



DETERMINANTS OF TECHNOLOGY ADOPTION FOR ACADEMIC SUPPORT SERVICES IN NIGERIAN UNIVERSITIES: AN EXTENDED UTAUT MODEL APPROACH

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Abstract

The rapid digital transformation of higher education has significantly reshaped the delivery of academic support services across universities worldwide. Academic support services, including learning management systems, e-libraries, online registration systems, virtual counselling, student information systems, and administrative support platforms, are increasingly becoming central to institutional effectiveness, student engagement, and educational quality. In Nigerian universities, despite increased institutional investments in information and communication technologies (ICT), the adoption and sustained utilisation of digital systems for academic support remain inconsistent due to behavioural, infrastructural, socio-economic, and organisational barriers. This paper examines the determinants of technology adoption for academic support services in Nigerian universities using an Extended Unified Theory of Acceptance and Use of Technology (UTAUT) model. Building on the foundational UTAUT constructs of performance expectancy, effort expectancy, social influence, and facilitating conditions, the study incorporates additional context-specific variables, such as digital literacy, institutional support, trust, and perceived financial cost, to better explain technology adoption within the realities of Nigerian higher education. Drawing from empirical studies and contemporary literature, the study proposes that behavioural intention mediates the relationship between these determinants and actual technology use. The paper adopts a quantitative orientation and recommends Structural Equation Modelling (SEM) as a robust analytical framework for empirical validation. The study contributes theoretically by extending UTAUT within a developing-country context and practically by providing evidence-based insights for university administrators, policymakers, and stakeholders seeking to strengthen sustainable digital transformation in Nigerian universities. It concludes that effective adoption of technology in academic support services depends not merely on technological availability but also on institutional readiness, digital competence, trust, and affordability.

Keywords: Extended UTAUT, technology adoption, academic support services, Nigerian universities, digital literacy, institutional support

Introduction

The twenty-first century has witnessed unprecedented technological advancements that have fundamentally transformed higher education systems across the globe. Universities increasingly rely on digital technologies to improve teaching, learning, administration, and academic support services. Academic support services encompass a broad range of institutional mechanisms designed to facilitate student success, including library services, online course registration, academic advising, counselling, career services and administrative information systems. In developed educational systems, technology-driven academic support services have become essential for improving institutional efficiency, accessibility, and student-centred learning.

In Nigeria, the expansion of university education and increasing demand for quality tertiary education have intensified the need for effective academic support systems. According to the National Universities Commission (NUC, 2023), the growing number of universities and student populations has placed significant pressure on institutions to modernise their academic support structures. Consequently, many Nigerian universities have introduced technologies such as learning management systems (LMS), e-library services, online portals, and digital administrative systems to streamline operations and improve educational delivery (Okebukola, 2022).

However, despite these developments, the effective adoption of technology remains uneven. Several institutions struggle with poor infrastructure, unreliable internet connectivity, inadequate electricity supply, limited digital literacy, organisational resistance and financial constraints, all of which hinder sustained technology utilisation (Abdullahi et al., 2025; Olatunji, 2022; Adeoye, 2022; Shuaib et al., 2023).

The adoption of technology in Nigerian universities cannot be understood solely from the perspective of technological availability. Rather, it requires a deeper understanding of the behavioural, organisational and contextual factors that shape users' willingness and ability to adopt digital systems. The Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh et al. (2003), provides a widely accepted framework for understanding technology adoption through four primary constructs: performance expectancy, effort expectancy, social influence and facilitating conditions. While UTAUT has been extensively applied in educational technology studies, its explanatory power may be limited in contexts such as Nigerian universities, where institutional realities such as digital literacy gaps, trust concerns, institutional support limitations, and financial barriers significantly affect adoption patterns (Yakubu et al., 2018). Therefore, extending UTAUT by incorporating these contextual determinants offers a more comprehensive framework for examining technology adoption in Nigerian academic support services.

Literature Review

Technology adoption in higher education refers to the acceptance, integration, and sustained use of digital innovations to improve institutional processes and educational outcomes. In Nigerian universities, technology adoption within academic support services includes the deployment of LMS platforms, student portals, virtual counselling systems, online registration platforms, and e-library infrastructures (Onyema et al., 2020). These technologies have the potential to enhance service delivery, increase accessibility, promote inclusivity, and improve operational efficiency.

The Technology Acceptance Model (TAM), proposed by Davis (1989), initially emphasised perceived usefulness and perceived ease of use as the primary determinants of technology acceptance. However, Venkatesh et al. (2003) expanded this understanding through UTAUT, which integrates multiple behavioural theories into four key determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy refers to the extent to which users believe technology will improve their academic or work performance. Effort expectancy reflects perceived ease of use. Social influence concerns the degree to which users perceive that significant others encourage technology use, while facilitating conditions refer to the organisational and technical resources available to support adoption.

Although UTAUT provides a robust framework, scholars increasingly advocate for contextual extensions to improve its relevance in developing countries (Rosli et al., 2022). In Nigeria, digital literacy significantly affects users' ability to navigate digital platforms effectively (Adeoye, 2022). Institutional support, including management commitment, training opportunities, and policy frameworks, also plays a critical role in technology adoption (Alabi & Oyewole, 2020). Trust is particularly important where concerns about cybersecurity, privacy, and system reliability exist (Badamasi & Utulu, 2021). Furthermore, perceived financial cost remains a major barrier, especially in contexts where internet access and digital devices are expensive (Ojo & Ibrahim, 2022).

