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Determinants of Cloud Computing Adoption for Academic Work Among Postgraduate Students in Kwara State, Nigeria

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Abstract: The contemporary academic landscape increasingly relies on digital tools and internet-based platforms to facilitate learning and research. This study investigated the determinants of cloud computing adoption for academic work among postgraduate students in Kwara State, Nigeria. Guided by the Unified Theory of Acceptance and Use of Technology (UTAUT) model, the study examined awareness, performance expectancy, effort expectancy, social influence, and facilitating conditions. Employing a descriptive research design with a cross-sectional survey approach, structured questionnaires were administered to 375 postgraduate students selected through multi-stage and purposive sampling techniques across three universities. Data were analyzed using descriptive statistics, multiple regression, independent t-tests, and analysis of variance (ANOVA). The findings revealed that postgraduate students possess a high level of awareness and actively adopt cloud computing resources such as email and cloud storage for academic work. Furthermore, performance expectancy emerged as a strong, statistically significant positive determinant of cloud computing adoption. While gender showed no significant differences in effort expectancy or overall adoption behavior, students' academic areas of specialization significantly influenced their adoption patterns. The study highlights the need for institutional frameworks and targeted awareness campaigns to encourage seamless cloud technology integration among postgraduate researchers.

Keywords: *Cloud Computing, Technology Adoption, Postgraduate Students, UTAUT Model, Academic Work, Higher Education*.

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I. INTRODUCTION

In today's fast-paced digital era, technological innovations constantly emerge to make modern life and academic pursuits more efficient. Within the broader scope of education, educational technology acts as both a process and a product approach, encompassing the creation, use, and management of technological resources to improve learning performance. Among these technological advancements, Information and Communication Technology (ICT) has established itself as a primary driver of economic development and social change worldwide. In Nigerian higher education, ICT tools are indispensable for modern teaching, learning, and conducting rigorous postgraduate research.

A direct evolution of internet-based ICT is cloud computing, which refers to a model that enables ubiquitous, convenient, and on-demand network access to a shared pool of configurable computing resources, including servers, storage, applications, and network services. For postgraduate students juggling literature reviews, data collection, collaborative writing, and thesis management, cloud computing provides a flexible space where thousands of files can be securely stored, accessed, and retrieved from anywhere at any time. Despite these clear benefits, postgraduate students in Nigeria often face challenges in keeping pace with rapid technological reforms. Traditional data storage methods such as physical hard drives or local computer storage frequently leave students vulnerable to data loss from computer crashes, hardware theft, or high equipment costs. To better understand why students choose to accept or avoid these technologies, this study anchors itself in the Unified Theory of Acceptance and Use of Technology (UTAUT) model developed by Venkatesh et al. (2003). The UTAUT framework emphasizes four primary constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. While prior research has explored general ICT adoption, empirical studies investigating the specific determinants influencing postgraduate students' adoption of cloud computing in Nigerian universities, particularly examining moderating variables such as gender

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and area of specialization, remain relatively limited. This study bridges that gap by investigating the awareness, determining factors, and usage patterns of cloud computing among postgraduate students across universities in Kwara State.

II. REVIEW OF RELATED LITERATURE

➢ *Information and Communication Technology in Education*

Information and Communication Technology (ICT) forms the foundational bedrock of modern economic development, societal transformation, and educational reform in the twenty-first century. Within the educational sector, the proliferation of the internet, mobile devices, and digital applications has effectively eliminated traditional barriers of distance and time. This paradigm shift has transformed virtual learning, electronic research collaboration, and remote resource accessibility into standard components of modern academic scholarship. Higher education institutions increasingly rely on digital paradigms to optimize operational efficiency, streamline complex academic workflows, and foster cooperative learning environments among students and faculty alike. Recent evaluations highlight that integrating these digital tools effectively accelerates overall academic productivity and post-pandemic educational recovery, ensuring that learners remain competitive in a knowledge-driven global economy (Sharma et al., 2025). Furthermore, scholars emphasize that the systematic incorporation of ICT must align closely with institutional needs and pedagogical strategies to yield optimal learning outcomes.

