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Challenges and Prospects of Marketing Student-made Computer Software

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Abstract: This research examines the challenges and prospects of marketing student-made software, focusing on key factors such as market recognition, infrastructural barriers, financial constraints, and competition from foreign brands. The study aims to provide an in-depth analysis of the current state of the Nigerian software industry, identifying obstacles that hinder its growth and opportunities that can be leveraged for expansion and development. A descriptive research design was employed to gather primary data from stakeholders, including student software developers, IT professionals, business owners, and end-users. The instrument for data collection is a validated researcher-developed questionnaire titled "Challenges and Prospects of Marketing Student-made Software". The quantitative data from the questionnaires was analyzed using descriptive statistics of percentages, means, and standard deviations. The study's findings reveal that Nigerian student-made software faces significant market visibility challenges, primarily due to inadequate marketing strategies and consumer preference for foreign software solutions. Moreover, infrastructural deficiencies, particularly unreliable electricity and poor internet connectivity, significantly impact software adoption and development. Financial constraints, including limited access to venture capital and high-interest rates on loans, present another significant challenge. Many Nigerian software companies struggle to secure funding, limiting their ability to scale and compete effectively. Furthermore, competition from well-established foreign brands has made it difficult for local software firms to gain a foothold in both domestic and international markets. However, the study identifies promising opportunities in fintech, e-commerce, and education technology, where Nigerian developers can leverage localized solutions to meet specific market demands. The study concludes that overcoming these challenges requires a multi-faceted approach involving government support, improved infrastructure, increased funding opportunities, and strategic marketing efforts. Recommendations include the implementation of favourable government policies, investment in technology infrastructure, financial incentives for student software developers, and enhanced collaboration between industry stakeholders and academic institutions. The outcomes of this study expressed the hope that by addressing these barriers and harnessing available opportunities, Nigeria's software industry can experience significant growth and contribute to the nation's economic advancement. The study provides valuable insights for policymakers, business leaders, and technology innovators looking to foster a thriving software ecosystem in Nigeria.

Keywords: Student-Made Software, Nigeria Software Ecosystem, Market Recognition, Infrastructural Barriers, Financial Constraints, Brand Competition

Introduction

Student-made software refers to applications or digital tools created by students, typically as part of academic projects, hackathons, or extracurricular initiatives. These software projects often stem from coursework in computer science, engineering, or related fields, allowing students to apply theoretical concepts to practical challenges. Whether it's a mobile app designed to solve a campus-specific problem or a web tool for social impact, these projects provide valuable hands-on experience in coding, design, and teamwork. They also reflect students' creativity and ability to innovate within limited resources and time (Forte & Guzdial, 2005; Marque *et al.*, 2017).

One of the most significant advantages of student-made software is its educational value. Through the development process, students not only strengthen their technical skills but also gain exposure to software development cycles, version control systems, and collaboration tools. These experiences simulate real-world software engineering environments, preparing students for careers in the tech industry. Additionally, feedback from peers, instructors, and sometimes public users helps students understand the importance of user-centered design and iterative improvement (Mas *et al.*, 2020; Ahtee & Poranen, 2009).

There are many success stories around student-initiated software development projects in Nigeria. For instance, the library of the Federal University of Technology Akure, FUTA has test run software developed by a student for access control. The software, named TouchNut developed by a team led by a 400-Level student of the Department of Electrical and Electronics Engineering, Daniel Adeniyi, is now being used to regulate entry and exit of students into the Albert Ilemobade Library and to monitor activities (Federal University of Technology Akure – FUTA, 2025). The Software provides an easy-to-use identification system that helps the security unit to monitor the activities that go on in the library, using an Intranet server that contains student's information and comes with an intranet connection. On the TouchNut app, students can borrow books and library staff will not need to worry about its return on its expiration date because the software would track down the student's Card and notify the staff (Federal University of Technology Akure – FUTA, 2025).

