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Influence of Technological Innovation and ICT Utilization on Startup Success

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Abstract **Original Research Article**

In the modernized and more digitally advanced economy, new businesses face a dualistic challenge of applying technological innovation and information and communication technology (ICT) to gain sustainable success. The paper is a conceptual one that explores the degree and combined effect of technological innovation and use of ICTs on the growth, competitiveness and survival of startups particularly those in emerging markets such as Nigeria. The research is a product of the issue of high mortality rate in startup due to low innovation capacity, low adoption of ICT and inadequate digital infrastructure. The overall objective is to explore the role of innovation capabilities and ICT tools as facilitators of performance and sustainability of startups. Therefore, the conceptual research approach ensures that through secondary data relied upon in the research by other scholars, books, industry reports, and the policy documents are used only. It has been shown during the analysis that technological innovation, the use of ICTs impact on the efficiency of the operations, market growth, and long-term growth in their own, whereas their complementarity determines the overall success outcomes. These effects are however mediated by a number of contextual factors including infrastructure, digital literacy and policy environment. In the paper, it is suggested that start-ups should embrace innovative strategies as they work toward adopting ICT tools and systems. It also advises policymakers to support entrepreneurs by ensuring a more enabling digital environment that encourages growth and helps emerging businesses scale successfully.

Keywords: Technological Innovation, ICT Utilization, Startup Success, Digital Transformation, Emerging Economies.

1.0 Introduction to the Study

1.1 Background of the Study

The technological invention and the involvement with information and communication technologies (ICT) have become dominant forces of start-up developments, competitiveness and long-term sustainability in the global entrepreneurial ecosystem. In developed economies, ICT capital services, digital market, and techno capabilities complement such innovation performance, acquisition and retention opportunities to new business ventures (Afawubo and Noglo, 2022; Usman and Sun, 2023; Choi et al., 2020). Increasingly, investments in digital infrastructure -- including wireless broadband, 5G connectivity, IoT and cybersecurity -- have come to be identified as key enablers of sustainable start-up performance and strategic expansion (Olota, 2025). In emerging economies, adoption of digital technologies offers opportunities to overcome traditional bounds to markets and highly supports the development of entrepreneurs. ICT is cost effective for business operations, access export

market, better logistics, and innovation driven growths as small and medium size firms mostly adopt ICT for business operations, particularly for growth of middle to medium size firms (Masenyetse & Manamathela, 2023; Alam et al., 2022). Studies in regions such as Southern Africa and Australia emphasize that start-ups who could figure out ways of combining ICT skills with technology-enabled approaches often have a better performance even in resource-limited settings (Alam et al., 2022; Kihombo, 2019).

Within the African context, ICT adoption supports the positive contribution that entrepreneurship has in boosting economic growth and promotes the performance of young firms operating in dynamic environments (MDPI Journal of Risk and Financial Management, 2024; Li et al., 2021). However, structural challenges such as weak infrastructure, lack of digital skills, high costs of adoption, and regulations continue to hinder business development driven by technology in many African countries (Yuwono, Suroso & Novandari, 2024). Specifically in West Africa, technology-based firms are recognized as new contributors to the quality of jobs and innovation. Their success is becoming more linked to the capabilities of technological innovation and ICT integration in business operations (Okpalaoka et al., 2022; Machiri et al., 2023). During and after the Covid-19 era, the firms in the region have managed to establish that the adoption of ICTs not only helps to enhance the efficiency of operations but also enhances the resilience and performances of workers (Li et al. 2021; Sundararajan et al. 2022).

Nigeria as one of the largest hub for tech-entrepreneurs in West Africa and hence witnessed great growth in Digital driven business of tech start-ups in sectors such as fintech, agritech, health-tech, commerce etc. Research has found out that ICT utilization, digital marketplace innovation, managerial support and talent capability, and strategic orientation have significant impact on the growth and sustainability of start ups in the Nigerian context (Mohammed, 2023; Muhammed et al., 2022; Mohammed et al., 2024). Yet, Nigerian start-ups still grapple with a number of barriers that have to do with access to the required infrastructure, adapting to the necessary technology and innovation capabilities -- all of which pose a threat to the survival rate of startups in the early stage (Kumar et al., 2024; Mohammed & Sundararajan, 2023).

Thus, the importance of understanding how technological innovation and ICT utilization affect the success of a start-up venture still remains crucial especially in Nigeria and other developing economies with similar economies where innovation is needed for economic transformation, job creation and global competitiveness.

1.2 Problem Statement

Despite the worldwide recognition of technological innovation and ICT utilization as important drivers of entrepreneurial performance, start-ups in the developing economies still experience some structural, strategic, and capability-related problems that affect their success. Globally, evidence exists that ICT integration and digital transformation lead to innovation, market expansion and sustainable competitiveness (Koellinger, 2008; Autio, 2018; Olota, 2025). However, how much these benefits can translate to meaningful start-up success in emerging markets is inconsistent due to variations in the quality of infrastructure, digital literacy and ecosystem maturity (Afawubo & Noglo, 2022 Yuwono, Suroso & Novandari, 2024). In Africa, while ICT adoption is moderating and strengthening the relationship between entrepreneurship and economic growth (MDPI Journal of Risk and Financial Management, 2024), many start-ups are struggling with making technology investment translate into measurable outcomes of performance. Weak digital infrastructure, poor access to finance and lack of ICT skills continue to be the challenges compromising the productive use of technology in innovation and scalability (Okpalaoka et al., 2022; Li et al., 2021). Start-ups in Southern and Eastern Africa that combine ICT with export activities/digital market platforms have better growth performance (Masenyetse & Manamathela, 2023), but synergies are not equally popular in the continent.