➢ *Meaning and Nature of Cloud Computing*

As an advanced subset of ICT, cloud computing represents a model that enables ubiquitous, convenient, and on-demand network access to a shared pool of configurable computing resources, including networks, servers, storage, applications, and services. Defined by the National Institute of Standards and Technology (NIST) and echoed by contemporary researchers, cloud computing shifts computational loads away from static local hardware to remote data centers. Rather than depending entirely on localized physical hardware, external hard drives, or desktop storage, users can access software, platform environments, and massive storage spaces over the internet on a flexible, scalable basis.

For postgraduate students managing intensive literature reviews, large datasets, collaborative writing, and comprehensive thesis projects, cloud computing serves as a vital digital workspace. It supports diverse applications ranging from web-based email and cloud storage to advanced data analysis tools and virtual learning environments. Recent empirical evaluations confirm that key technical attributes such as rapid elasticity, broad network access, resource pooling, measured service, enhanced disaster recovery, and mobility continue to heavily drive students toward cloud-based adoption for academic and research tasks (Alghushami et al., 2020; Jamali et al., 2026).

➢ *Determinants of Technology Adoption and the UTAUT Model*

Understanding why individuals choose to accept or reject emerging technological innovations requires examining established theoretical frameworks in information systems. Rogers' diffusion of innovations theory highlights how characteristics such as relative advantage, compatibility, complexity, trialability, and observability dictate the speed and scale at which innovations find acceptance within a social system. To systematically analyze technology adoption behaviors in educational contexts, this study utilizes the Unified Theory of Acceptance and Use of Technology (UTAUT) model developed by Venkatesh et al. (2003). The UTAUT framework was formulated by synthesizing eight prominent technology acceptance theories, providing a comprehensive view that accounts for up to 70% of the variance in behavioral intention. The framework asserts that behavioral intention and technology usage are directly driven by four core constructs (Blut et al., 2022; Venkatesh et al., 2003):

- Performance Expectancy: Defined as the degree to which an individual believes that utilizing a particular system will help them attain gains in job or academic performance. In an academic context, this reflects a student's belief that cloud computing improves research effectiveness, simplifies task execution, and enhances overall productivity.
- Effort Expectancy: Defined as the level of ease associated with the use of the system, indicating how free of mental and physical effort the user expects the technology to be. This construct encompasses perceived ease of use and the minimization of complexity when interacting with digital platforms.
- Social Influence: Defined as the extent to which an individual perceives that important peers, mentors, or institutional superiors believe they should use the new technology. It captures subjective norms and social pressures within academic networks.
- Facilitating Conditions: Defined as the organizational, structural, and technical infrastructure available in the environment to support system use. This includes perceived behavioral control, technical support, and the availability of necessary hardware and internet connectivity.

Recent adaptations and applications of the UTAUT framework in higher education continue to validate that performance expectancy, technological competency, and facilitating conditions heavily dictate student intent and active use behavior (Changchit et al., 2022; Feng, 2025). Furthermore, recent studies emphasize that ensuring adequate institutional technology readiness and user trust are vital elements for sustainable cloud adoption in academic environments (Alghushami et al., 2020). Contextual moderating variables such as gender, age, experience, and area of specialization play an essential role in understanding how different student sub-groups interact with and adopt emerging educational technologies.

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➢ *Conceptual Framework*

Building upon the theoretical architecture of the UTAUT model (Venkatesh et al., 2003), this study investigates how postgraduate students' behavioral intentions and actual adoption of cloud computing are shaped by performance expectancy, effort expectancy, social influence, and facilitating conditions. Furthermore, the framework incorporates key demographic and contextual variables specifically gender and area of specialization to determine whether academic discipline or personal background introduces meaningful variations in how postgraduate students adopt and utilize cloud-based resources for their research and academic assignments.

