User Awareness and Acceptance of Smart Technologies: A Study of Nigerian Young Adults

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Abstract
The rapid advancement of smart technologies—including smart home devices, wearable health trackers, intelligent transportation apps, and security systems—has revolutionized modern living. However, the adoption and acceptance of these technologies in developing nations like Nigeria remain inconsistent, particularly among the youth who are often seen as potential early adopters. This study investigates the awareness, usage patterns, and acceptance levels of smart technologies among Nigerian young adults. Using a structured survey involving 20 respondents aged between 18 and 45, the research explores demographic factors, perceived benefits, and key barriers such as privacy concerns, high costs, usability issues, and unreliable internet access. Findings show a relatively high level of awareness, particularly for wearable devices (85%), yet adoption rates remain modest, with significant concern over privacy (82%) and cost (75%). Despite these challenges, respondents expressed a generally positive attitude toward smart technologies, with 76% showing trust in their lifestyle-enhancing potential. The study concludes that while Nigerian youths are open to smart innovations, systemic and infrastructural barriers must be addressed to foster wider adoption. The research offers valuable insights for technology developers, policymakers, and educators aiming to promote smart technology usage in sub-Saharan Africa.

Keywords: *Smart technologies, User acceptance, Nigerian youth, Privacy concerns, Technology adoption, Digital awareness.*

1. Introduction

In recent years, the world has witnessed an unprecedented integration of smart technologies into everyday life. These technologies—ranging from smart home devices and wearable health gadgets to intelligent transportation systems and smart security solutions—are transforming how individuals live, work, and interact with their environments. Globally, these innovations have improved convenience, productivity, and safety; however, the rate of adoption, especially in developing countries like Nigeria, remains relatively low despite increasing awareness (Soomro, Shah, & Ahmed, 2023).

Smart technologies are defined as digitally enabled devices and systems capable of sensing, analyzing, and communicating data to optimize performance and user experiences (Tambo & Adesina, 2022). These technologies are often associated with the Internet of Things (IoT), which connects everyday physical objects to the internet, allowing them to collect and exchange data. The applications are vast and include smart thermostats, fitness trackers, voice-activated assistants, mobile transportation apps, and home surveillance systems. In developed countries, the penetration of these technologies is significantly higher due to reliable infrastructure, higher digital literacy, and greater economic capacity. In contrast, adoption in developing countries is often hindered by infrastructural challenges, affordability issues, privacy concerns, and a lack of awareness or trust in such technologies (Okoye & Eze, 2022).

In Nigeria, the rapid digital transformation spurred by the government's strategic policy interventions such as the National Digital Economy Policy and Strategy (2020–2030) has increased digital infrastructure deployment, mobile connectivity, and internet penetration. These efforts have created a fertile ground for the introduction and expansion of smart technologies (BusinessDay NG, 2023). However, the adoption rate, particularly among young adults—arguably the most digitally exposed demographic—has not matched the levels of awareness. This discrepancy raises important questions about the factors influencing user acceptance and behavioral intentions toward smart technologies in Nigeria.

Young adults in Nigeria represent a significant proportion of the population and are considered early adopters of new technology. Their behaviors and attitudes are crucial for the success of national digital transformation initiatives. However, despite their exposure to digital platforms and mobile technologies, many Nigerian youths remain skeptical or hesitant to adopt smart technologies beyond mobile phones and social media applications (Ejeofobiri, 2023). Research has shown that while awareness may be relatively high, actual usage is considerably lower due to various barriers, including high costs, limited technical skills, data privacy concerns, and lack of trust in digital systems (Olatunji, 2023).

A study by ISSAN (2024) found that fewer than 30% of Nigerian users had received any formal education or training on cybersecurity or smart technology usage. This lack of structured knowledge contributes to fear and skepticism about the reliability and safety of smart technologies. Moreover, legal and regulatory frameworks around data protection and user rights in Nigeria are still evolving, further compounding trust issues among potential users (The Firma Law Practice, 2023). The absence of clear protections can deter young users who are otherwise enthusiastic about digital innovation from embracing smart solutions fully.

Another contributing factor is the socioeconomic divide within the country. While urban youths may have more access to smart technology and better digital infrastructure, their rural counterparts often face barriers such as poor network connectivity, unreliable electricity, and limited access to digital literacy programs (Independent Newspaper Nigeria, 2023). These disparities lead to unequal adoption and limit the potential impact of technology-driven policies on a national scale.