Innovative programmes such as the Software Development Competitions organized by the Nigeria Computer Society (NCS) have attested to students' coding prowess and potential for student-built computer software (Bells University of Technology, 2024). A final-year Software Engineering student at the American University of Nigeria (AUN), David Edijala, has launched an innovative new payment platform called "Zinger Wallet." The app was created to address problems with payment methods in Nigeria, especially with cash, bank transfers, and POS machines. "Zinger Wallet" allows businesses to receive payments in a reliable, quick, and cheap manner while providing easy management of staff, departments, and customers (Premium Times, 2021). Many breakthrough stories abound across Nigeria's landscape, with student-made software solving problems in Education (Omotayo, 2021), helping visually-impaired mobile users (Sebambo, 2015), and transforming networking (Maryam Abacha American University of Nigeria – MAAUN, 2024).

Beyond the classroom, student-made software has the potential to create real impact. Some projects evolve into fully-fledged startups or open-source tools adopted by wider communities. Because students often create solutions based on firsthand experiences or issues, they are passionate about, the resulting software can be highly relevant and innovative. In many cases, these projects demonstrate that with curiosity, mentorship, and a strong learning environment, students can produce professional-quality software that addresses genuine needs (Chao, 2007; Morais *et al.*, 2021).

The global software industry has grown exponentially over the past few decades, becoming a critical component of the digital economy. In many countries, software development has emerged as a key driver of innovation, economic growth, and job creation. Nigeria, as one of Africa's largest economies, has not been left behind in this digital revolution. The Nigerian software industry has seen significant growth, fuelled by a young, tech-savvy population, increased internet penetration, and government initiatives aimed at fostering digital transformation (Abah, 2019; Iji & Abah, 2019). Despite this progress, the industry faces numerous challenges that hinder the marketing and adoption of Nigerian-made software both locally and internationally. This study aims to explore these challenges and identify potential opportunities for growth.

Nigeria's software industry is a vital part of its burgeoning tech ecosystem, often referred to as the "Silicon Savannah" of Africa. The country is home to a growing number of software developers, startups, and tech hubs that have produced innovative solutions in various sectors, including finance (FinTech), education (EduTech), and agriculture (AgriTech). According to the National Information Technology Development Agency (NITDA), the Information and Communications Technology (ICT) sector, which includes software development, contributed approximately 14.7% to Nigeria's GDP in the first quarter of 2023 (National Bureau of Statistics, 2023).

This growth has been driven by several factors. First, the demographic advantage of Nigeria's young population, with a median age of around 18 years, has created a large pool of digital natives who are both consumers and creators of software. Second, increased internet penetration has expanded the market for digital products, including software. The Nigerian Communications Commission (NCC) reported that as of January 2025, Nigeria had over 169 Million internet subscribers with a teledensity of 78.1 %, making it one of the largest internet markets in Africa (NCC, 2025). Additionally, government policies such as the National Digital Economy Policy and Strategy (2020-2030) have provided a framework for supporting the growth of the digital economy, including the software industry (Federal Ministry of Communications and Digital Economy, 2020).

However, despite these positive developments, the marketing and adoption of Nigerian-made software face significant challenges that need to be addressed for the industry to reach its full potential. One of the primary challenges in marketing Nigerian-made software is limited market awareness. Nigerian software brands often struggle with low visibility, both locally and internationally, compared to their foreign counterparts. This is partly due to limited marketing budgets and the absence of a strong brand presence in the global market. International brands, which have been established for decades, often

overshadow local products. Furthermore, there is a general perception among consumers that foreign software is of superior quality, leading to a preference for international products over local ones. This perception is often reinforced by the extensive marketing campaigns and established customer support systems of foreign companies, which Nigerian firms may not be able to match (Binuyo *et al.*, 2024).

Another significant challenge is the infrastructural and technological barriers that impede the adoption of software in Nigeria. Although internet access has improved, it remains uneven across the country, with rural areas particularly underserved. The limited and inconsistent internet penetration hinders the widespread use of cloud-based and online software solutions, which require reliable internet access. In addition to internet challenges, the country's erratic power supply also poses a significant obstacle. Frequent power outages disrupt software usage and can discourage potential customers from adopting new technologies, particularly those that require continuous power, such as enterprise software (Pushak & Foster, 2011; Gwani, 2024; Nneze *et al.*, 2024).