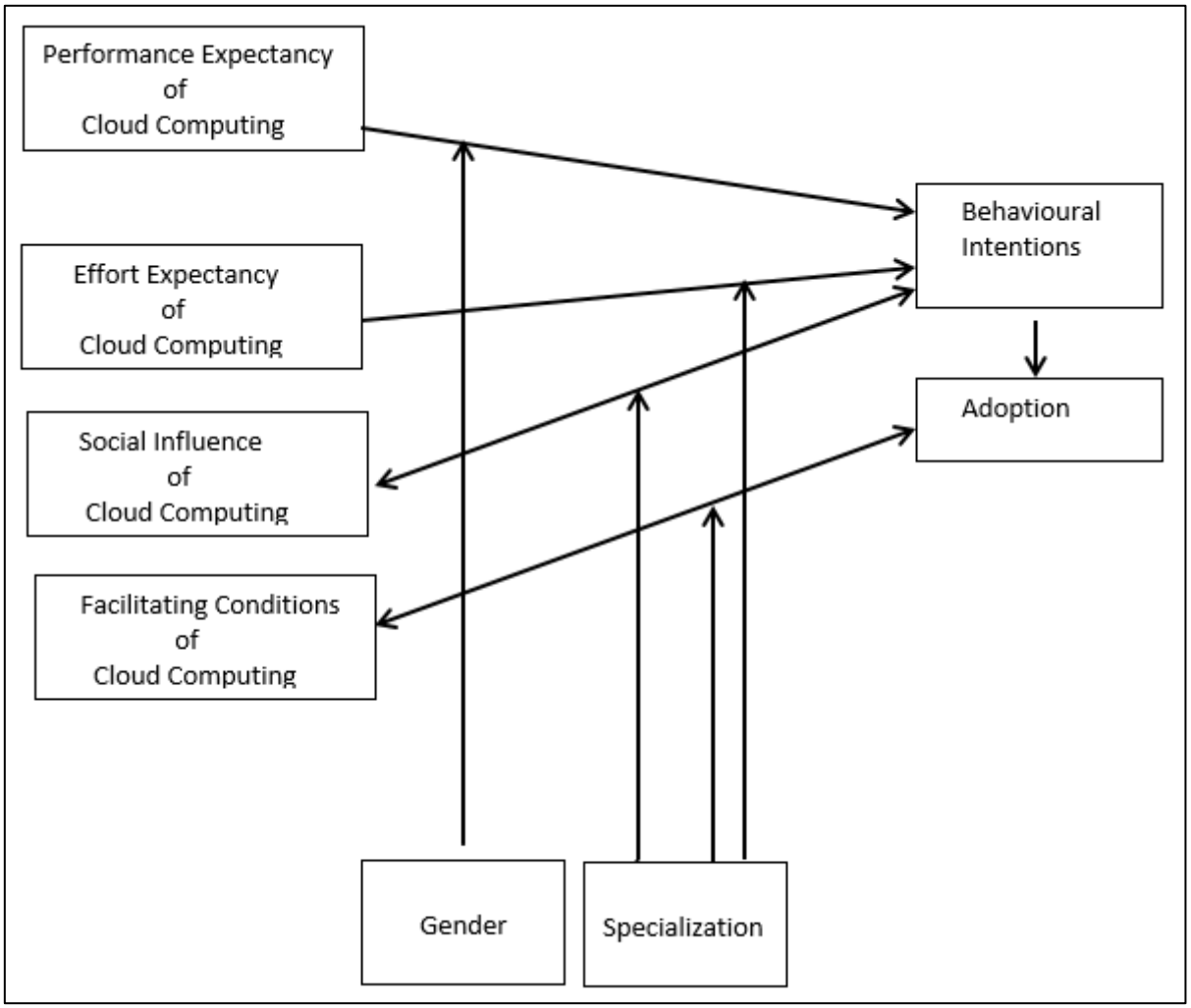


Fig 1 Researcher Model

III. METHODOLOGY

➢ *Research Design*

This study adopted a descriptive research design incorporating a cross-sectional survey approach. Data were collected from postgraduate students at a single point in time, allowing for the comparison of different sub-groups—such as varying areas of specialization and gender—simultaneously.

➢ *Population, Sample, and Sampling Techniques*

The target population comprised postgraduate students across universities in Kwara State, Nigeria. Specifically, the study focused on three universities offering postgraduate degree programs: University A (Federal), University B (State), and University C (Private). A sample size of 375 respondents was determined using Israel's sample size table. Multi-stage sampling was employed: purposive sampling was used to select the three participating universities based on active postgraduate offerings; proportional sampling was applied to allocate appropriate respondent representation based on institution size; and stratified sampling was used to categorize and select participants along gender lines and academic areas of specialization.

➢ *Instrument, Validation, and Reliability*

Data collection utilized a structured questionnaire adapted from established technology acceptance scales (Venkatesh et al., 2003). The instrument evaluated background data, awareness and usage of cloud computing resources (Yes/No response mode), and determining factors across a 4-point Likert scale. Expert reviewers in Educational Technology at the University of Ilorin established face and content validity. A pilot test with 20 postgraduate students yielded split-half reliability coefficients of 0.83 for cloud computing resource items and 0.81 for the determining factors scale.