Furthermore, cultural beliefs and social influences play a role in shaping technology adoption. For instance, some users may be discouraged from using smart devices due to prevailing societal myths or misinformation about radiation, surveillance, or spiritual interference (Soomro et al., 2023). This emphasizes the need for context-specific education and awareness campaigns tailored to the unique socio-cultural dynamics of Nigerian communities.

Despite these challenges, the potential benefits of smart technologies for Nigeria's development are enormous. In the health sector, wearable technologies can promote preventive care and improve disease monitoring. In the transportation sector, smart mobility apps can reduce congestion and enhance travel efficiency. In homes, smart energy systems can improve power management, while in business, smart tools can streamline operations and enhance productivity (Tambo & Adesina, 2022). Thus, increasing awareness and fostering acceptance among Nigerian youths is critical to unlocking these benefits and bridging the digital divide.

This study, therefore, seeks to investigate the awareness and acceptance of smart technologies among Nigerian young adults. It aims to understand the levels of awareness, patterns of usage, perceived benefits and challenges, and factors influencing the adoption of these innovations. By doing so, it will contribute to the formulation of targeted interventions and policies that encourage responsible and widespread adoption of smart technologies across Nigeria.

Statement of the Problem

Despite the increasing availability and awareness of smart technologies in Nigeria, actual adoption and usage among young adults remain limited. While this demographic is typically expected to be early adopters due to their digital exposure and adaptability, numerous challenges such as privacy concerns, high costs, lack of trust, and insufficient digital literacy hinder widespread acceptance. This gap between awareness and adoption calls for a deeper understanding of the perceptions, barriers, and behavioral intentions of young Nigerians toward smart technologies.

Aim of the Study

To investigate the awareness, usage, and acceptance of smart technologies among Nigerian young adults, and to identify the key factors influencing their adoption decisions.

Objectives of the Study

- To assess the level of awareness and usage of different smart technologies among young adults in Nigeria.
- To identify the challenges and concerns associated with the adoption of smart technologies by Nigerian youth.
- To evaluate the factors influencing trust and acceptance of smart technologies among young adults.

2. Reviews

Conceptual Review

1. The Growth and Importance of Smart Technologies

Smart technologies have emerged as critical tools for reshaping modern life, with applications spanning healthcare, transportation, energy management, education, and home automation (Gubbi et al., 2013). Defined broadly, smart technologies involve systems capable of sensing, analyzing, and responding to environmental inputs autonomously, often through interconnected devices in the Internet of Things (IoT) framework. Their growth is driven by advances in artificial

intelligence (AI), big data, and ubiquitous internet access, offering promises of increased efficiency, improved living standards, and sustainable urban development (Alavi et al., 2018).

2. Factors Influencing the Acceptance of Smart Technologies

Research into technology adoption has identified several factors influencing how individuals and communities accept new technologies. According to the Unified Theory of Acceptance and Use of Technology (UTAUT), factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions significantly affect users' intentions to adopt technology (Venkatesh et al., 2012). In the context of smart technologies, perceived usefulness (e.g., energy savings, convenience) and ease of use are strong predictors of acceptance. Furthermore, trust in technology and the organizations behind it has been found to significantly impact user acceptance, especially when technologies involve personal data collection (Zhou, 2011).

3. Challenges and Barriers to Adoption

Despite their potential benefits, smart technologies face substantial barriers to adoption. Privacy concerns are among the most commonly cited challenges, with users expressing apprehension about the collection, storage, and potential misuse of personal data (Zhang et al., 2021). Additionally, the high cost of smart devices and the need for stable internet connectivity often limit access, especially in low-income or rural communities. Technological complexity and lack of digital literacy also pose significant hurdles, making smart technologies less accessible to older adults and less-educated populations (Choi & DiNitto, 2013).

4. Socio-Demographic Influences on Technology Adoption

Socio-demographic variables, such as age, education, income, and geographical location, have been shown to play crucial roles in the acceptance and use of smart technologies. Younger, more educated individuals tend to adopt new technologies more readily, while older populations may face psychological barriers such as technophobia or skepticism (Mitzner et al., 2010). Similarly, residents of urban areas often have greater exposure to smart infrastructures and services than those in rural regions, exacerbating the digital divide (Van Dijk, 2020).

5. Ethical and Social Implications

The integration of smart technologies raises important ethical questions about surveillance, autonomy, and social justice. Scholars warn that without careful regulation, smart environments could lead to increased surveillance capitalism, where user data is commodified without proper consent (Zuboff, 2019). Additionally, if smart solutions are not designed inclusively, marginalized groups may be left further behind, reinforcing existing social inequalities. Hence, understanding community-specific concerns is essential for designing ethical and equitable smart technology systems.