Financial constraints also play a crucial role in limiting the marketing and scalability of Nigerian software products. Many Nigerian software startups struggle to secure funding from venture capitalists or other financial institutions, which limits their ability to scale their operations and market their products effectively. The high cost of software development, coupled with the low purchasing power of the average Nigerian consumer, further exacerbates the situation. As a result, many local software products are either priced out of reach for most consumers or are not adequately marketed to reach a broader audience (Edoigiawerie, 2024; Baale, 2025).

Regulatory and policy challenges are another significant barrier to the growth of the Nigerian software industry. Intellectual property (IP) protection in Nigeria is weak, with inadequate enforcement mechanisms leading to high levels of software piracy. This discourages both local and international investors from investing in software development in Nigeria. Additionally, navigating the complex regulatory landscape can be costly and time-consuming, particularly for startups that may lack the resources to comply with various regulations (Waziri, 2011; Edosomwan, 2019; Komolafe, 2021; Afolayan, 2022)

Market awareness and brand recognition pose significant hurdles. Nigerian software products struggle to gain visibility and trust among consumers who often favour foreign software brands. This preference is rooted in the perception that international software offers superior quality, reliability, and after-sales support (Sowunmi *et al.*, 2016). As a result, Nigerian developers face difficulty in establishing a strong market presence, which is essential for competitiveness (Mursu *et al.*, 2003).

Competition from established foreign software products poses a significant challenge to the marketing of Nigerian-made software. The Nigerian market is saturated with well-established international software products, making it difficult for local developers to gain a foothold. Foreign companies often engage in aggressive pricing strategies, offering their products at lower prices than local developers can afford, further undermining the competitiveness of Nigerian software (Ekanem & Peter, 2020; Casado-Lumbreras *et al.*, 2014; Yarma *et al.*, 2023).

Despite these challenges, there are several prospects for the Nigerian software industry that offer potential for growth. The growing digital economy in Nigeria presents a significant opportunity for local software developers. As more sectors of the economy digitize, there is an increasing demand for software solutions tailored to the Nigerian market. This includes sectors such as education, finance, agriculture, and healthcare, where digital solutions are becoming increasingly vital. Additionally, government initiatives aimed at promoting digital literacy and technology adoption provide a conducive environment for the growth of the local software industry (Federal Ministry of Communications and Digital Economy, 2020). Nigerian software developers, including student developers, have the advantage of being able to create localized solutions that address the specific needs and challenges of the Nigerian market. This ability to innovate and customize products gives local student developers a competitive edge over international competitors who may not fully understand the local context. Moreover, smaller local companies are often more agile and can quickly adapt to changes in the market, allowing them to capitalize on new opportunities.

There is also growing potential for Nigerian software to be exported to other African markets. West Africa presents a promising market for Nigerian software, especially in countries that face similar challenges and have similar needs. Additionally, the Nigerian diaspora can play a crucial role in promoting and distributing Nigerian software internationally, particularly in regions with large Nigerian communities (Statista, 2025; BrightBrand Digital, 2024).

The rise of tech hubs and incubators across Nigeria provides critical support for student software startups. These ecosystems offer mentorship, funding, and networking opportunities that can help startups grow and succeed. Furthermore, collaboration with educational institutions can enhance the credibility of Nigerian software products and expand their reach by involving academia in the research and development process (Akanle *et al.*, 2019; Adegbiji, 2021; Atiase *et al.*, 2020; Nwaichi *et al.*, 2024).

To be specific, student-made software faces several challenges, primarily due to limited resources, experience, and time constraints. Many student developers juggle coursework, part-time jobs, and other commitments, which can hinder consistent progress on software projects. Additionally, students may lack access to professional development tools, testing environments, or mentorship, making it difficult to build scalable, bug-free applications. Team-based projects also present challenges in communication and coordination, especially when students have varying skill levels or expectations (Odulaja *et al.*, 2010).

Despite these challenges, the prospects for student-made software are promising. Educational institutions increasingly support innovation through incubators, hackathons, and maker spaces that provide mentorship and funding opportunities. Open-source communities and online platforms like GitHub also offer collaboration and feedback channels, enabling students to build publicly visible portfolios. Moreover, some student projects gain recognition beyond academia – either by addressing real-world problems or evolving into startups, especially when they meet niche or underexplored needs.