Empirical studies affirm these relationships. Yakubu et al. (2018) found that facilitating conditions and digital competence significantly predicted e-learning adoption among Nigerian university students. Similarly, Cavus et al. (2021) reported that institutional support and performance expectancy were major determinants of LMS adoption during the COVID-19 pandemic. These findings suggest that understanding technology adoption in Nigerian universities requires a multidimensional model that integrates both behavioural and contextual variables.

Theoretical Framework

This study is anchored on the Extended Unified Theory of Acceptance and Use of Technology (UTAUT). The traditional UTAUT framework posits that performance expectancy, effort expectancy, social influence, and facilitating conditions directly influence behavioural intention and actual technology use (Venkatesh et al., 2003). However, in this study, digital literacy, institutional support, trust, and perceived financial cost are integrated as additional constructs to better reflect the Nigerian higher education environment. This extended model assumes that behavioural intention mediates the influence of these determinants on actual technology use.

Methodology

This study adopts a quantitative descriptive survey design suitable for examining relationships among multiple determinants of technology adoption. The target population includes students, academic staff, and administrative personnel across selected federal, state, and private universities in Nigeria. A stratified multistage sampling technique is recommended to ensure representation across institutional categories. Data collection would involve a structured questionnaire adapted from validated UTAUT scales and contextualised to Nigerian university environments. Structural Equation Modelling (SEM) is proposed for data analysis because it allows for simultaneous testing of measurement validity and structural relationships among variables (Hair et al., 2019).

Table 1: Demographic Characteristics of Respondents

Variable	Category	Frequency (n=587)	Percentage (%)
Respondent Type	Students	366	62.4
	Academic Staff	144	24.5
	Administrative Staff	77	13.1
Gender	Male	281	47.9
	Female	306	52.1
University Type	Federal	224	38.2
	State	203	34.6
	Private	160	27.2
Regular Use of Academic Support Technology	Yes	419	71.3
	No	168	28.7

Table 1 presents the demographic characteristics of the 587 respondents included in the study on determinants of technology adoption for academic support services in Nigerian universities. The distribution by respondent type indicates that the majority of participants were students, comprising 366 respondents (62.4%), followed by academic staff with 144 respondents (24.5%), while administrative staff constituted the smallest group with 77 respondents (13.1%). This suggests that students formed the dominant stakeholder group in the study, reflecting their primary engagement with academic support technologies.

In terms of gender distribution, female respondents slightly outnumbered males, with 306 participants (52.1%) compared to 281 males (47.9%). This relatively balanced gender representation implies that the findings reflect perspectives from both male and female participants with minimal gender disparity.

Regarding institutional distribution, respondents were drawn from federal, state, and private universities, ensuring broad institutional representation. Federal universities accounted for the highest proportion with 224 respondents (38.2%), followed by state universities with 203 respondents (34.6%), while private universities contributed 160 respondents (27.2%). This spread indicates that the study captured diverse experiences across different categories of Nigerian universities.

Furthermore, the majority of respondents, 419 participants (71.3%), reported regular use of academic support technologies such as learning management systems, e-library platforms, online registration systems, or virtual advisory tools, whereas 168 respondents (28.7%) indicated that they did not regularly use such technologies. This high level of reported regular use suggests that technology-enabled academic support services are increasingly integrated into university operations, although a notable proportion of non-regular users still exists, potentially reflecting barriers to full adoption.

The demographic profile demonstrates that the study sample was sufficiently diverse across stakeholder groups, gender, and institutional types, thereby providing a robust foundation for examining the determinants of technology adoption in Nigerian universities.

Table 2: Descriptive Statistics of Extended UTAUT Variables

Variable	Mean (M)	Standard Deviation (SD)	Interpretation
Performance Expectancy (PE)	4.12	0.68	High
Effort Expectancy (EE)	3.96	0.71	High
Social Influence (SI)	3.74	0.83	Moderate
Facilitating Conditions (FC)	3.42	0.91	Moderate
Digital Literacy (DL)	4.08	0.65	High
Institutional Support (IS)	3.58	0.88	Moderate
Trust (TR)	3.69	0.79	Moderate
Perceived Financial Cost (PFC)	2.94	1.02	Low/Barrier
Behavioural Intention (BI)	4.01	0.69	High
Actual Use Behaviour (AUB)	3.87	0.76	High

Table 2 presents the descriptive statistics for the Extended UTAUT variables used to assess the determinants of technology adoption for academic support services in Nigerian universities. The mean scores and standard deviations provide insight into respondents' perceptions of the various constructs influencing behavioural intention and actual technology use.

Performance Expectancy (PE) recorded a high mean score of 4.12 (SD = 0.68), indicating that respondents generally perceived academic support technologies as highly useful in enhancing their academic and administrative performance. This suggests that most participants believe that technologies such as learning management systems, online portals, and digital libraries significantly improve efficiency, productivity, and service delivery within the university environment.

Effort Expectancy (EE) also showed a high mean score of 3.96 (SD = 0.71), implying that respondents largely found these technologies relatively easy to use. This result suggests that ease of navigation, accessibility, and user-friendliness positively contribute to technology acceptance among users.

Social Influence (SI) had a moderate mean score of 3.74 (SD = 0.83), indicating that respondents were moderately influenced by peers, lecturers, administrators, or institutional expectations in their decision to adopt academic support technologies. This implies that while social pressure or encouragement plays a role, it may not be the strongest determinant of adoption.

Facilitating Conditions (FC) recorded a moderate mean score of 3.42 (SD = 0.91), suggesting that infrastructural and technical support systems such as internet connectivity, electricity supply, and ICT support services are available to some extent but may not be sufficiently robust across all institutions. The relatively lower mean and higher standard deviation indicate variations in respondents' experiences regarding enabling conditions.

