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The role of technological transformation in enhancing management and administrative decision-making in tertiary institutions in Anambra and Imo states

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ABSTRACT

Technological transformation has increasingly become a critical tool in enhancing management and administrative decision-making in tertiary institutions. The study adopted a quantitative descriptive survey design to examine the role of technological transformation in enhancing management and administrative decision-making in tertiary institutions in Anambra and Imo States. The population comprised students, lecturers, and administrative staff, from which a sample of 2,000 respondents was selected using multistage sampling techniques. Data were collected using a validated and reliable structured questionnaire. Descriptive statistics and inferential analyses were conducted using SPSS. Despite deviations from normality, one-way ANOVA and post-hoc tests were applied due to large sample sizes, ensuring robust and reliable findings. The results show that technological adoption, integration challenges, and the role of technological transformation in enhancing management are similarly perceived by students, lecturers, and administrative staff. Tests of normality revealed significant deviations across all variables ($p = .000$), but large sample sizes [Students ($N = 1000$), Lecturers ($N = 500$), Administrative Staff ($N = 500$)] justified the use of ANOVA. No significant differences were found in technological adoption ($F = 0.134$, $p = 0.875$), key challenges ($F = 0.022$, $p = 0.979$), or management enhancement ($F = 0.023$, $p = 0.977$). Post-hoc tests confirmed minimal mean differences across roles. The findings underscore the importance of institution-wide strategies for digital adoption, training, and infrastructure improvement to maximize the benefits of technological transformation in enhancing effective management and informed administrative decision-making.

INTRODUCTION

Tertiary institutions worldwide are under pressure to optimize administrative operations, enhance decision-making processes, and deliver high-quality academic services amidst increasing student populations and constrained resources. Traditional administrative models, often reliant on manual processes and fragmented systems, hinder responsiveness, data accuracy, and operational efficiency (Mabotha & Ngcamu, 2025). These challenges are further exacerbated by rapid digital disruption requiring universities to innovate their management practices to remain competitive and relevant in the 21st-century knowledge economy (Mohamed-Hashim et al., 2022; Fernández et al., 2023).

Technological transformation in tertiary institutions involves the deliberate integration of digital technologies into administrative and academic activities to enhance efficiency, teaching effectiveness, and informed decision-making. Studies indicate that tools such as Zoom, blended learning platforms, and other ICT applications have significantly reshaped instructional delivery and institutional management by improving accessibility, collaboration, and record management (Enemuo & Muogbo, 2023; Okafor et al., 2023). Research further shows that lecturers' computer literacy and experiential learning strategies play a critical role in effective technology adoption and student engagement (Muogbo et al, 2025). However, evidence also highlights challenges, including

negative academic influences and digital divide issues, particularly where ICT use is poorly regulated or skills are inadequate (Muogbo & Nnoli, 2025; Favour, 2025; Enemuo & Muogbo, 2025).

Additionally, emerging innovations such as AI-driven learning and ICT-supported entrepreneurship education demonstrate the potential of technological transformation to support sustainability, STEM development, and institutional goals when strategically implemented (Muogbo & Obiefoka, 2022; Anakpua et al., 2025; Enemuo et al., 2025). Digital transformation goes beyond simple digitization of documents to include restructuring processes around technology, developing digital culture, and aligning digital strategies with institutional vision and governance (Mabotha & Ngcamu, 2025; Fernández et al., 2023). In this context, digital transformation is both an operational necessity and a strategic enabler for institutional performance.

A central theme in the literature is how digital transformation enhances administrative efficiency. The adoption of enterprise architecture and integrated information systems supports operational optimization by consolidating data flows and reducing redundancy in administrative tasks (Hindarto, 2023). Hindarto's (2023) study emphasizes the role of enterprise architecture as an enabling framework that aligns technology initiatives with institutional processes to improve response times, data accuracy, and workflow coordination. Similarly, systematic reviews highlight that emerging technologies such as cloud computing, artificial intelligence, and big data analytics are crucial for modernizing administrative workflows, from admissions to financial management, enabling institutions to manage complexity and scale services effectively (Mabotha & Ngcamu, 2025; Fernández et al., 2023).

Technological transformation also strengthens decision-making among university leaders by providing real-time analytics, dashboards, and data visualization tools that inform strategic decisions. According to Mabotha and Ngcamu (2025), digital transformation improves performance by restructuring systems and practices to support data-driven decision-making, a key requirement for contemporary higher education management. Without integrated digital systems, leaders face difficulties in accessing accurate, timely information, which can stall strategic initiatives and degrade institutional performance.

Although the focus of this synthesis is management, the literature consistently links academic transformation with administrative improvement. Digital tools in teaching and learning such as learning management systems (LMS) have become essential for broad institutional transformation, connecting administrative processes with academic outcomes (Thai et al., 2021). While LMS adoption is often framed in pedagogical terms, its integration affects scheduling, assessment tracking, and resource allocation, thereby influencing administrative workloads and institutional planning.