In the long run, student-made software serves as a vital stepping-stone for budding developers, bridging the gap between academic learning and industry practice. These projects foster a mindset of problem-solving, adaptability, and creativity, all essential traits in the rapidly evolving tech landscape. As universities and industries continue to invest in experiential learning and tech entrepreneurship, student developers are better positioned than ever to turn their ideas into impactful and sustainable software solutions (Okiki & Adewumi, 2015).

Given the existing challenges, the Nigerian software industry is at a critical juncture. Without concerted efforts to address these issues, the sector's growth will remain stunted, and its potential contributions to the national economy and global digital economy will continue to be unrealized. Despite numerous studies on challenges and prospects of marketing Nigeria-made computer software, the industry continues to face significant obstacles including, poor market penetration, limited competitiveness, inadequate support, and insufficient infrastructure. Previous studies focused on identifying challenges, analyzing market trends, and examining government policies. However, there is a dearth of research on innovating market strategies, collaborative approaches between industry stakeholders, and impact of digital transformation on Nigeria-made software marketing, particularly with respect to development projects linked to students.

Research Questions

The following questions guide this study:

1. What factors contribute to the limited market awareness and brand recognition of student-made software?
2. How do infrastructural challenges, such as internet penetration and power supply issues, affect the adoption of student-made software?
3. What are the financial challenges faced by software companies established by students, and how do these challenges impact their growth and scalability?
4. How does competition from foreign software impact the market share and growth of local software companies?

Methodology

This study adopts a descriptive research design to evaluate the challenges and prospects of the student-made software industry. Descriptive survey design was chosen for this study because it allows for the efficient collection of data directly from respondents in a systematic and structured manner (Abah, 2020). Descriptive survey design is appropriate for using standardized questionnaires in obtaining detailed and accurate descriptions of the variables under study, including market recognition, infrastructural barriers, financial constraints, and regulatory challenges.

The study focuses on student-made software within the Nigerian software industry, with particular emphasis on Lagos, Abuja, and Benue. These cities are Nigeria's primary tech hubs, hosting numerous software companies, start-ups, and tech ecosystems. Lagos is home to the Yaba technology cluster, known as "Nigeria's Silicon Valley", and houses the

largest number of software firms in the country. Abuja, the capital, has growing government-backed tech initiatives, while Benue is a developing tech hub.

The population of the study includes stakeholders in the Nigerian software industry and higher educational institutions. These stakeholders include software developers, computer science lecturers and students, IT professionals, tech entrepreneurs, employees in software companies, regulatory authorities, and consumers of software products. The estimated population from these groups is around 1,000 individuals across the three study areas.

The sample size is calculated as 286 participants, rounded to 300 to account for potential non-responses. A stratified sampling technique was used to ensure equal representation from the various stakeholder groups.

A self-structured questionnaire titled "Challenges and Prospects of Marketing Student-made Software" was used to capture quantitative data from respondents. It consists of closed-ended questions to allow the participants to give responses from a controlled list of options. The questionnaire will primarily be divided into eight sections: Section A gathers demographic information of respondents, section B examines the level of Market Awareness and Brand Recognition of Student-made Software, section C explores the Infrastructural Challenges Affecting the Adoption of Student Software, section D explores the Financial Challenges Faced by Student-run Software companies, while section E examines the Competitive Advantage of Student-made Software.

Validity refers to how accurately an instrument measures the concepts it is intended to measure. The face and content validity of the instrument was done by a chief educational officer, a cyber security expert and a computer science lecturer. The experts made valuable comments and suggestions that led to the final improved version of the instrument.

Reliability refers to the consistency of the scores obtained, how consistent they are from one administration of an instrument to another. The study used Cronbach's Alpha test to measure internal consistency, arriving at a coefficient of 0.70.

To collect data for the study, a questionnaire was administered both online and in-person to ensure higher response rates. Online distribution used Google Forms sent via Social Media and emails, while in-person distribution will be facilitated in tech hubs, software companies, and higher educational institutions. A total of 300 questionnaires were distributed to the three major cities (FCT, Lagos and Makurdi). The researchers hired key informants (software developers) to coordinate the survey in two major cities Abuja and Lagos, while the study team self-administered the instrument via online and offline survey within the Makurdi metropolis to ensure accurate completion of the instrument by the respondents as well as ensuring high return rate of the instrument.