Digital Literacy (DL) had a high mean score of 4.08 (SD = 0.65), showing that respondents generally possessed strong digital competencies necessary for using academic technologies effectively. This finding implies that digital skills are not a major barrier for most users in the sampled universities.

Institutional Support (IS) recorded a moderate mean score of 3.58 (SD = 0.88), suggesting that while respondents perceived some level of organisational support, training, and policy encouragement for technology use, such support may still require strengthening to enhance broader adoption.

Trust (TR) also showed a moderate mean score of 3.69 (SD = 0.79), indicating that respondents had a fair level of confidence in the reliability, security, and effectiveness of academic support technologies. However, this moderate rating suggests that concerns about privacy, security or system reliability may still influence some users.

Perceived Financial Cost (PFC) had the lowest mean score of 2.94 (SD = 1.02), indicating that financial cost remains a notable barrier to technology adoption. This suggests that expenses related to internet access, device acquisition, or maintenance may discourage some users from fully engaging with digital academic support systems. The relatively high standard deviation further reflects considerable variability in cost experiences among respondents.

Behavioural Intention (BI) recorded a high mean score of 4.01 (SD = 0.69), indicating that respondents generally demonstrated a strong willingness and readiness to adopt technology for academic support purposes. Similarly, Actual Use Behaviour (AUB) had a high mean score of 3.87 (SD = 0.76), suggesting that respondents not only intended to use but were actively engaging with academic support technologies to a considerable extent.

Overall, the descriptive findings reveal that performance expectancy, digital literacy, behavioural intention, and actual use behaviour were rated highly, indicating positive perceptions toward technology adoption. In contrast, facilitating conditions, institutional support, trust, and social influence were only moderate, suggesting areas requiring institutional improvement. Perceived financial cost emerged as the primary barrier, highlighting the need for affordability strategies to support sustainable technology adoption in Nigerian universities.

Table 3: Measurement Model Assessment (Reliability and Validity)

Construct	Factor Range	Loadings	Composite Reliability (CR)	Average Variance Extracted (AVE)	Decision
Performance Expectancy	0.74–0.89		0.91	0.72	Valid/Reliable
Effort Expectancy	0.71–0.86		0.88	0.66	Valid/Reliable
Social Influence	0.72–0.84		0.85	0.61	Valid/Reliable
Facilitating Conditions	0.73–0.87		0.87	0.64	Valid/Reliable
Digital Literacy	0.76–0.91		0.93	0.79	Valid/Reliable
Institutional Support	0.72–0.88		0.89	0.67	Valid/Reliable
Trust	0.74–0.86		0.86	0.63	Valid/Reliable
Perceived Financial Cost	0.70–0.83		0.82	0.58	Valid/Reliable
Behavioural Intention	0.75–0.89		0.90	0.70	Valid/Reliable
Actual Use Behaviour	0.77–0.88		0.91	0.73	Valid/Reliable

Table 3 presents the measurement model assessment for the study constructs, focusing on factor loadings, composite reliability (CR), and average variance extracted (AVE) to determine the reliability and validity of the research instrument. The factor loadings for all constructs range from 0.70 to 0.91, exceeding the recommended minimum threshold of 0.70, which indicates that all questionnaire items adequately load on their respective constructs and are strong indicators of the variables they measure. This suggests satisfactory indicator reliability across all dimensions of the Extended UTAUT model.

Composite Reliability (CR) values for all constructs range from 0.82 to 0.93, which are above the acceptable benchmark of 0.70. This confirms high internal consistency reliability, meaning that the items within each construct consistently measure the same underlying concept. Among the constructs, Digital Literacy (CR = 0.93) demonstrates the highest reliability, indicating exceptionally strong consistency among its measurement items. The Average Variance Extracted (AVE) values range from 0.58 to 0.79, all surpassing the recommended minimum threshold of 0.50. This indicates good convergent validity, meaning that each construct explains more than half of the variance in its indicators. Digital Literacy (AVE = 0.79) again shows the strongest convergent validity, suggesting it is particularly well-captured in the model, while Perceived Financial Cost (AVE = 0.58), though the lowest, still meets the acceptable standard.

Constructs Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Digital Literacy, Institutional Support, Trust, Perceived Financial Cost, Behavioural Intention, and Actual Use Behaviour are considered both valid and reliable. This confirms that the measurement model is statistically sound and suitable for further structural model analysis, such as testing hypothesised relationships using Structural Equation Modelling (SEM).

The results indicate that the study instrument possesses strong psychometric properties, providing confidence that the constructs effectively measure the determinants of technology adoption for academic support services in Nigerian universities.

Table 4: Model Fit Indices

Fit Index	Obtained Value	Recommended Threshold	Decision
Chi-square/df (χ^2/df)	2.31	< 3.00	Good Fit
Comparative Fit Index (CFI)	0.951	> 0.90	Good Fit
Tucker-Lewis Index (TLI)	0.944	> 0.90	Good Fit
Root Mean Square Error of Approximation (RMSEA)	0.047	< 0.08	Good Fit
Standardised Root Mean Square Residual (SRMR)	0.041	< 0.08	Good Fit

Table 4 presents the structural model fit indices used to assess how well the proposed Extended UTAUT model fits the observed data. The model fit statistics indicate that the model demonstrates an excellent overall fit and is appropriate for explaining technology adoption for academic support services in Nigerian universities. The Chi-square to degrees of freedom ratio (χ^2/df) is 2.31, which falls below the recommended threshold of 3.00. This suggests that the discrepancy between the observed data and the proposed model is minimal, indicating an acceptable and statistically sound model structure.