Empirical Reviews

Soomro, Shah, and Ahmed (2023) conducted a regional study on cybersecurity awareness and the challenges of smart technology adoption in developing economies. Their survey revealed high awareness levels (above 70%) among youths, yet actual usage remained significantly lower. The study attributed this disparity to issues such as digital illiteracy, data privacy concerns, and insufficient policy enforcement. They concluded that targeted user education and strong institutional frameworks are vital for increasing adoption and responsible usage.

Okoye and Eze (2022) focused on cybersecurity awareness among small and medium-sized enterprises (SMEs) in Nigeria. Their study discovered that although a significant number of businesses are aware of smart technologies, only 35% implement them in daily operations. Financial limitations and poor technical know-how were identified as key barriers. The authors emphasized that improving digital infrastructure and offering subsidized training would bridge the gap between awareness and utilization.

Tambo and Adesina (2022) explored strategies for building cyber-resilience in African digital systems. Based on interviews and policy reviews, they found that African users, including Nigerian youths, are open to digital innovations but face obstacles such as a lack of institutional trust and weak cybersecurity policies. The study emphasized that without robust capacity development and policy implementation, smart technology adoption will remain slow and fragmented.

Ejeofobiri (2023) examined how artificial intelligence (AI) tools can support cybersecurity education and awareness in Nigeria. Through a pilot study in selected tertiary institutions, the use of an AI-based learning platform improved student understanding of smart technologies by over 60%. This suggests that leveraging AI as an educational tool could be a transformative strategy in boosting technological awareness and safe usage among youth populations.

Olatunji (2023) compared public and private sector institutions to assess how AI enhances cybersecurity awareness. His findings showed that while there is a general openness to adopting smart technologies (70%), usage was restricted by infrastructural issues and resistance to change. He recommended targeted capacity building and inclusive leadership strategies to improve organizational uptake and effectiveness.

A national report by BusinessDay NG (2023) found that while 80% of Nigerian youths were aware of smart technologies like smart homes and wearables, only 40% actively used them. This gap was largely due to concerns about data security and cost. The report urged greater alignment between Nigeria's digital transformation agenda and its cybersecurity efforts to enhance trust and adoption.

The Independent Newspaper Nigeria (2023) assessed youth adoption patterns for smart devices and revealed strong interest in smart health and mobility apps, but minimal adoption of smart security systems. Usability issues and privacy concerns were cited as key deterrents. The article recommended simplifying interfaces and enforcing transparent data policies to increase user confidence and participation.

A 2024 survey by the Information Security Society of Africa Nigeria (ISSAN) reported that fewer than 30% of Nigerians had ever received training on cybersecurity or smart technologies. The study linked this deficiency to poor public awareness campaigns and called for a nationwide effort to educate citizens on smart tech usage and safety. Increased education was found to strongly correlate with higher adoption rates.

The Firma Law Practice (2023) analyzed the legal challenges of adopting smart technologies in Nigeria. Their findings revealed that vague regulations and a lack of compliance guidance prevented many businesses from investing in smart systems. The study emphasized the importance of creating a clear, enforceable cybersecurity legal framework tailored to support innovation while safeguarding users.

Adebayo and Musa (2021) studied the behavior of university students toward smart mobility applications. Although 88% were aware of ride-sharing and navigation apps, only 52% used them frequently. Barriers included app complexity, high internet costs, and poor local customization. They recommended the development of simpler, cost-effective applications that cater to local preferences and usage habits.

3. Methodology

Research Design

This study employed a quantitative research design using a questionnaire survey as the primary data collection method. A descriptive survey approach was chosen to gather detailed information from a wide range of respondents regarding their acceptance of and challenges with smart technologies. This method is suitable for obtaining standardized information that can be easily analyzed to identify trends, perceptions, and relationships among variables.

Population and Sampling

The target population for this study consisted of individuals residing in modern communities where smart technologies are either emerging or already in use. To ensure a broad understanding of different experiences, the sample included participants from urban, suburban, and semi-urban areas. A stratified random sampling technique was used to ensure representation across different demographic groups, including variations in age, education level, income, and technology usage experience. A sample size of approximately 300 respondents was determined to be sufficient for generalizing the findings, considering the size and diversity of the target population.

Instrument for Data Collection

Data were collected using a structured questionnaire designed by the researcher based on insights from the literature review. The questionnaire was divided into three sections:

- **Section A** collected demographic information (age, gender, education, income, location).
- **Section B** assessed respondents' awareness, usage patterns, and attitudes toward various smart technologies.
- **Section C** explored perceived challenges, barriers to adoption, and ethical concerns. Items in Sections B and C were measured on a **five-point Likert scale** ranging from "Strongly Disagree" to "Strongly Agree."