The quantitative data from the questionnaires was analyzed using descriptive statistics of percentages, means, and standard deviations. The study's results are presented in tables.

Results and Discussion

The presentation of results follows the sequence of the research questions.

Research Question One

What factors contribute to the limited market awareness and brand recognition of Nigerian-made software?

Table 1. Factors Contributing to Limited Market Awareness and Brand Recognition of Student-Made Software

S/No.	Statements	Mean	Std	Decision
1	I am aware of student-made computer software available on the market.	3.13	0.94	Agree
2	Student-made software is adequately marketed in the local market.	2.43	1.02	Disagree
3	Students' software brands have lower visibility compared to foreign software brands.	3.37	0.89	Agree
4	Lack of advertisements limits the awareness of student-made software.	3.43	0.92	Agree
5	Social media campaigns can improve brand recognition of student-made software.	3.57	0.86	Agree
	Cluster Mean	**3.19**		**Agreed**

The analysis in Table 1 shows that most respondents agree that students' software brands suffer from limited visibility compared to foreign alternatives (Mean = 3.37) and that lack of advertisements hinders awareness (Mean = 3.43). The mean score of 2.43 for the statement on adequate marketing suggests that respondents disagree that student-made software is well-marketed. However, social media campaigns are seen as a potential solution to improve brand recognition (Mean = 3.57). The cluster mean of 3.19 indicates that market awareness and brand recognition challenges significantly impact student-made software.

Research Question Two

How do infrastructural challenges, such as internet penetration and power supply issues, affect the adoption of student-made software?

Table 2. Infrastructural Challenges Affecting the Adoption of Student-made Software

S/No.	Statements	Mean	Std	Decision
1	Unreliable electricity is a major barrier for student software development.	3.60	0.85	Agree
2	Poor internet connectivity affects the adoption of student-made software.	3.57	0.87	Agree
3	Government investment in infrastructure will enhance software development by students.	3.63	0.88	Agree
4	I frequently encounter issues such as server downtime or glitches in software-made software.	3.33	0.90	Agree
5	Stable electricity is the most urgent infrastructural need for student software developers.	3.67	0.83	Agree
	Cluster Mean	**3.56**		**Agreed**

The analysis in Table 2 confirms that unreliable electricity (Mean = 3.60) and poor internet connectivity (Mean = 3.57) are major challenges for student-made software

adoption. The highest agreement is on the need for stable electricity (Mean = 3.67) and government investment in infrastructure (Mean = 3.63). The cluster mean of 3.56 shows that infrastructural challenges significantly hinder the adoption of student-made software.

Research Question Three

What are the financial challenges faced by software companies established by students, and how do these challenges impact their growth and scalability?

Table 3. Financial Challenges Faced by Student-owned Software Companies

S/No.	Statements	Mean	Std	Decision
1	Student-owned software companies struggle with accessing funding.	3.53	0.89	Agree
2	High-interest loans hinder the growth of student-managed software companies.	3.50	0.91	Agree
3	Student-made software is less affordable than foreign alternatives.	2.97	1.00	Agree
4	Government subsidies for student-made software would enhance affordability.	3.60	0.85	Agree
5	Financial challenges negatively impact innovation in local software development.	3.57	0.87	Agree
	Cluster Mean	**3.43**		**Agreed**

The results in Table 3 indicate that financial constraints, including access to funding (Mean = 3.53) and high-interest loans (Mean = 3.50), significantly impact student-owned software companies. While affordability is a mixed concern (Mean = 2.97), government subsidies (Mean = 3.60) and financial investment would likely boost the sector. The cluster mean of 3.43 highlights financial challenges as a critical factor in student-owned software development.

Research Question Four

How does competition from foreign software impact the market share and growth of local software companies?