Despite the benefits, several studies underscore persistent barriers to effective technological transformation. Inadequate infrastructure, limited funding, and insufficient digital skills among staff and students are frequently cited constraints that impede full realization of digital transformation benefits (Mabotha & Ngcamu, 2025; Mohamed-Hashim et al., 2022). Moreover, resistance to change rooted in institutional culture which can slow adoption of new systems and undermine strategic alignment (Fernández et al., 2023). These challenges suggest that technology alone cannot guarantee improved management; successful transformation requires leadership commitment, capacity building, and robust change management practices that foster digital literacy and stakeholder buy-in. hence the need to examine the role of technological transformation in enhancing management and administrative decision-making in tertiary institutions.

Objectives

1. Evaluate the current state of technological adoption in tertiary institutions in Anambra and Imo states.
2. Identify key challenges in technological integration in tertiary institutions in Anambra and Imo states.

3. Determine the role of technological transformation in enhancing management in tertiary institutions in Anambra and Imo states

Research Questions

1. To what extent has technological adoption been implemented in tertiary institutions in Anambra and Imo states?
2. What are the key challenges affecting technological integration in tertiary institutions in Anambra and Imo states?
3. What is the role of technological transformation in enhancing management in tertiary institutions in Anambra and Imo states?

Hypotheses

1. There is no significant level of technological adoption in tertiary institutions in Anambra and Imo states.
2. There are no significant challenges affecting technological integration in tertiary institutions in Anambra and Imo states.
3. Technological transformation does not significantly enhance management in tertiary institutions in Anambra and Imo states.

2. METHOD

The study adopted a quantitative, descriptive survey research design. This design was appropriate because it enabled the systematic collection of numerical data from a large population to examine patterns, group differences, and relationships concerning technological adoption, integration challenges, and the role of technological transformation in enhancing management and administrative decision-making in tertiary institutions. The study was conducted in tertiary institutions located in Anambra and Imo States, Nigeria. These states were selected because they host a concentration of federal, state, and private tertiary institutions with ongoing digital transformation initiatives in teaching, administration, and management.

The population comprised students, lecturers, and administrative staff in selected tertiary institutions in Anambra and Imo States. These groups were considered relevant because they are the primary stakeholders who interact directly with institutional technologies for learning, teaching, administration, and decision-making. A total sample size of 2,000 respondents was used, consisting of 1,000 students, 500 lecturers, and 500 administrative staff. A multistage sampling technique was employed. First, tertiary institutions were purposively selected based on evidence of ICT usage. Second, stratified sampling was used to categorize respondents into students, lecturers, and administrative staff. Finally, simple random sampling was applied within each stratum to ensure equal chances of participation and adequate representation of each group.

Data were collected using a structured questionnaire developed by the researcher. The instrument was divided into sections covering: the extent of technological adoption (digital platforms, administrative digitization, ICT training, infrastructure, and policy); key challenges affecting technological integration (funding, training, connectivity, resistance to change, and power supply), and the role of technological transformation in enhancing management (administrative efficiency, data management, decision-making, communication, and e-learning outcomes). Responses were measured using a Likert-type scale, enabling the computation of mean scores and suitability for parametric analysis. The questionnaire was subjected to face and content validation by experts in educational management, measurement and evaluation, and information technology. Their feedback ensured clarity, relevance, and alignment of items with the study objectives before final administration.

The reliability of the instrument was established through a pilot study, and internal consistency was determined using Cronbach's Alpha. The results indicated that the instrument was sufficiently reliable for data collection. The questionnaires were administered electronically to respondents with the assistance of trained research assistants. Ethical considerations such as informed consent and confidentiality were strictly observed. Completed questionnaires were retrieved and screened for completeness before analysis. Data were analyzed using Statistical Package for the Social Sciences (SPSS). Descriptive statistics (means and standard deviations) were used to summarize responses. Kolmogorov–Smirnov and Shapiro–Wilk tests were conducted to assess normality. Although the data significantly deviated from normality, one-way ANOVA was applied due to the large sample sizes, which make the test robust to normality violations. Post-hoc tests (Tukey HSD, LSD, Games–Howell, Tamhane, and Dunnett procedures) were conducted to further examine group differences. Estimated marginal means were also plotted to visually illustrate patterns across roles.

3. RESULT AND DISCUSSION

3.1 Extent that technological adoption been implemented in tertiary institutions

Table 1. Tests of Normality for Technological Adoption by Role in Tertiary Institutions.

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Role	Statistic	df	Sig.	Statistic	df	Sig.
My institution uses digital platforms for teaching and learning	Student	.324	1000	.000	.740	1000	.000
	Lecturer	.324	500	.000	.745	500	.000
	Administrative staff	.326	500	.000	.745	500	.000
Administrative tasks (e.g., records, payments) are handled digitally.	Student	.402	1000	.000	.652	1000	.000
	Lecturer	.399	500	.000	.657	500	.000
	Administrative staff	.403	500	.000	.654	500	.000
There is regular training on the use of technology for staff and students	Student	.342	1000	.000	.684	1000	.000
	Lecturer	.340	500	.000	.687	500	.000
	Administrative staff	.337	500	.000	.690	500	.000
ICT infrastructure in the institution is up-to-date and functional.	Student	.299	1000	.000	.712	1000	.000
	Lecturer	.293	500	.000	.705	500	.000
	Administrative staff	.300	500	.000	.712	500	.000

The institution has a clear policy on technology integration.	Student	.262	1000	.000	.842	1000	.000
	Lecturer	.258	500	.000	.843	500	.000
	Administrative staff	.263	500	.000	.842	500	.000

a. Lilliefors Significance Correction

The normality tests in Table 1 shows that all variables significantly deviate from normality across roles (Kolmogorov-Smirnov: Student [.324–.402], Lecturer [.258–.399], Administrative Staff [.263–.403]; Shapiro-Wilk: Student [.652–.842], Lecturer [.657–.843], Administrative Staff [.654–.845], all p = .000). This indicates that responses on technological adoption are not normally distributed. Despite this, ANOVA is suitable for further analysis because the sample sizes are large (Students N=1000, Lecturers N=500, Administrative Staff N=500), and ANOVA is robust to violations of normality under such conditions. Therefore, mean differences between roles can be validly examined to assess variation in technology adoption practices.