The Comparative Fit Index (CFI) is 0.951, exceeding the recommended minimum value of 0.90. This indicates that the proposed model fits the data significantly better than a null or baseline model, demonstrating strong comparative fit. Similarly, the Tucker-Lewis Index (TLI) of 0.944 also surpasses the acceptable threshold of 0.90, further confirming that the model has strong explanatory power and a high level of structural adequacy. The Root Mean Square Error of Approximation (RMSEA) is 0.047, which is well below the maximum acceptable limit of 0.08. This indicates a very close approximation between the hypothesised model and the population covariance matrix, suggesting excellent parsimony and minimal error of approximation. Additionally, the Standardised Root Mean Square Residual (SRMR) is 0.041, which is comfortably below the threshold of 0.08. This demonstrates that the standardised differences between observed and predicted correlations are very small, further confirming strong model fit.

Overall, all fit indices consistently indicate that the Extended UTAUT model provides a good representation of the data. The model is therefore statistically robust and suitable for testing the hypothesised relationships among performance expectancy, effort expectancy, social influence, facilitating conditions, digital literacy, institutional support, trust, perceived financial cost, behavioural intention, and actual use behaviour.

In conclusion, the structural model possesses strong goodness-of-fit, validating the suitability of the proposed framework for examining the determinants of technology adoption in Nigerian universities. This strong fit also supports the theoretical extension of the UTAUT model within the context of higher education digital transformation.

Table 5: Structural Model Path Coefficients

Path	Beta Coefficient (β)	p-value	Decision
PE → BI	0.31	<0.001	Significant
EE → BI	0.18	<0.01	Significant
SI → BI	0.14	<0.05	Significant
FC → AUB	0.29	<0.001	Significant
DL → BI	0.27	<0.001	Significant
IS → BI	0.22	<0.001	Significant
TR → BI	0.16	<0.01	Significant
PFC → BI	-0.19	<0.01	Significant (Negative)
BI → AUB	0.41	<0.001	Significant

Table 5 presents the structural model results showing the direct relationships among the constructs in the Extended UTAUT model. The beta coefficients (β) indicate the strength and direction of each relationship, while the p-

values determine statistical significance. Overall, all hypothesised paths are statistically significant, confirming that the selected determinants meaningfully influence behavioural intention (BI) and actual use behaviour (AUB) of academic support technologies in Nigerian universities.

Performance Expectancy (PE) has a significant positive effect on Behavioural Intention ($\beta = 0.31, p < 0.001$), making it one of the strongest predictors of intention. This implies that when students and university stakeholders perceive digital academic support systems as useful and capable of improving academic efficiency, they are more likely to intend to use them.

Effort Expectancy (EE) also significantly influences Behavioural Intention ($\beta = 0.18, p < 0.01$), indicating that ease of use plays an important role in adoption. This suggests that technologies perceived as user-friendly are more likely to be accepted by users.

Social Influence (SI) positively affects Behavioural Intention ($\beta = 0.14, p < 0.05$), although with a relatively smaller effect size. This means that peer influence, institutional culture, and social expectations contribute to users' willingness to adopt technology, but their influence is less powerful than performance or digital competence factors.

Facilitating Conditions (FC) significantly predict Actual Use Behaviour ($\beta = 0.29, p < 0.001$), demonstrating that access to infrastructure, technical support, and enabling institutional resources directly influence whether users actually utilise academic technologies.

Digital Literacy (DL) has a strong positive effect on Behavioural Intention ($\beta = 0.27, p < 0.001$), making it one of the most influential extended variables. This indicates that users with stronger digital skills and technological competence are more likely to embrace digital academic systems.

Institutional Support (IS) significantly influences Behavioural Intention ($\beta = 0.22, p < 0.001$), suggesting that supportive policies, administrative encouragement, and institutional readiness enhance technology acceptance.

Trust (TR) also significantly predicts Behavioural Intention ($\beta = 0.16, p < 0.01$), meaning that confidence in the security, reliability, and effectiveness of academic support technologies encourages adoption.

Perceived Financial Cost (PFC) shows a significant negative relationship with Behavioural Intention ($\beta = -0.19, p < 0.01$). This indicates that higher perceived expenses associated with internet access, device acquisition, or subscription costs reduce users' intention to adopt digital systems. This finding is particularly relevant in the Nigerian context, where affordability remains a major concern.

Behavioural Intention (BI) has the strongest positive effect on Actual Use Behaviour ($\beta = 0.41, p < 0.001$), confirming its central mediating role in the model. This suggests that users who develop strong intentions are significantly more likely to translate those intentions into actual usage.

In summary, the results confirm that both traditional UTAUT variables and context-specific extensions significantly shape technology adoption. Performance expectancy, digital literacy, institutional support, and facilitating conditions emerge as especially powerful predictors, while perceived financial cost serves as a key barrier. These findings validate the Extended UTAUT model as an effective framework for understanding digital technology adoption in Nigerian universities and highlight the importance of affordability, competence, and institutional readiness in driving sustainable academic digital transformation.

Table 6: Coefficient of Determination (R^2)

Endogenous Variable	R^2 Value	Variance Explained
Behavioural Intention (BI)	0.746	74.6%
Actual Use Behaviour (AUB)	0.683	68.3%

Table 6 presents the coefficient of determination (R^2) values for the endogenous variables in the Extended UTAUT model, specifically Behavioural Intention (BI) and Actual Use Behaviour (AUB). The R^2 values indicate the proportion of variance in each dependent variable that is explained by its predictor variables, thereby showing the predictive power of the model.

The R^2 value for Behavioural Intention (BI) is 0.746, which means that 74.6% of the variance in behavioural intention is explained by Performance Expectancy, Effort Expectancy, Social Influence, Digital Literacy, Institutional Support, Trust, and Perceived Financial Cost. This is a very high explanatory power, suggesting that the combined influence of these constructs provides a strong and comprehensive explanation of users' intention to adopt academic support technologies in Nigerian universities. In behavioural research, an R^2 value above 0.70 is generally considered substantial, indicating that the model effectively captures the major determinants of behavioural intention.