Table 4. Competitive Advantage of Student-made Software

S/No.	Statements	Mean	Std	Decision
1	Foreign software brands have a competitive advantage over local student-made software.	3.57	0.87	Agree
2	Locally developed software can compete effectively with foreign software in the local market.	2.97	1.00	agree
3	Better customer service will help student-made software compete with foreign alternatives.	3.60	0.85	Agree
4	Government policies play a crucial role in reducing reliance on foreign software.	3.63	0.88	Agree
	Cluster Mean	**3.44**		**Agreed**

The analysis in Table 4 shows that foreign software brands have a competitive advantage (Mean = 3.57), but improved customer service (Mean = 3.60) and government policies (Mean = 3.63) could enhance Nigerian student software competitiveness. However, opinions on whether Nigerian software can effectively compete are mixed (Mean = 2.97).

The cluster mean of 3.44 suggests that while Nigerian student-made software faces competition, strategic improvements can enhance its market position.

Discussion of Findings

The findings of this study reveal significant challenges facing Nigerian student-made software, particularly in terms of market awareness, infrastructural deficiencies, financial constraints, and competitive disadvantage. These findings align with existing literature on the Nigerian software industry, which highlights similar concerns regarding limited visibility, inadequate infrastructure, and financial struggles (Casado-Lumbreras *et al.*, 2014).

The issue of limited market awareness and brand recognition is evident in the cluster mean in Table 1, suggesting that Nigerian student-made software lacks adequate promotion and visibility. Previous studies, such as those by Yarma *et al.* (2023) have emphasized that local software brands struggle to compete with foreign alternatives due to inadequate marketing strategies. The low mean score for adequate marketing further supports the notion that Nigerian software companies do not engage in sufficient promotional activities. However, the strong agreement on the role of social media campaigns aligns with recent research by Mursu *et al.* (2003), which highlights digital marketing as a crucial tool for increasing software brand recognition. Limited market awareness and brand recognition of Nigerian software can hinder growth and adoption. This can be due to factors like inadequate marketing efforts, competition from global brands, and a lack of trust in locally developed solutions (Sowunmi *et al.*, 2016). Addressing these issues requires strategic marketing, emphasizing the value of Nigerian software, and building confidence in its quality and reliability (Onana, 2021; Karen & Zai, 2022).

The outcomes study also confirms that infrastructural challenges remain a significant barrier to student-made software adoption, with unreliable electricity and poor internet connectivity identified as major obstacles. These findings are consistent with research by Pushak and Foster (2011) and Gwani (2024) who found that Nigeria's inadequate power supply and limited broadband access hinder technology-driven businesses. The strong agreement on the need for government investment in infrastructure reinforces the argument that policy interventions are necessary for the growth of the local software industry (Nneze *et al.*, 2024). Reliable power supply and broadband access are critical for the growth and development of the Nigerian software industry. Poor power supply leads to increased operational costs, decreased productivity, and hinders innovation, while limited broadband access restricts online collaboration, access to resources, and market reach for student software developers (Ngene & Aviara, 2014; Tayo *et al.*, 2016).

Financial constraints, including difficulty accessing funding and high-interest loans, are also key challenges affecting Nigerian software companies. This aligns with findings by Ayalew and Xianzhi (2020), who reported that many tech start-ups in Nigeria struggle with funding due to the high-risk perception of investors. Although affordability concerns were mixed, the strong agreement on the role of government subsidies supports existing recommendations for financial interventions to boost local software development (Edoigiawerie, 2024; Baale, 2025). As highlighted by the outcomes of this study, the Nigerian

software industry, despite its promising talent pool and growing digital economy, continues to face significant challenges, with financial funding constraints being among the most critical. Limited access to funding impedes the capacity of software startups and companies to scale, innovate, and compete globally (Singh, 2024). In contrast to more developed markets where venture capital and institutional investment are more readily accessible, Nigerian firms often rely heavily on personal savings or informal funding sources (Oburo, 2021; Garg & Shivam, 2017).

One major impact of funding constraints is the reduced capacity for research and development (R&D). Software development is resource-intensive and requires substantial investment in human capital, infrastructure, and tools. Without adequate funding, Nigerian developers are unable to invest in the latest technologies or sustain product development lifecycles (Peter & Olufemi, 2023). This results in a reliance on outdated systems and limits competitiveness in both domestic and international markets. Moreover, funding shortages also affect talent retention. The Nigerian software industry frequently suffers from a "brain drain" phenomenon, where skilled professionals migrate to countries with better opportunities and financial rewards (Adebogun *et al.*, 2024). Local student-built firms struggle to offer competitive salaries, further weakening the sector's potential (Unity & Josiah, 2024).