Table 2. Tests of Between-Subjects Effects on Technological Adoption by Role in Tertiary Institutions.

Dependent Variable: State of technological adoption in tertiary institutions

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2.052[a]	2	1.026	.134	.875
Intercept	447117.505	1	447117.505	58343.245	.000
Role	2.052	2	1.026	.134	.875
Error	15304.148	1997	7.664		
Total	512692.000	2000			
Corrected Total	15306.200	1999			

a. R Squared = .000 (Adjusted R Squared = -.001)

The ANOVA results in Table 2 indicate no statistically significant differences in technological adoption across roles (F = 0.134, p = 0.875). The corrected model accounts for virtually no variance (R^2 = .000, Adjusted R^2 = -.001), suggesting that role does not meaningfully explain differences in technology adoption. The intercept is significant (F = 58343.245, p < .001), reflecting the overall mean adoption level. These findings imply that Students, Lecturers, and Administrative Staff report similar experiences with digital platforms, administrative digitization, training, ICT infrastructure, and policy clarity. ANOVA was appropriate due to multiple independent groups and numeric dependent measures, despite non-normality, because large sample sizes render the test robust.

Table 3. Multiple Comparisons of Technological Adoption by Role in Tertiary Institutions.

Dependent Variable: State of technological adoption in tertiary institutions

			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
	(I) Role	(J) Role				Lower Bound	Upper Bound
Tukey HSD	Student	Lecturer	.0340	.15163	.973	-.3216	.3896
		Administrative staff	.0780	.15163	.864	-.2776	.4336
	Lecturer	Student	-.0340	.15163	.973	-.3896	.3216

		Administrative staff	.0440	.17508	.966	-.3667	.4547
	Administrative staff	Student	-.0780	.15163	.864	-.4336	.2776
		Lecturer	-.0440	.17508	.966	-.4547	.3667
LSD	Student	Lecturer	.0340	.15163	.823	-.2634	.3314
		Administrative staff	.0780	.15163	.607	-.2194	.3754
	Lecturer	Student	-.0340	.15163	.823	-.3314	.2634
		Administrative staff	.0440	.17508	.802	-.2994	.3874
	Administrative staff	Student	-.0780	.15163	.607	-.3754	.2194
		Lecturer	-.0440	.17508	.802	-.3874	.2994
Tamhane	Student	Lecturer	.0340	.15215	.994	-.3299	.3979
		Administrative staff	.0780	.15171	.939	-.2848	.4408
	Lecturer	Student	-.0340	.15215	.994	-.3979	.3299
		Administrative staff	.0440	.17612	.992	-.3772	.4652
	Administrative staff	Student	-.0780	.15171	.939	-.4408	.2848
		Lecturer	-.0440	.17612	.992	-.4652	.3772
Dunnett T3	Student	Lecturer	.0340	.15215	.994	-.3299	.3979
		Administrative staff	.0780	.15171	.939	-.2848	.4408
	Lecturer	Student	-.0340	.15215	.994	-.3979	.3299
		Administrative staff	.0440	.17612	.992	-.3772	.4652
	Administrative staff	Student	-.0780	.15171	.939	-.4408	.2848
		Lecturer	-.0440	.17612	.992	-.4652	.3772
Games-Howell	Student	Lecturer	.0340	.15215	.973	-.3231	.3911
		Administrative staff	.0780	.15171	.864	-.2781	.4341
	Lecturer	Student	-.0340	.15215	.973	-.3911	.3231
		Administrative staff	.0440	.17612	.966	-.3694	.4574
	Administrative staff	Student	-.0780	.15171	.864	-.4341	.2781
		Lecturer	-.0440	.17612	.966	-.4574	.3694
Dunnett C	Student	Lecturer	.0340	.15215		-.3235	.3915
		Administrative staff	.0780	.15171		-.2784	.4344
	Lecturer	Student	-.0340	.15215		-.3915	.3235
		Administrative staff	.0440	.17612		-.3700	.4580
	Administrative staff	Student	-.0780	.15171		-.4344	.2784
		Lecturer	-.0440	.17612		-.4580	.3700

Based on observed means.

The error term is Mean Square(Error) = 7.664.

The multiple comparisons in Table 3 reveal that the mean differences in technological adoption between Students, Lecturers, and Administrative Staff are minimal (e.g., Student–Lecturer = 0.034, Student–Administrative = 0.078) and statistically non-significant across all post-hoc tests (p-values range from .607 to .994). Confidence intervals also include zero (e.g., Tukey HSD Student–Lecturer [-0.322, 0.390]; Student–Administrative [-0.278, 0.435]), confirming no meaningful differences. These results reinforce the earlier ANOVA finding (F = 0.134, p = .875) that role does not influence technological adoption. Despite non-normal distributions, the large sample sizes justify the use of ANOVA and post-hoc analyses to compare group means reliably.

