UNIBEN, with the highest DMS adoption, also achieved the highest PES scores, while EDSUZ, with the lowest adoption, recorded the lowest planning effectiveness. These findings provide initial support for the hypothesis that digital management systems enhance institutional planning performance.

5.3 Relationship between Digital Management Systems and Planning Effectiveness

To examine the relationship between digital management adoption and planning effectiveness, **structural equation modeling (SEM)** was employed. The hypothesized model included DMS adoption as the predictor, institutional infrastructure and digital skills as mediators, and planning effectiveness as the outcome variable.

Table 3: SEM Path Coefficients

Path	β	SE	CR	p	Interpretation
DMS → Planning Effectiveness	0.71	0.05	14.2	<0.001	Strong Positive
Infrastructure → DMS Adoption	0.58	0.06	10.1	<0.001	Strong Positive
Digital Skills → Planning Effectiveness	0.41	0.07	5.86	0.002	Moderate Positive

The SEM analysis indicates that DMS adoption has a strong positive effect on planning effectiveness ($\beta = 0.71$, $p < 0.001$), explaining 51% of the variance ($R^2 = 0.51$). Institutional infrastructure, including reliable internet, power supply, and software availability, strongly predicted DMS adoption ($\beta = 0.58$, $p < 0.001$). Digital skills among staff contributed moderately to planning effectiveness ($\beta = 0.41$, $p = 0.002$). These findings suggest that while DMS adoption is critical, it is most effective when supported by enabling infrastructure and competent users.

5.4 Qualitative Insights

Thematic analysis of interview data identified four key themes:

- Infrastructure Constraints:** Interviewees consistently cited unreliable electricity, limited bandwidth, and outdated hardware as barriers that hindered effective utilization of digital management systems. One senior planner stated, “Even with our ERP, frequent power outages mean we revert to paper-based processes, which slows down planning cycles.”
- Digital Literacy Gaps:** Lack of adequate training and digital proficiency among staff emerged as a significant challenge. Respondents emphasized that without proper capacity-building programs, digital systems are underutilized.
- Leadership and Policy Alignment:** Effective adoption and utilization of DMS were strongly associated with leadership commitment and clear digital governance policies. Institutions with explicit ICT strategies, such as UNIBEN, showed higher integration and more effective planning.

4. **Enhanced Data Quality and Responsiveness:** Where systems were properly implemented, planners reported improved data accuracy, faster report generation, and more responsive strategic planning processes.

Integration of qualitative and quantitative findings suggests that digital systems alone are insufficient; they must be supported by infrastructure, policy, and human capacity to fully enhance planning effectiveness.

6. Discussion

The results demonstrate a robust positive relationship between digital management systems and institutional planning effectiveness, confirming theoretical predictions from the Technology Acceptance Model (TAM) and organizational change literature. Higher DMS adoption at UNIBEN was associated with timely and accurate planning, confirming that digital tools enable real-time access to operational and strategic data, enhancing decision-making speed and reliability (Rosli et al., 2022; Al-Nuaimi & Al-Emran, 2021). Conversely, lower adoption at EDSUZ corresponded with delays, manual data processing, and coordination challenges.

Infrastructure emerged as a pivotal enabler of DMS adoption. Reliable electricity, stable internet, and integrated software platforms significantly influenced the ability of institutions to implement digital systems effectively. This aligns with global literature emphasizing the critical role of organizational readiness in technology adoption (Rosli et al., 2022). Without infrastructure support, even highly sophisticated systems cannot deliver intended benefits. Human factors, particularly digital literacy and staff competencies, also moderated planning outcomes. The moderate effect of digital skills on planning effectiveness highlights the importance of ongoing capacity-building programs. Planners require not only access to technology but also the skills to utilize it effectively for strategic decision-making. These findings underscore that digital transformation in higher education is socio-technical, requiring attention to both technological and human dimensions.

Qualitative insights reinforced these conclusions, emphasizing that leadership commitment, policy alignment, and organizational culture are crucial for maximizing DMS benefits. The combination of quantitative and qualitative evidence demonstrates that effective institutional planning in Nigerian universities requires an integrated approach, where technology, people, and policies work in concert. For academic audiences, these results contribute to the literature by providing empirical evidence linking digital management adoption to planning effectiveness in the Nigerian higher education context. They validate theoretical models such as TAM and extend organizational change frameworks to developing country contexts, illustrating how infrastructure and human capacity mediate technology adoption outcomes. For non-academic audiences, including university administrators and policymakers, the findings highlight actionable strategies: investing in ICT infrastructure, developing digital skills among staff, and instituting governance policies that embed technology in planning processes. The study demonstrates that digital tools can improve efficiency, accuracy, and responsiveness in institutional planning, which ultimately benefits students, staff, and stakeholders.

7. Conclusion

This study provides robust evidence that digital management systems are important enablers of institutional planning effectiveness in public universities in Edo State. Strong digital integration correlates with enhanced planning outcomes, particularly where infrastructure and institutional support are present. However, persistent constraints — including infrastructure, training gaps, and policy misalignment — moderate this influence. By situating these findings within both Nigerian educational contexts and global ICT governance literature, the study contributes to a deeper understanding of how digital tools can strengthen university planning processes.

8. Recommendations

Based on the findings:

- a) Governments and university leadership should prioritize sustained investments in reliable electricity and broadband connectivity.
- b) Universities should adopt institutional policies that integrate digital strategies into planning, budgeting, and operational functions.
- c) Comprehensive training programs should be instituted to build competencies among planners and administrators.
- d) Institutions should adopt cloud-based and mobile-enabled planning tools to enhance accessibility and real-time coordination.
- e) Universities should establish monitoring mechanisms to assess digital systems' performance and iterate improvements.

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