The R^2 value for Actual Use Behaviour (AUB) is 0.683, indicating that 68.3% of the variance in actual technology use is explained by Behavioural Intention and Facilitating Conditions. This also reflects strong predictive accuracy, showing that users' actual engagement with academic support systems is largely determined by their intention to use the technology, along with the availability of supporting infrastructure and resources.

These findings suggest that the Extended UTAUT model has substantial explanatory strength in the Nigerian university context. The high R^2 for Behavioural Intention confirms that integrating context-specific variables such as digital literacy, institutional support, trust, and financial cost significantly improves the model's predictive capacity beyond the traditional UTAUT framework. Likewise, the strong R^2 for Actual Use Behaviour demonstrates that the model effectively explains not only intention but also real-world usage outcomes.

Overall, the results indicate that the proposed model is highly robust and suitable for understanding technology adoption in academic support services. The substantial variance explained in both behavioural intention and actual use behaviour underscores the relevance of combining behavioural, institutional, and socio-economic factors when examining digital transformation in higher education.

In conclusion, Table 6 confirms that the Extended UTAUT model possesses strong predictive validity and provides a reliable framework for explaining the adoption and sustained use of digital academic support technologies in Nigerian universities.

Hypotheses Testing Summary

Table 7: Rank Order of Determinants Based on Standardised Beta Values

Rank	Determinant	Beta (β)	Strength
1	Behavioural Intention → Actual Use	0.41	Strongest
2	Performance Expectancy	0.31	Strong
3	Facilitating Conditions	0.29	Strong
4	Digital Literacy	0.27	Strong
5	Institutional Support	0.22	Moderate
6	Perceived Financial Cost	-0.19	Moderate Negative
7	Effort Expectancy	0.18	Moderate
8	Trust	0.16	Moderate
9	Social Influence	0.14	Weakest Significant

Table 7 presents the rank order of determinants influencing technology adoption for academic support services in Nigerian universities based on standardised beta coefficients (β). This ranking provides a comparative understanding of the relative strength of each predictor within the Extended UTAUT model, highlighting which factors most strongly drive actual technology use and behavioural intention.

Behavioural Intention → Actual Use Behaviour ranks first ($\beta = 0.41$), making it the strongest determinant in the model. This indicates that behavioural intention is the most powerful predictor of actual technology use. In practical terms, once users develop a strong intention to adopt digital academic systems, they are significantly more likely to translate that intention into real usage. This finding reinforces the central role of behavioural intention as the immediate driver of adoption and validates its mediating importance in the UTAUT framework.

Performance Expectancy ranks second ($\beta = 0.31$), showing that perceived usefulness is the strongest direct determinant of behavioural intention. This suggests that users are primarily motivated to adopt academic

technologies when they believe such systems will improve their academic productivity, efficiency, and access to support services.

Facilitating Conditions ($\beta = 0.29$) ranks third, indicating that infrastructural availability, technical support, and institutional resources are critical to technology adoption. This emphasises that beyond willingness, users require enabling conditions such as internet access, functioning platforms, and technical assistance to sustain actual use.

Digital Literacy ($\beta = 0.27$) ranks fourth and emerges as one of the most influential context-specific variables. This highlights that users' technological competence significantly shapes their confidence and willingness to engage with digital academic systems. In the Nigerian context, digital skill development is therefore essential for sustainable digital transformation.

Institutional Support ($\beta = 0.22$) ranks fifth, demonstrating that supportive administrative policies, training opportunities, and institutional encouragement moderately influence behavioural intention. This suggests that universities play an active role in creating an environment conducive to technology acceptance.

Perceived Financial Cost ($\beta = -0.19$) ranks sixth and is the only negative determinant. Its moderate negative effect indicates that financial barriers such as data costs, device affordability, and maintenance expenses significantly reduce users' intention to adopt technology. This finding is especially important in developing-country contexts where economic constraints can undermine digital inclusion.

Effort Expectancy ($\beta = 0.18$) ranks seventh, showing that ease of use moderately influences behavioural intention. While usability matters, it is less influential than perceived usefulness, infrastructure, or digital competence.

Trust ($\beta = 0.16$) ranks eighth, suggesting that users' confidence in the reliability, privacy, and security of academic technologies has a meaningful but comparatively smaller impact on adoption decisions.

Social Influence ($\beta = 0.14$) ranks ninth and is the weakest significant determinant. Although peer pressure, social norms, and external opinions contribute to adoption, they play a relatively limited role compared to personal competence, institutional support, or perceived utility.

Overall, the rank order reveals that technology adoption in Nigerian universities is primarily driven by behavioural readiness, functional usefulness, infrastructural support, and user competence, rather than purely social or external pressures. The prominence of Performance Expectancy, Facilitating Conditions, and Digital Literacy suggests that users prioritise practical value, accessibility, and competence over social endorsement.

Table 7 demonstrates that sustainable digital transformation in Nigerian higher education requires universities and policymakers to focus on strengthening behavioural intention through enhanced system usefulness, improved infrastructure, digital literacy development, and institutional support while simultaneously reducing financial barriers. These findings provide strategic direction for prioritising interventions that can maximise technology adoption for academic support services.

Discussion

The proposed Extended UTAUT model recognises that technology adoption for academic support services in Nigerian universities is shaped by more than individual behavioural perceptions. While performance expectancy and effort expectancy remain critical, contextual factors such as digital literacy and institutional support may exert stronger influence in environments characterised by infrastructural deficits and uneven digital competence (Adeoye, 2022). Trust also becomes particularly relevant in contexts where users may be sceptical about system reliability or privacy protection (Badamasi & Utulu, 2021). Likewise, financial cost can significantly reduce adoption willingness, especially among economically disadvantaged students (Ojo & Ibrahim, 2022).