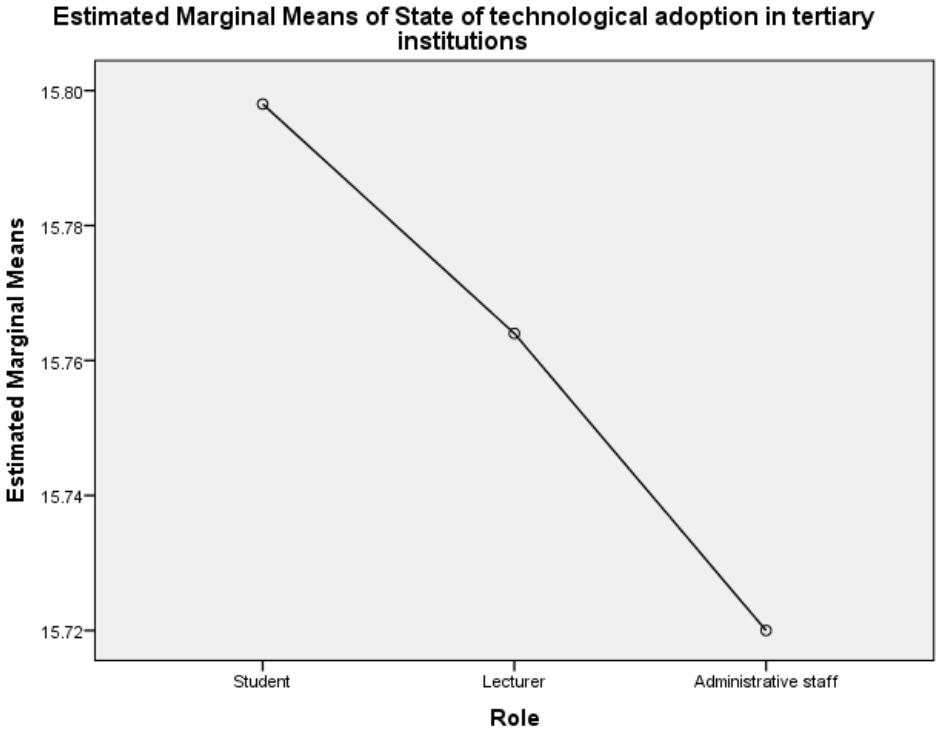

Figure 1. Estimated Marginal Means of Technological Adoption by Role in Tertiary Institutions.

Figure 1 shows slight differences in perceived technological adoption across roles. Students report the highest mean adoption (15.80), followed by Lecturers (15.76), and Administrative Staff (15.72). The narrow range of values indicates minimal variation between groups. This visual pattern aligns with ANOVA results, where differences in means were not statistically significant (F = 0.134, p = 0.875). The nearly parallel line suggests a consistent perception of digital platform use across roles. Consequently, technological adoption appears uniform in tertiary institutions, reinforcing the finding that role does not meaningfully influence the extent of adoption.

3.2 The key challenges affecting technological integration in tertiary institutions

Figure 4. Tests of Normality for Key Challenges Affecting Technological Integration by Role in Tertiary Institutions.

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Role	Statistic	df	Sig.	Statistic	df	Sig.
	Student	.271	1000	.000	.758	1000	.000
	Lecturer	.266	500	.000	.756	500	.000

Poor funding limits access to technological tools	Administrative staff	.271	500	.000	.761	500	.000
Lack of ICT training affects effective integration.	Student	.285	1000	.000	.762	1000	.000
	Lecturer	.285	500	.000	.763	500	.000
	Administrative staff	.285	500	.000	.762	500	.000
Internet connectivity is a major issue in my institution	Student	.257	1000	.000	.776	1000	.000
	Lecturer	.256	500	.000	.778	500	.000
	Administrative staff	.256	500	.000	.774	500	.000
There is resistance to change among staff regarding technology use	Student	.264	1000	.000	.789	1000	.000
	Lecturer	.266	500	.000	.788	500	.000
	Administrative staff	.262	500	.000	.790	500	.000
Power supply instability affects technology use in the institution.	Student	.331	1000	.000	.770	1000	.000
	Lecturer	.335	500	.000	.768	500	.000
	Administrative staff	.335	500	.000	.768	500	.000

a. Lilliefors Significance Correction

Normality tests in Table 4 indicate that all challenge variables significantly deviate from normality across roles (Kolmogorov-Smirnov: Student [.257–.331], Lecturer [.256–.335], Administrative Staff [.256–.335]; Shapiro-Wilk: Student [.758–.789], Lecturer [.756–.788], Administrative Staff [.761–.790], all p = .000). This shows that perceptions of funding limitations, inadequate ICT training, poor internet connectivity, staff resistance, and unstable power supply are non-normally distributed. Despite this, ANOVA is appropriate for further analysis because large sample sizes (Students N=1000, Lecturers N=500, Administrative Staff N=500) make the test robust. Therefore, mean differences between roles can be validly examined to identify which groups face greater technological integration challenges.