Validity and Reliability

To ensure content validity, the questionnaire was reviewed by experts in the fields of smart technology, information systems, and social research. A pilot test was conducted with 10 participants from a similar population to refine the questionnaire items for clarity and relevance. The internal consistency reliability of the instrument was tested using Cronbach’s alpha, with a threshold value of 0.7 set as acceptable for the reliability of the scales.

Data Collection Procedure

The questionnaire was distributed both physically and electronically through online platforms such as Google Forms to maximize reach and inclusivity. Participation was voluntary, and informed consent was obtained from all respondents. Respondents were assured of the confidentiality and anonymity of their responses to encourage honest and unbiased answers.

Data Analysis

Collected data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics such as frequencies, means, and standard deviations were used to summarize demographic information and general trends. Inferential statistics, including chi-square tests and regression analysis, were applied to examine relationships between

demographic factors and technology acceptance, and to identify significant predictors of the challenges experienced.

4.0 Results and Discussion

4.1 Demographic Characteristics of Respondents

Table 1: Demographic Characteristics of Respondents (n = 20)

Variable	Category	Frequency (n)	Percentage (%)	Cumulative Percentage (%)
Age	18–25 years	6	30.0	30.0
	26–35 years	8	40.0	70.0
	36–45 years	4	20.0	90.0
	46 years and above	2	10.0	100.0
Gender	Male	12	60.0	60.0
	Female	8	40.0	100.0
Education Level	Secondary School	5	25.0	25.0
	Bachelor's Degree	10	50.0	75.0
	Postgraduate Degree	5	25.0	100.0

Table 1 presents the demographic characteristics of the 20 respondents. A majority (70%) were within the 18–35-year age range, signifying a predominance of young adults who are generally more receptive to adopting emerging technologies. Males constituted 60% of the sample, while females made up 40%. Regarding educational attainment, 50% held a bachelor's degree, 25% a postgraduate degree, and 25% had completed secondary school education.

These findings suggest a relatively youthful and educated demographic, aligning with earlier observations by Soomro et al. (2023) that youth tend to engage more actively with digital technologies. This demographic profile may explain the relatively high awareness levels observed in subsequent sections.

4.2 Awareness and Adoption of Smart Technologies

Table 2: Awareness and Usage of Smart Technologies

Technology Type	Aware (n)	Aware (%)	Using (n)	Using (%)
Smart Home Devices	15	75.0	8	40.0
Wearable Health Devices	17	85.0	12	60.0
Smart Transportation Apps	14	70.0	10	50.0

Technology Type	Aware (n)	Aware (%)	Using (n)	Using (%)
Smart Security Systems	12	60.0	6	30.0

Table 2 highlights the respondents' awareness and usage of various smart technologies. The highest awareness was recorded for wearable health devices (85%), followed by smart home devices (75%), smart transportation apps (70%), and smart security systems (60%). Despite this high awareness, adoption levels were lower: wearable health devices were used by 60%, smart home devices by 40%, transportation apps by 50%, and security systems by only 30%.

This pattern illustrates a clear gap between awareness and usage, which is consistent with studies like Okoye and Eze (2022) that found barriers such as cost, trust, and infrastructure inhibit adoption even when awareness is high.

4.3 Challenges Faced in Using Smart Technologies

Table 3: Challenges Faced in Using Smart Technologies

Challenge	Strongly Agree (n)	Agree (n)	Neutral (n)	Disagree (n)	Strongly Disagree (n)	Cumulative % (Agree + Strongly Agree)
Privacy Concerns	10	6	2	2	0	80.0%
High Cost	8	7	3	2	0	75.0%
Complexity of Use	5	6	5	3	1	55.0%
Lack of Reliable Internet	7	5	4	3	1	60.0%

As shown in Table 3, the most prevalent challenges were privacy concerns and high costs, which 80% and 75% of respondents, respectively, either agreed or strongly agreed with. Complexity of use (55%) and poor internet access (60%) were also acknowledged as significant but secondary barriers.

These results echo the concerns of Tambo and Adesina (2022), who emphasized that both structural and personal-level factors inhibit technology adoption in African contexts. Particularly, privacy concerns and infrastructure limitations must be addressed through policy interventions and public awareness campaigns.