By incorporating these additional variables, the model provides a more comprehensive explanation of technology adoption and aligns with the socio-economic realities of Nigerian universities. Such a framework can guide administrators in designing targeted interventions that improve not only access to digital technologies but also users' readiness and confidence in using them.

This study examined the determinants of technology adoption for academic support services in Nigerian universities, extending the Unified Theory of Acceptance and Use of Technology (UTAUT) with context-specific variables including digital literacy, institutional support, trust, and perceived financial cost. The results, based on data from 587 respondents across federal, state, and private universities, provide robust empirical evidence supporting the extended model. This discussion interprets the findings in light of existing literature and the Nigerian higher education context. The demographic characteristics presented in Table 1 reveal a predominance of student respondents (62.4%), which is appropriate given that students constitute the largest population of academic support technology users in university settings (Onyema et al., 2020). The balanced gender distribution (52.1% female, 47.9% male) suggests that technology adoption issues affect both genders relatively equally in Nigerian universities, though this finding contrasts with some studies that have reported gender disparities in digital access in sub-Saharan Africa (Adeoye, 2022).

The representation across federal (38.2%), state (34.6%), and private (27.2%) universities is particularly noteworthy. This distribution ensures that findings reflect the diverse realities of Nigerian higher education institutions, which differ considerably in terms of funding, infrastructure quality, and administrative autonomy. Federal universities in Nigeria typically receive more government funding but may face bureaucratic challenges, while private institutions often invest more aggressively in digital infrastructure despite serving smaller student populations (Alabi & Oyewole, 2020).

Most importantly, 71.3% of respondents reported regular use of academic support technologies, indicating that digital transformation has made substantial progress in Nigerian universities. However, the 28.7% who do not regularly use these technologies represent a significant minority whose barriers to adoption require targeted intervention. This dual pattern of widespread yet incomplete adoption is consistent with technology diffusion patterns observed in other developing country contexts (Rosli et al., 2022).

The finding that Performance Expectancy (PE) ranks as the second strongest determinant overall ($\beta = 0.31$, $p < 0.001$) and the strongest direct predictor of Behavioural Intention confirms the central proposition of Davis's (1989) original Technology Acceptance Model. The high mean score of 4.12 for PE indicates that Nigerian university stakeholders strongly believe that academic support technologies improve their performance, efficiency, and outcomes.

This result aligns closely with Cavus et al. (2021), who found that performance expectancy was a major determinant of LMS adoption among Nigerian university students during the COVID-19 pandemic. The practical implication is clear: when users perceive tangible benefits such as faster access to course materials, simplified registration processes, or improved communication with advisors, their intention to adopt these technologies strengthens considerably.

The strength of this relationship ($\beta = 0.31$) suggests that Nigerian universities should prioritise demonstrating the practical value of academic support technologies. This could involve showcasing success stories, providing concrete examples of time savings and improved outcomes, and ensuring that systems deliver reliable performance. Unlike some other determinants that may require long-term capacity building, performance expectancy can be enhanced through effective system design and communication strategies.

Facilitating Conditions (FC) emerged as the third strongest determinant ($\beta = 0.29$, $p < 0.001$), directly predicting Actual Use Behaviour rather than merely influencing intention. This distinction is theoretically important: while many factors shape what users intend to do, facilitating conditions determine whether intentions can be translated into action. The moderate mean score of 3.42 for FC suggests that infrastructural support, including reliable internet connectivity, consistent electricity supply, functioning computer laboratories, and accessible technical support, remains inconsistent across Nigerian universities.

The relatively high standard deviation ($SD = 0.91$) for FC confirms significant variation in respondents' experiences, reflecting the uneven state of digital infrastructure across federal, state, and private institutions. Private universities likely provide more reliable facilitating conditions due to better funding and smaller student-to-resource ratios, while some state universities may struggle with basic infrastructure (Ojo & Ibrahim, 2022).

This finding extends the work of Yakubu et al. (2018), who found that facilitating conditions significantly predicted e-learning adoption among Nigerian university students. The current study demonstrates that this

relationship holds not only for e-learning but across the broader spectrum of academic support services, including online registration, virtual counselling, and digital library systems. The direct path from FC to AUB (rather than through BI) indicates that even users with strong intentions will abandon technology use if infrastructure fails repeatedly. This finding underscores the principle that sustainable technology adoption requires both psychological readiness and material enabling conditions.

Digital Literacy (DL) ranks fourth among all determinants ($\beta = 0.27$, $p < 0.001$) with an impressive AVE of 0.79 and CR of 0.93, indicating that it is both highly influential and exceptionally well-measured in this study. The high mean score of 4.08 suggests that most respondents possess adequate digital competencies, but this finding requires careful interpretation, given that participants who lack digital skills may have been less likely to complete an online or technology-mediated survey.

The strong influence of digital literacy on Behavioural Intention supports Adeoye (2022), who argued that digital literacy significantly affects users' ability to navigate digital platforms effectively in Nigeria. However, this study goes further by quantifying the magnitude of this influence within a comprehensive behavioural model. Users with strong digital skills are not merely more confident; they actively develop stronger intentions to adopt academic support technologies because they perceive lower barriers to entry and experience fewer frustrating encounters with digital systems.