Table 5. Tests of Between-Subjects Effects on Key Challenges in Technological Integration by Role in Tertiary Institutions.

Dependent Variable: Key challenges in technological integration in tertiary institutions

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.348[a]	2	.174	.022	.979
Intercept	443663.160	1	443663.160	54808.770	.000
Role	.349	2	.174	.022	.979
Error	16165.211	1997	8.095		
Total	508863.000	2000			
Corrected Total	16165.559	1999			

a. R Squared = .000 (Adjusted R Squared = -.001)

The ANOVA results in Table 5 show no statistically significant differences in perceived challenges among Students, Lecturers, and Administrative Staff (F = 0.022, p = 0.979). The corrected

model explains virtually no variance (R^2 = .000, Adjusted R^2 = -.001), indicating that role does not meaningfully account for differences in challenge perception. The intercept is significant (F = 54808.770, p < .001), reflecting the overall mean level of perceived challenges across all respondents. These findings suggest that all roles experience similar obstacles to technological integration. Despite non-normality, the large sample sizes (Students N=1000, Lecturers N=500, Administrative Staff N=500) justify using ANOVA for group comparisons.

Table 6. Multiple Comparisons of Key Challenges in Technological Integration by Role in Tertiary Institutions.

Dependent Variable: Key challenges in technological integration in tertiary institutions

			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
	(I) Role	(J) Role				Lower Bound	Upper Bound
Tukey HSD	Student	Lecturer	-.0310	.15583	.978	-.3965	.3345
		Administrative staff	-.0190	.15583	.992	-.3845	.3465
	Lecturer	Student	.0310	.15583	.978	-.3345	.3965
		Administrative staff	.0120	.17994	.998	-.4100	.4340
	Administrative staff	Student	.0190	.15583	.992	-.3465	.3845
		Lecturer	-.0120	.17994	.998	-.4340	.4100
LSD	Student	Lecturer	-.0310	.15583	.842	-.3366	.2746
		Administrative staff	-.0190	.15583	.903	-.3246	.2866
	Lecturer	Student	.0310	.15583	.842	-.2746	.3366
		Administrative staff	.0120	.17994	.947	-.3409	.3649
	Administrative staff	Student	.0190	.15583	.903	-.2866	.3246
		Lecturer	-.0120	.17994	.947	-.3649	.3409
Tamhane	Student	Lecturer	-.0310	.15534	.996	-.4025	.3405
		Administrative staff	-.0190	.15606	.999	-.3923	.3543
	Lecturer	Student	.0310	.15534	.996	-.3405	.4025
		Administrative staff	.0120	.17947	1.000	-.4173	.4413
	Administrative staff	Student	.0190	.15606	.999	-.3543	.3923
		Lecturer	-.0120	.17947	1.000	-.4413	.4173
Dunnett T3	Student	Lecturer	-.0310	.15534	.996	-.4025	.3405
		Administrative staff	-.0190	.15606	.999	-.3922	.3542
	Lecturer	Student	.0310	.15534	.996	-.3405	.4025
		Administrative staff	.0120	.17947	1.000	-.4172	.4412
	Administrative staff	Student	.0190	.15606	.999	-.3542	.3922
		Lecturer	-.0120	.17947	1.000	-.4412	.4172
	Student	Lecturer	-.0310	.15534	.978	-.3956	.3336

Games-Howell		Administrative staff	-.0190	.15606	.992	-.3853	.3473
	Lecturer	Student	.0310	.15534	.978	-.3336	.3956
		Administrative staff	.0120	.17947	.998	-.4093	.4333
	Administrative staff	Student	.0190	.15606	.992	-.3473	.3853
		Lecturer	-.0120	.17947	.998	-.4333	.4093
Dunnett C	Student	Lecturer	-.0310	.15534		-.3960	.3340
		Administrative staff	-.0190	.15606		-.3857	.3477
	Lecturer	Student	.0310	.15534		-.3340	.3960
		Administrative staff	.0120	.17947		-.4099	.4339
	Administrative staff	Student	.0190	.15606		-.3477	.3857
		Lecturer	-.0120	.17947		-.4339	.4099

Based on observed means.

The error term is Mean Square(Error) = 8.095.

The multiple comparisons in Table 6 indicate that the mean differences in perceived technological integration challenges between Students, Lecturers, and Administrative Staff are very small (e.g., Student–Lecturer = -0.031, Student–Administrative = -0.019) and not statistically significant across all post-hoc tests (p-values range from .842 to 1.000). Confidence intervals include zero (e.g., Tukey HSD Student–Lecturer [-0.397, 0.335]), confirming no meaningful differences between roles. These results align with the ANOVA findings (F = 0.022, p = 0.979), suggesting that all roles experience similar obstacles such as poor funding, inadequate ICT training, weak connectivity, staff resistance, and unstable power supply in tertiary institutions.