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IV. DATA ANALYSIS AND RESULTS

➢ *Demographic Distribution*

Out of 375 administered questionnaires, all 375 were retrieved, yielding a 100% response rate. The respondents comprised 164 males (43.7%) and 211 females (56.3%). Distribution by faculty/area of specialization included Agriculture (38, 10.1%), Arts (80, 21.3%), Computer and Information Sciences (75, 20.0%), Education (105, 28.0%), and Management Sciences (77, 20.5%).

➢ *Research Questions and Hypotheses Testing*

- Research Question 1: *Do postgraduate students in Kwara State adopt cloud computing for academic work?*

✓ *Result:* Postgraduate students demonstrated high awareness and adoption with an overall grand mean of 0.92 (surpassing the 0.5 benchmark), with web email showing the highest utilization (mean = 1.00).

- Research Question 2 & Hypothesis 1: *Will there be any relationship between postgraduate students' performance expectancy and adoption of cloud computing resources for academic work?*

✓ *Result:* Performance expectancy yielded a grand mean of 3.49 out of 4.0, indicating a strong positive influence. Linear regression analysis revealed a statistically significant relationship ($F(1, 373) = 48.154$, $p = .000$, $R^2 = .114$), leading to the rejection of the null hypothesis.

- Research Questions 3 & Hypotheses 2–3*: Is cloud computing easy to use and free of effort among male and female postgraduate students?*

✓ *Result:* Effort expectancy showed a grand mean of 3.11, indicating that students find cloud tools easy and clear to use. Independent t-tests revealed no significant difference between male and female students regarding effort expectancy ($t(373) = 1.370$, $p = .172$) or overall adoption determinants ($t(373) = 1.418$, $p = .157$); thus, null hypotheses 2 and 3 were not rejected.

- Research Question 4 & Hypothesis 4: *There is no significant difference between postgraduate students' area of specialization and the determinants of cloud computing adoption for academic work.*

✓ *Result:* One-way ANOVA showed a statistically significant difference across areas of specialization ($F(4, 370) = 44.150$, $p = .000$), with post-hoc tests indicating that postgraduate students in Computer and Information Sciences exhibited higher adoption levels compared to counterparts in Agriculture and Arts.

➢ *Ethical Considerations*

Prior to data collection, ethical clearance and institutional approval were secured in accordance with ethical standards for research involving human participants. Informed consent was obtained from all participating respondents, who were assured of voluntary participation, anonymity, and confidentiality. To protect participants' identities and institutional affiliations, pseudonyms and general descriptors are used throughout this paper.

V. DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

➢ *Discussion of Findings*

The findings confirm that postgraduate students in Kwara State possess strong awareness and actively utilize cloud computing resources for academic tasks, aligning closely with prior regional studies (Oyeleye et al., 2014). Furthermore, awareness of cloud computing services, perceived ease of use, and computer self-efficacy have significant relationships with the intentions to use cloud computing services, which substantially influence actual usage behavior among postgraduate students (Ogunsola & Fadoju, 2023). Performance expectancy was proven to be a vital predictor of adoption; students readily embrace cloud services because tools like cloud storage and collaborative applications enhance task efficiency and research productivity. Moreover, the absence of significant gender differences reflects a closing digital divide among modern postgraduate researchers, whereas variations across academic specializations highlight that technical disciplines integrate cloud applications more rapidly than non-technical fields.

➢ *Conclusions*

Postgraduate students in Kwara State heavily rely on cloud computing resources to optimize their academic workflows. Performance expectancy serves as a primary cognitive driver for adoption, while gender equality in technology uptake indicates positive progressive trends in higher education. However, academic specialization remains a critical differentiating factor.

➢ *Recommendations*

- Institutional Awareness: Government bodies, non-governmental organizations, and university management should actively foster awareness campaigns regarding advanced cloud computing tools.
- Curriculum Integration: University policy makers should explicitly embed cloud-based collaborative platforms and ICT resources into postgraduate curricula.
- Equitable Infrastructure: Tertiary institutions must provide robust internet infrastructure to support seamless disciplinary integration across all faculties.

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