Additionally, investors often perceive the Nigerian software market as high-risk due to macroeconomic instability, regulatory challenges, and limited intellectual property protections (Waziri, 2011; Afolayan, 2022). This perception hinders the influx of foreign direct investment and curtails growth opportunities for emerging software firms (Edosomwan, 2019; Komolafe, 2021). The line of reasoning emanating from the present study agrees with the work of Mursu *et al.* (2003) which produces a rank-order list of software risk factors and compares results with an earlier study, showing significant differences. Obtained rankings signal the importance of the infrastructure-related and socio-economic software risks in developing countries like Nigeria. This demonstrates the importance of understanding the broader socio-economic context in identifying and managing software risks. Thus, the choice of contingent mitigation strategies of project managers plays a less important role, because the risks are so deeply engrained with the poor quality of basic infrastructure services (Mursu *et al.*, 2003). Evidently, the main differences in software development when compared to industrial countries are in a socioeconomic and infrastructural context, rather than in technical issues. The software industry in Nigeria is professional and ambitious, and capable of providing IT solutions for local companies, but the resources for IT investments are scarce (Mursu, 2002).

Efforts by the Nigerian government, such as the establishment of tech hubs and innovation funds, have been commendable (Okoeguale, 2024; Abakpa *et al.*, 2018). However, these initiatives often lack continuity or are insufficient in scope to address the deep-seated funding issues. More robust policy interventions and public-private partnerships are required to build a sustainable funding ecosystem for software development in Nigeria (Adegbiji, 2021). funding constraints have a multidimensional impact on the Nigerian software industry – limiting innovation, stifling growth, and causing

talent attrition. Addressing this issue is critical for Nigeria to fully harness its digital potential and participate competitively in the global tech economy (Iji & Abah, 2017). The results of this study affirm that government subsidies (Mean = 3.60) and financial investment would likely boost the sector, strengthening the development of student-made software.

In terms of competitiveness, the findings of this study suggest that foreign software brands hold a significant advantage over Nigerian-made software. This is consistent with the work of Soriyan and Heeks (2004) and Casado-Lumbreras *et al.* (2014), who argued that foreign software dominates the Nigerian market due to superior branding and customer trust. However, respondents strongly agreed that improved customer and favourable government policies could enhance Nigerian software competitiveness. This is in line with studies by Ekanem and Peter (2020), which emphasize the role of customer support and regulatory frameworks in strengthening local software industries. The mixed perception regarding Nigerian software's ability to compete indicates the need for further investment in quality improvement and strategic positioning.

Expanding market reach and achieving international competitiveness require significant investment in marketing, sales, and infrastructure. Funding constraints can restrict Nigerian student-owned software companies' ability to effectively market their products and services, both domestically and internationally. This limited market presence can hinder growth and make it difficult to compete with established global players who have greater financial resources (Ibor *et al.*, 2017). The growth of student-made software for international competitiveness requires a multifaceted approach that includes investing in quality education, fostering innovation, and strengthening digital infrastructure. Nigerian software developers have shown exceptional talent, but to scale globally, the industry must adopt international standards in software development, cybersecurity, and data protection. Government support through favourable policies, funding, and tax incentives can also help local tech startups grow and access foreign markets (Du & Banwo, 2015). Furthermore, building partnerships with global tech companies and participating in international tech expos can enhance visibility and credibility. By focusing on capacity building, regulatory alignment, and global collaboration, Nigeria can position its software industry as a competitive player on the world stage (Bayo *et al.*, 2007).

The findings from this study align with existing literature on the challenges faced by Nigerian software companies, particularly in the areas of market recognition, infrastructural barriers, financial constraints, and foreign competition. For instance, Ogidiaka *et al.* (2022) highlight how limited recognition of local software in the Nigerian market is compounded by inadequate infrastructure, which affects the quality and reach of products. Financial constraints, particularly access to capital, have also been identified as a major obstacle by Ogbonna (2023), limiting the ability of Nigerian software companies to innovate and expand. Moreover, competition from foreign software, often perceived as superior in quality and functionality, further undermines the competitiveness of local firms, as noted by Agbeyangi *et al.* (2024). These findings are consistent with previous research that suggests a need for government intervention in improving infrastructure, enhancing access

to funding, and fostering market awareness to promote the growth of the local software industry (Oladeji, 1998; Binuyo *et al.*, 2024; Oladeinde *et al.*, 2023).