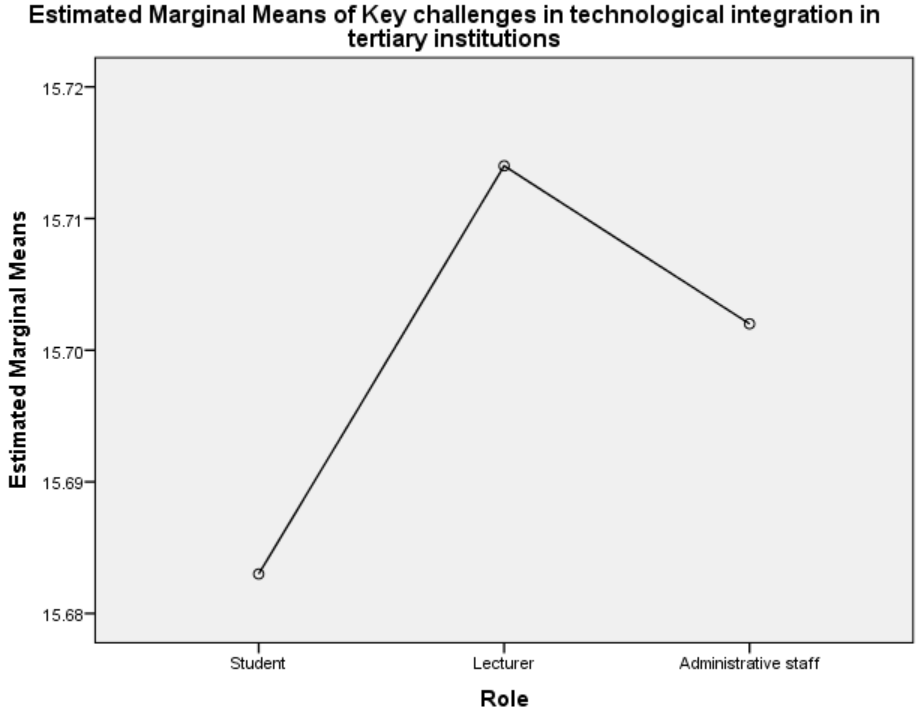

Figure 2. Estimated Marginal Means of Key Challenges in Technological Integration by Role in Tertiary Institutions.

Figure 2 shows that Lecturers perceive slightly higher key challenges in technological integration (15.712) compared to Administrative Staff (15.702) and Students (15.683). The narrow range of means indicates minimal variation among roles. This visual trend aligns with the ANOVA results, which showed no significant difference in mean scores between roles ($F = 0.022$, $p = 0.979$). The pattern suggests that all groups experience similar challenges, including poor funding, limited ICT training, connectivity issues, and power instability. Therefore, interventions to address technological integration challenges should be institution-wide rather than role-specific, targeting systemic factors that affect all stakeholders equally.

3.3 The role of technological transformation in enhancing management in tertiary institutions

Figure 7. Tests of Normality for the Role of Technological Transformation in Enhancing Management by Role in Tertiary Institutions.

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Role	Statistic	df	Sig.	Statistic	df	Sig.
Technology has improved administrative efficiency in my institution.	Student	.291	1000	.000	.697	1000	.000
	Lecturer	.295	500	.000	.700	500	.000
	Administrative staff	.288	500	.000	.694	500	.000
Technology aids in data storage, processing, and retrieval.	Student	.254	1000	.000	.836	1000	.000
	Lecturer	.252	500	.000	.838	500	.000
	Administrative staff	.255	500	.000	.836	500	.000
Decision-making has become easier through digital data systems.	Student	.293	1000	.000	.770	1000	.000
	Lecturer	.295	500	.000	.773	500	.000
	Administrative staff	.290	500	.000	.770	500	.000
Technology has enhanced communication among departments.	Student	.311	1000	.000	.828	1000	.000
	Lecturer	.308	500	.000	.831	500	.000
	Administrative staff	.311	500	.000	.829	500	.000
E-learning has positively influenced student engagement and performance.	Student	.372	1000	.000	.758	1000	.000
	Lecturer	.375	500	.000	.749	500	.000
	Administrative staff	.371	500	.000	.759	500	.000

a. Lilliefors Significance Correction

The normality tests in Table 7 indicate significant deviations from normality across all variables for Students (Kolmogorov-Smirnov [.254–.372], Shapiro-Wilk [.697–.836]), Lecturers (KS [.252–.375], SW [.700–.838]), and Administrative Staff (KS [.255–.371], SW [.694–.836], all $p = .000$). This shows that perceptions of technological transformation's impact on management are non-normally distributed. Despite this, ANOVA can still be applied due to the large sample sizes (Students N=1000, Lecturers N=500, Administrative Staff N=500), as it is robust to violations of normality. Thus, mean differences between roles can be reliably examined to determine how technology affects management functions across groups.

Table 8. Tests of Between-Subjects Effects on the Role of Technological Transformation in Enhancing Management by Role in Tertiary Institutions.

Dependent Variable: How technological transformation enhance management

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.193[a]	2	.097	.023	.977
Intercept	410037.568	1	410037.568	99016.818	.000
Role	.193	2	.096	.023	.977
Error	8269.757	1997	4.141		
Total	463988.000	2000			
Corrected Total	8269.950	1999			

a. R Squared = .000 (Adjusted R Squared = -.001)

The ANOVA results in Table 8 show no statistically significant differences in perceptions across roles ($F = 0.023$, $p = 0.977$). The corrected model explains virtually no variance ($R^2 = .000$, Adjusted $R^2 = -.001$), indicating that role does not meaningfully account for differences in perceived benefits of technological transformation. The intercept is significant ($F = 99016.818$, $p < .001$), reflecting the overall mean perception of technology's positive impact on management. Despite non-normality in the data, the large sample sizes (Students N=1000, Lecturers N=500, Administrative Staff N=500) justify the use of ANOVA, allowing reliable comparison of mean perceptions across roles.