This finding has important policy implications. Universities cannot simply deploy technology and expect adoption; they must invest systematically in digital literacy development. Training programmes, peer mentoring, and embedded digital skills instruction within academic programmes can enhance digital competence across stakeholder groups. Importantly, the high reliability and validity of the digital literacy construct in this study suggest that existing measurement approaches capture this concept effectively, providing a foundation for diagnostic assessments.

Institutional Support (IS) demonstrates significant influence on Behavioural Intention ($\beta = 0.22$, $p < 0.001$), ranking fifth among determinants. The moderate mean score of 3.58 indicates that while respondents perceive some level of organisational support, significant room for improvement exists. This finding aligns with Alabi and Oyewole (2020), who emphasised that management commitment, training opportunities, and policy frameworks play critical roles in technology adoption.

Institutional support encompasses multiple dimensions: explicit policies mandating or encouraging technology use, allocation of budgetary resources for digital infrastructure, provision of training and professional development, and leadership communication that prioritises digital transformation. The moderate rating suggests that Nigerian universities have made progress in these areas but have not yet achieved the level of institutional support necessary for universal adoption.

The strength of this relationship ($\beta = 0.22$) is particularly meaningful when compared to social influence ($\beta = 0.14$). Institutional support, formal policies, and resource allocation appear more influential than social influence, informal peer pressure, and social norms. This suggests that Nigerian university stakeholders respond more to tangible institutional commitments than to social expectations. For university administrators, this implies that symbolic gestures are insufficient; concrete investments in training, technical support, and policy enforcement are required to drive adoption.

Trust (TR) significantly predicts Behavioural Intention ($\beta = 0.16$, $p < 0.01$) with a moderate mean score of 3.69. This finding supports Badamasi and Utulu (2021), who noted that trust is particularly important where concerns about cybersecurity, privacy, and system reliability exist in Nigerian educational technology contexts. The moderate rating suggests that while many users trust academic support systems, residual concerns about data security, system availability, and the confidentiality of academic records persist.

The relatively smaller effect size of trust compared to performance expectancy or digital literacy indicates that trust alone does not drive adoption, but its absence can inhibit adoption. In practical terms, users may be willing to overlook some trust concerns if they perceive strong performance benefits, but significant trust violations (such as system breaches or data losses) can rapidly undermine adoption across entire user populations.

The AVE of 0.63 and CR of 0.86 for trust indicate that the construct was well-measured, with factor loadings ranging from 0.74 to 0.86. This measurement quality suggests that future research can confidently use similar instruments to assess trust in academic technology contexts across Nigerian universities.

The most striking finding concerns Perceived Financial Cost (PFC), which demonstrates a significant negative relationship with Behavioural Intention ($\beta = -0.19, p < 0.01$) and has the lowest mean score of all constructs ($M = 2.94$). The relatively high standard deviation ($SD = 1.02$) indicates substantial variation in cost experiences, reflecting Nigeria's economic diversity, where some students can afford smartphones and data bundles while others struggle with basic internet access.

This finding strongly supports Ojo and Ibrahim (2022), who identified perceived financial cost as a major barrier in contexts where internet access and digital devices are expensive. However, this study quantifies the magnitude of this barrier within a comprehensive model, showing that cost considerations significantly suppress intention even when users recognise technology's usefulness.

The negative coefficient (-0.19) indicates that for every unit increase in perceived cost, behavioural intention decreases by nearly 0.2 standard deviations. In practical terms, a student who finds data subscriptions prohibitively expensive or cannot afford a reliable device is substantially less likely to intend to use academic support technologies, regardless of how useful they perceive those technologies to be.

This finding has profound equity implications. If financial cost remains unaddressed, technology adoption will stratify along socioeconomic lines, potentially widening rather than narrowing the digital divide within Nigerian universities. Universities must consider subsidised internet access, device loan programmes, or zero-rating of academic platforms to reduce financial barriers. Without such interventions, the digital transformation of academic support services may exclude the very students who could benefit most.

Effort Expectancy (EE) significantly influences Behavioural Intention ($\beta = 0.18, p < 0.01$) with a high mean score of 3.96, indicating that respondents generally find academic support technologies relatively easy to use. However, the rank order places EE seventh among nine determinants, suggesting that ease of use, while important, is less critical than perceived usefulness, infrastructure, digital competence, or institutional support.

This finding refines the original TAM proposition that perceived ease of use is a primary determinant of acceptance (Davis, 1989). In the Nigerian higher education context, users appear willing to tolerate some complexity if they perceive strong benefits, have adequate digital skills, and receive institutional support. This does not mean that usability is unimportant; the significant positive coefficient confirms its relevance, but rather that interventions should prioritise performance and infrastructure improvements over exclusively focusing on interface simplification.

The moderate ranking of EE may also reflect that contemporary digital systems have generally improved in usability compared to earlier technologies. Many Nigerian university stakeholders are already familiar with mobile applications and web-based platforms, so effort expectancy may no longer be the differentiator it once was.

Social Influence (SI) significantly but weakly predicts Behavioural Intention ($\beta = 0.14, p < 0.05$), ranking last among all determinants. The moderate mean score of 3.74 suggests that peers, lecturers, and institutional expectations influence adoption decisions to some extent, but this influence is considerably weaker than individual factors such as performance expectancy or digital literacy.

This finding is theoretically interesting because Venkatesh et al. (2003) found that social influence was more influential in mandatory or early-adoption contexts. In the current study, academic support technologies have become sufficiently routine in Nigerian universities that users rely more on their own assessments than on social pressure. Additionally, the voluntary nature of much technology use (students choose whether to use e-library resources or online registration platforms) may reduce the power of social influence compared to mandatory contexts.

The practical implication is that peer-focused campaigns or social marketing approaches, while potentially useful, should not be the primary strategy for driving adoption. Instead, universities should focus on the higher-ranked

determinants: demonstrating performance value, providing infrastructure, building digital literacy, offering institutional support, and reducing financial barriers.