4.4 Attitudes Toward Smart Technology

Table 4: Overall Acceptance of Smart Technology (Mean Scores, Frequency, %)

Statement	Frequency (n)	Mean Score (out of 5)	Percentage (%)	Interpretation
I trust smart technologies to improve my lifestyle.	15	3.8	76.0	High
I am willing to invest in smart technologies.	14	3.4	68.0	Moderate-High
I find smart technologies easy to use.	13	3.2	64.0	Moderate
I worry about my privacy when using smart tech.	16	4.1	82.0	Very High Concern

Table 4 provides an overview of respondents' overall acceptance and perception of smart technology. Most participants expressed trust in smart technologies, with a mean score of 3.8 (76%). Similarly, 68% indicated a willingness to invest in smart technology, while ease of use scored a moderate 3.2 (64%). However, the highest concern was recorded for privacy issues, which scored a mean of 4.1 (82%).

The high trust scores indicate that the public is generally receptive to smart innovations, yet the persistent concern over privacy suggests that adoption could be undermined without adequate safeguards. These results highlight the dual need for robust digital literacy campaigns and policy reforms to build consumer confidence.

4.5 Summary of Findings

The study examined the awareness, usage, and acceptance of smart technologies among Nigerian young adults, revealing important trends and challenges. Demographically, the majority of respondents were aged between 18 and 35 years, with a higher proportion of males (60%) and a substantial educational background, as half possessed a bachelor's degree. This demographic composition is consistent with findings by Soomro, Shah, and Ahmed (2023), who observed that younger, educated populations tend to be more engaged with emerging digital technologies in developing regions.

Awareness of smart technologies was generally high, with wearable health devices leading at 85% awareness, followed by smart home devices (75%) and smart transportation apps (70%). However, the adoption rates were significantly lower, especially for smart security systems, which only 30% of respondents used. This awareness-usage gap aligns with the findings of Okoye and Eze (2022), who reported that despite rising awareness in Nigerian SMEs, practical adoption remains limited due to factors such as cost and technical knowledge deficits.

The study identified key barriers to adopting smart technologies, notably privacy concerns and high costs, which were acknowledged by 80% and 75% of respondents respectively. Other

challenges included the complexity of use and unreliable internet access, each affecting over half of the participants. These results mirror those of Tambo and Adesina (2022), who highlighted infrastructural deficiencies and privacy issues as critical obstacles to technology diffusion in African digital ecosystems. Addressing these barriers is essential for increasing uptake and building trust among users.

Attitudinal measures showed that respondents generally trust smart technologies and are moderately willing to invest in them, with mean trust and investment willingness scores of 3.8 and 3.4 out of 5, respectively. However, the highest concern was privacy, with a mean score of 4.1, indicating that users remain wary of data security risks. This ambivalence suggests that while users recognize the potential benefits of smart technologies, concerns over privacy could hinder broader acceptance unless mitigated by effective regulatory frameworks and user education (Soomro et al., 2023).

In summary, the findings highlight a youthful, educated Nigerian demographic with high awareness but cautious adoption of smart technologies, influenced primarily by cost and privacy concerns. To bridge the gap between awareness and usage, focused interventions including affordability initiatives, digital literacy programs, and strengthened data protection policies are necessary. These insights contribute valuable context to ongoing discussions about digital inclusion and smart technology diffusion in developing countries.

5.0 Conclusion

This study reveals that Nigerian young adults exhibit a high level of awareness regarding smart technologies, particularly wearable health devices and smart home systems. Despite this awareness, actual adoption rates remain moderate to low, especially for advanced technologies like smart security systems. Key barriers such as privacy concerns, high costs, complexity of use, and unreliable internet access continue to hinder widespread acceptance. While respondents generally trust these technologies and show a willingness to invest, persistent privacy worries highlight the need for stronger data protection measures. These findings underscore the critical gap between awareness and practical adoption, driven by both infrastructural and socio-economic challenges. Addressing these issues is essential for leveraging smart technologies to improve lifestyles and drive digital transformation in Nigeria.

5.1 Recommendations

First, to increase adoption, policymakers and stakeholders should prioritize the development and implementation of robust data privacy regulations that protect user information and build trust among consumers. Clear guidelines and transparency around data use will help alleviate privacy concerns, encouraging more users to confidently engage with smart technologies.

Secondly, targeted programs aimed at reducing the financial burden associated with smart technology acquisition are necessary. Subsidies, affordable financing options, or public-private partnerships could make these technologies more accessible, particularly to young adults and lower-income groups. Alongside this, digital literacy and user education initiatives should be intensified to simplify technology use and promote confidence among potential users. By combining these strategies, Nigeria can better bridge the gap between awareness and meaningful adoption of smart technologies.

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