Table 9. Multiple Comparisons of the Role of Technological Transformation in Enhancing Management by Role in Tertiary Institutions.

Dependent Variable: How technological transformation enhance management

	(I) Role	(J) Role	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Student	Lecturer	.0230	.11146	.977	-.2384	.2844
		Administrative staff	.0010	.11146	1.000	-.2604	.2624
	Lecturer	Student	-.0230	.11146	.977	-.2844	.2384
		Administrative staff	-.0220	.12870	.984	-.3239	.2799
	Administrative staff	Student	-.0010	.11146	1.000	-.2624	.2604
		Lecturer	.0220	.12870	.984	-.2799	.3239
LSD	Student	Lecturer	.0230	.11146	.837	-.1956	.2416
		Administrative staff	.0010	.11146	.993	-.2176	.2196
	Lecturer	Student	-.0230	.11146	.837	-.2416	.1956
		Administrative staff	-.0220	.12870	.864	-.2744	.2304
	Administrative staff	Student	-.0010	.11146	.993	-.2196	.2176
		Lecturer	.0220	.12870	.864	-.2304	.2744
Tamhane	Student	Lecturer	.0230	.11152	.996	-.2437	.2897
		Administrative staff	.0010	.11140	1.000	-.2654	.2674

	Lecturer	Student	-.0230	.11152	.996	-.2897	.2437
		Administrative staff	-.0220	.12870	.998	-.3298	.2858
	Administrative staff	Student	-.0010	.11140	1.000	-.2674	.2654
		Lecturer	.0220	.12870	.998	-.2858	.3298
Dunnett T3	Student	Lecturer	.0230	.11152	.996	-.2437	.2897
		Administrative staff	.0010	.11140	1.000	-.2654	.2674
	Lecturer	Student	-.0230	.11152	.996	-.2897	.2437
		Administrative staff	-.0220	.12870	.997	-.3298	.2858
	Administrative staff	Student	-.0010	.11140	1.000	-.2674	.2654
		Lecturer	.0220	.12870	.997	-.2858	.3298
Games-Howell	Student	Lecturer	.0230	.11152	.977	-.2388	.2848
		Administrative staff	.0010	.11140	1.000	-.2605	.2625
	Lecturer	Student	-.0230	.11152	.977	-.2848	.2388
		Administrative staff	-.0220	.12870	.984	-.3241	.2801
	Administrative staff	Student	-.0010	.11140	1.000	-.2625	.2605
		Lecturer	.0220	.12870	.984	-.2801	.3241
Dunnett C	Student	Lecturer	.0230	.11152		-.2390	.2850
		Administrative staff	.0010	.11140		-.2607	.2627
	Lecturer	Student	-.0230	.11152		-.2850	.2390
		Administrative staff	-.0220	.12870		-.3246	.2806
	Administrative staff	Student	-.0010	.11140		-.2627	.2607
		Lecturer	.0220	.12870		-.2806	.3246

Based on observed means.

The error term is Mean Square(Error) = 4.141.

The post-hoc tests in Table 9 reveal negligible mean differences between roles (e.g., Student–Lecturer = 0.023, Student–Administrative = 0.001), with all comparisons statistically non-significant (p-values range from .837 to 1.000) and confidence intervals encompassing zero (e.g., Tukey HSD Student–Lecturer [-0.238, 0.284]). These results align with the ANOVA findings (F = 0.023, p = 0.977), indicating that Students, Lecturers, and Administrative Staff perceive the benefits of technological transformation in management similarly. Large sample sizes (Students N=1000, Lecturers N=500, Administrative Staff N=500) justify using ANOVA and post-hoc tests, confirming that role does not significantly influence perceptions of technology's impact on institutional management.