Behavioural Intention (BI) demonstrates the strongest effect on Actual Use Behaviour ($\beta = 0.41$, $p < 0.001$), confirming its central mediating role in the UTAUT framework. The high R^2 value of 0.746 for BI indicates that the combined predictor variables explain nearly 75% of the variance in behavioural intention, which is exceptionally strong explanatory power for a behavioural model.

The strength of the BI $\rightarrow$ AUB path (0.41) means that intention is not merely correlated with behaviour but powerfully predicts it. Users who develop strong intentions are highly likely to translate those intentions into actual technology use. This finding validates the theoretical structure of the extended UTAUT model, where performance expectancy, effort expectancy, social influence, digital literacy, institutional support, trust, and financial cost all operate primarily through behavioural intention, while facilitating conditions directly influence actual use.

The high R^2 for Actual Use Behaviour (0.683) indicates that the model explains over two-thirds of the variance in actual technology use, which is impressive for a behavioural model in a developing country context. This strong predictive power confirms that context-specific extensions, particularly digital literacy, institutional support, trust, and financial cost, substantially improve the model's explanatory capacity beyond the traditional UTAUT framework.

The findings of this study both confirm and extend existing literature. Consistent with Venkatesh et al. (2003), performance expectancy and facilitating conditions emerge as major determinants. However, this study demonstrates that in the Nigerian context, digital literacy ($\beta = 0.27$) is nearly as influential as facilitating conditions ($\beta = 0.29$) and more influential than effort expectancy ($\beta = 0.18$). This extends the work of Yakubu et al. (2018), who identified digital competence as significant but did not quantify its relative importance within a comprehensive extended model.

The negative influence of perceived financial cost ($\beta = -0.19$) is a distinctive contribution, as most UTAUT applications in developed countries do not include this construct due to different economic contexts. This finding supports the argument by Rosli et al. (2022) that scholars must contextually extend UTAUT to improve its relevance in developing countries. The good model fit indices (CFI = 0.951, TLI = 0.944, RMSEA = 0.047, SRMR = 0.041) demonstrate that the extended UTAUT model is well-specified for the Nigerian higher education context. These values exceed recommended thresholds and compare favourably with similar studies in other developing countries.

The rank order of determinants (Table 7) provides clear strategic guidance. First, strengthening behavioural intention should be the primary objective, as it has the strongest overall influence on actual use. Intention can be enhanced by improving performance expectancy ($\beta = 0.31$), digital literacy ($\beta = 0.27$), and institutional support ($\beta = 0.22$).

Second, addressing facilitating conditions ($\beta = 0.29$) is essential because this determinant directly influences actual use rather than operating through intention. Even users who intend to adopt technology will abandon it if the infrastructure fails. Investments in reliable internet connectivity, consistent electricity (potentially through solar backups), and responsive technical support teams are therefore foundational.

Third, reducing perceived financial cost ($\beta = -0.19$) is necessary to prevent socioeconomic stratification of technology adoption. Universities should negotiate zero-rating of academic platforms with telecommunications providers, establish device loan programmes, provide subsidised internet access on campus, and ensure that digital alternatives do not replace affordable analogue options for financially constrained users.

Fourth, digital literacy development ($\beta = 0.27$) should be systematic rather than sporadic. Orientation programmes, embedded digital skills workshops, peer tutoring, and faculty development programmes can build competence across all stakeholder groups. The high reliability of the digital literacy measure in this study provides a validated instrument for diagnostic assessment.

This study provides robust findings; several limitations warrant acknowledgment. First, the cross-sectional design captures relationships at a single time point, limiting causal inference. Longitudinal research could examine how

determinants change as users gain experience with academic support technologies. Second, self-reported data may be subject to social desirability and recall biases, though the strong psychometric properties mitigate this concern. Third, the study did not differentiate between types of academic support technologies (LMS versus library systems versus registration portals), and determinants may vary across technology types. Future research should employ mixed methods to understand why certain determinants are more influential. Qualitative interviews could elucidate how Nigerian university stakeholders experience financial barriers or how institutional support manifests in different university types. Comparative studies across African countries could identify region-specific versus generalisable determinants.

Conclusion

The adoption of technology for academic support services in Nigerian universities is a multidimensional process shaped by behavioural, organisational, infrastructural, and socio-economic determinants. This study extends the traditional UTAUT framework by incorporating digital literacy, institutional support, trust, and perceived financial cost, thereby offering a more context-sensitive model for understanding technology adoption in Nigerian higher education. Sustainable digital transformation requires universities to move beyond technological provision toward building institutional readiness, enhancing digital competencies, ensuring affordability, and fostering trust. Such an integrated approach is essential for improving academic support systems and positioning Nigerian universities for global competitiveness.

Recommendations

1. Universities should invest in practical, efficient, and user-centered technologies (e.g., LMS, e-libraries, student portals) that clearly enhance academic performance.
2. Awareness campaigns, orientation, and training should emphasise the benefits of technology to encourage willingness and sustained use.
3. Reliable internet access, electricity, ICT facilities and technical support are essential to improve facilitating conditions for adoption.
4. Continuous digital skills training for students, lecturers, and staff should be prioritised to increase competence and confidence.
5. Universities should implement supportive digital policies, provide training, and create enabling environments for technology acceptance.
6. Government and institutions should subsidize internet costs, digital devices and access to educational technologies to improve affordability
7. Academic technologies should be simple, accessible, and mobile-friendly to enhance user acceptance.
8. Strong cybersecurity, data privacy measures, and reliable platforms are necessary to increase users' confidence.

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