Conclusion

This study has examined the challenges and prospects of marketing student-made computer software, with a focus on market recognition, infrastructural barriers, financial constraints, and competition from foreign brands. The findings indicate that Nigerian student-made software faces limited market visibility due to inadequate marketing strategies and consumer preference for foreign brands. Respondents highlighted that social media campaigns and digital marketing strategies could improve awareness and adoption.

Additionally, infrastructural challenges, particularly unstable electricity and poor internet connectivity, significantly hinder software adoption and growth. Most respondents agreed that government investment in technology infrastructure could mitigate these barriers. Financial constraints emerged as a key issue, with many Nigerian student-built software companies struggling to secure funding. High-interest rates on loans and limited access to venture capital make it difficult for startups to scale. Government subsidies and financial incentives were recommended by the respondents in this study to alleviate these challenges.

Regarding competition, foreign software dominates the market, with respondents acknowledging that established international brands enjoy greater trust and recognition. However, respondents also suggested that local software companies could leverage better customer service and localized solutions to gain a competitive edge.

The study concludes that while Nigerian-made computer software has significant potential, several challenges must be addressed to enhance its marketability and sustainability. The lack of visibility and recognition hampers adoption, making it necessary for companies to invest in digital marketing and branding strategies. Furthermore, infrastructural deficiencies, particularly unreliable electricity and poor internet services, limit the effectiveness of software applications, thereby affecting user experience and adoption rates. Financial constraints remain a crucial issue, preventing software developers from expanding their operations and improving their offerings. Support from financial institutions and government-backed initiatives would be essential in fostering growth within the industry. Although foreign software currently holds a competitive advantage, Nigerian developers can capitalize on opportunities in localized solutions, fintech, e-commerce, and ed-tech sectors. By focusing on quality improvement, better customer service, and strategic government support, Nigerian software companies can enhance their global competitiveness.

Recommendations

The findings of this study have made it eminent to outline actionable strategies and policy suggestions aimed at addressing the identified challenges. These recommendations provide practical solutions for stakeholders, including government agencies, software developers, and investors, to improve the Nigerian software industry's marketability and sustainability.

1. Enhancing Market Recognition: Nigerian software companies should invest in aggressive digital marketing strategies, including influencer partnerships, social media campaigns, and targeted advertising to improve brand recognition. Collaboration with local and international tech firms can also enhance visibility and credibility.
2. Infrastructure Development: The Nigerian government should prioritize investments in stable electricity and broadband internet expansion to support the digital economy. Tech hubs should also be supported with uninterrupted power supply and better internet services to encourage innovation.
3. Financial Support and Funding Access: Financial institutions, should provide or create tailored funding options for tech startups, including grants and low-interest loans. Government-backed initiatives such as tax incentives for software developers and venture capital support could also enhance financial accessibility for startups.
4. Improving Competitiveness: To compete with foreign brands, Nigerian student software developers should focus on providing superior customer support and creating localized solutions that cater to Nigerian businesses and consumers. Price differentiation, loyalty programs, and improved user experiences can also enhance competitiveness.
5. Regulatory and Policy Support: The government should enforce stronger intellectual property protection laws to prevent software piracy and encourage investment in local software development. Simplifying business registration and compliance processes can also help attract more tech entrepreneurs.
6. Encouraging Industry-Academia Collaboration: Educational institutions should collaborate with software companies to develop tailored programmes that equip students with relevant skills. Internship programs, coding boot camps, and tech incubators should be expanded to bridge the talent gap in the software industry.
7. Expanding Local and International Market Reach: Nigerian student-owned software companies should explore opportunities in neighbouring African markets by leveraging the African Continental Free Trade Area (AFCFTA). Additionally, strategic partnerships with international companies can facilitate knowledge transfer and market expansion.

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