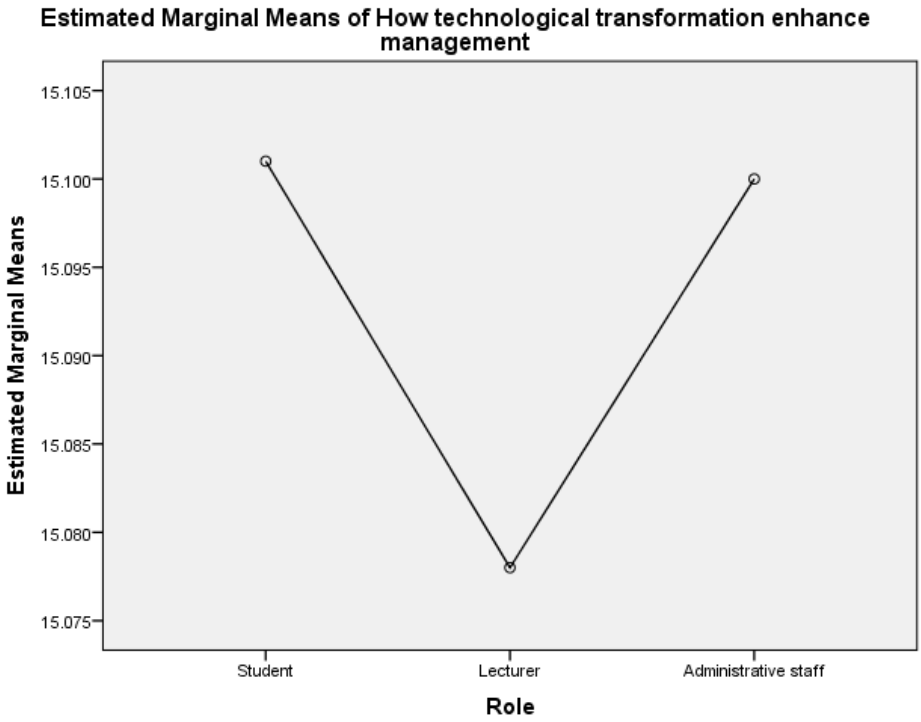

Figure 3: ***Estimated marginal means of the effect of technological transformation on management across roles (students, lecturers, and administrative staff).***

Figure 3 illustrates the estimated marginal means of how technological transformation enhances management as perceived by different roles within the institution. Students and administrative staff report relatively higher and comparable mean scores, indicating a stronger perceived positive impact of technological transformation on management practices. In contrast, lecturers show a slightly lower mean value, suggesting a comparatively reduced perception of management enhancement through technology. The V-shaped pattern implies role-based differences in experience and interaction with technological systems. Overall, the figure suggests that while technological transformation benefits management across all roles, its perceived effectiveness varies, being most pronounced among students and administrative staff.

3.4 Discussion

The results show that technological adoption in tertiary institutions including the use of digital platforms for teaching and learning, administrative digitalization, ICT training, infrastructure functionality, and clear technology policy was consistently perceived across students, lecturers, and administrative staff, with no significant role differences. In a related study, adoption was similarly embedded across institutional roles in higher education contexts, with institutions integrating e-learning systems broadly rather than in isolated silos (Ahmad et al., 2023). This finding agreed with research indicating that e-learning adoption post-COVID-19 became more uniform as universities standardized digital tools to sustain teaching and learning (Zhou et al., 2024). In contrast, other literature has identified role-based disparities in adoption, especially where faculty access, digital skills, or task-technology fit varied significantly across teacher and student groups (Alyoussef, 2023), suggesting that system maturity and institutional policy strength can influence adoption equality.

Regarding key challenges affecting technological integration including limited funding, inadequate ICT training, poor connectivity, resistance to change, and unstable power the study found

no role-based differences in perceptions. This finding agreed with a systematic review showing that infrastructure limitations and resistance to change remain persistent barriers to digital integration that affect all stakeholder groups in higher education equally (Mabidi, 2023). In contrast, other research has documented nuanced views where staff occasionally reported higher resistance due to entrenched pedagogical routines (Bausch et al, 2023), implying that contextual institutional culture can shape perceived challenge intensity. Moreover, the literature consistently highlights infrastructure deficits and unstable connectivity as major barriers to effective technology uptake, reinforcing the present findings (Ntorukiri et al., 2022).

Finally, on the role of technological transformation in enhancing management, the results indicate shared perceptions that technology improves administrative efficiency, data processes, decision-making, communication, and e-learning engagement across roles. This finding agreed with recent literature emphasizing that digital transformation initiatives particularly learning management systems and integrated administrative platforms which enhance operational efficacy across institutional functions (Souli & Pierrakeas, 2025). In contrast, some studies report that differences can emerge where digital literacy or readiness varies among staff versus students, particularly for more advanced systems like analytics dashboards (Molefi & Mutula, 2024). However, the uniformity in your results suggests that in your context, technology benefits are widely recognized regardless of role, aligning well with systematic evidence that institutional digital transformation can deliver broadly shared administrative gains when implementation is strategically supported.

4. CONCLUSION

This study examined the role of technological transformation in enhancing management and administrative decision-making in tertiary institutions in Anambra and Imo States. The findings demonstrate that technological transformation has become an integral component of institutional management, with digital systems supporting administrative efficiency, data storage and retrieval, inter-departmental communication, and evidence-based decision-making across tertiary institutions in the two states. The widespread use of digital platforms suggests that technology is no longer peripheral but central to contemporary higher education management practices. The results further reveal that perceptions of the benefits of technological transformation are largely uniform among students, lecturers, and administrative staff. This indicates that digital management systems are experienced institution-wide rather than being limited to specific roles. Such uniformity underscores the effectiveness of existing digital initiatives in promoting inclusive access to management information and administrative processes, thereby reducing role-based disparities in institutional operations.

Despite significant deviations from normality in response patterns, the large sample sizes justified the use of robust statistical analyses, which consistently showed no meaningful differences in perceptions across roles. This reinforces the conclusion that technological transformation enhances management functions in a holistic manner, particularly in improving administrative coordination, transparency, and responsiveness in decision-making processes. The study concludes that technological transformation has positively strengthened management and administrative decision-making in tertiary institutions in Anambra and Imo States. However, to sustain and deepen these gains, institutional leaders and policymakers should prioritize continuous investment in ICT infrastructure, regular capacity-building programmes, and the development of clear and enforceable digital governance policies. Addressing systemic challenges such as funding constraints, connectivity issues, and power supply instability will further optimize the impact of technological transformation and ensure that tertiary institutions remain adaptive, efficient, and accountable in an increasingly digital higher education environment.

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