In the West African situation, especially in

Nigeria, the difference between technological potential and success in starting a business is clear. Growing use of ICT tools could be seen on Nigerian start-ups for the development of the products, marketing, and customer engagement (Mohammed, 2023; Sundararajan & Mohammed, 2023). Nonetheless, a high rate of them fail to maintain operations past the early stages of growth due to insufficient technological innovation capacity, siloed digital environments, and poor alignment between technological adoption and business strategy (Mohammed et al., 2024; Machiri et al., 2023). Moreover, while global research has been focusing on the importance of ICT complementing the other factors of human capital and organizational practices (Koellinger, 2008; Afawubo & Noglo, 2022), the understanding of the empirical relationship of these factors in a startup in Nigeria is still limited. This has led to a major conceptual and practical gap, in a lack of coherent frameworks in the technological innovation and ICT utilization as dual enablers of start-up success.

Consequently, there is an urgent need to address the relationship between the interaction of innovation capabilities and ICT usage in shaping the outcome of the start-up in Nigeria and other such developing economies. Addressing this problem is important with the goal to inform policy, entrepreneurial strategy and capacity development initiatives to improve the sustainability, competitiveness and contribution of the start-up industries to the national development effort.

1.3 Significance of the Study

This research is important for a number of reasons, both academic and managerial, and even policy-oriented. First, it moves academic knowledge of the role of technological innovation and ICT use in contributing to start-up success an issue in which existing research in developing economies is fragmented. Although there is global proof of the existence of a strong link between ICT adoption, innovation capability, and firm performance (Koellinger, 2008; Usman and Sun, 2023; Olota, 2025) and the nature of the underlying mechanisms is clearly explained in the context of developing digital entrepreneurial ecosystems such as Nigeria, it is limited to the study of emerging digital entrepreneurial ecosystems. Second, this study adds to the issue of regional development priorities. Across Africa, the impact of ICT on the efficiency of entrepreneurship to spur economic growth has been proven (MDPI Journal of Risk and Financial Management, 2024). However, there remain gaps in knowledge regarding how start-ups may strategically use ICT infrastructure, skills, and innovation capacity to overcome market access, resource scarcity, and environmental uncertainty challenges (Li et. al., 2021; Yuwono, Suroso & Novandari, 2024). By focusing on Nigeria -- one of the African regions where innovation is at a high level -- the study produces insight that is context specific and is relevant to policy makers, incubators and development agencies who support technology driven entrepreneurship.

Third, the study offers practical value to start-up founders as well as managers. Prior researches emphasize that the use of digital technologies alone is not a sure-divisive in terms of its success unless supported by complementary skills, organizational culture, and strategic capability developing (Autio, 2018; Okpalaoka et al., 2022; Mohammed et al., 2024). This study will inform start-ups on how to structure technological investments and innovation routines that signifies to tangible performance outcomes that will improve survival and scaling prospects. Fourth, the results are in favour of the strategic improvement of innovation and ICT policies. Evidence from emerging economies shows that if there are no enabling regulatory environments, digital skills development and infrastructure investments, people's commitment to using ICTs often creates very little economic impact (Masenyetse & Manamathela, 2023; Afawubo & Noglo, 2022). Insights from here will help policymakers to develop interventions that are in line with innovation funding, talent development and digital ecosystem strengthening.

However, the study is favorable to the academic community as it adds to the theoretical expansion integrating Resource-Based View (RBV) and Technology Acceptance Model (TAM) to explain internal technological capabilities and user acceptance factors in interaction with start-

up success in developing contexts. This integration solves conceptual voids identified in the recent literature of innovation and ICT (Yuwono, Suroso & Novandari, 2024; Mohammed, 2023).

1.4 Research Objectives

The main objective of this study is to examine the influence of technological innovation and ICT utilization on start-up success, with a focus on emerging economies such as Nigeria.
This paper aims particularly to:

1. To determine how technological innovation can be used to improve the performance and sustainability of start-ups.
2. To reflect on the effect of ICT usage in terms of operational efficiency, market growth and start-up success.
3. To establish the overall impact of the technological innovation and the use of ICT on the growth, competitiveness, and survival of start-ups.
4. To establish the contextual enablers and constraints that shape ICT-enabled innovation within start-up settings especially in the West African ecosystem and specifically in Nigeria.
5. To offer strategic advice to entrepreneurs, investors and policy makers to use ICT and innovation to develop scalable start-ups.

1.5 Research Questions

1. What is the impact of technological innovation on performance and sustainability of start-ups?
2. In what ways does ICT utilization support operational improvement and competitiveness among start-ups?
3. What is the combined impact of ICT utilization and technological innovation on start-up growth and survival?
4. Which ecosystem factors enable or hinder effective ICT-driven innovation in Nigerian and West African start-ups?
5. What strategic measures can strengthen ICT and technological innovation adoption for improved start-up success in emerging economies?

2.0 Literature Review

2.1 Conceptual Review

2.1.1 Technological Innovation (IV1)

Definition and Evolution of Technological Innovation

Technological innovation is the process of creating and using new technologies for producing or improving products, services or business processes that create value and competitive advantage (Yuwono, Suroso, & Novandari, 2024). It includes the integration of digital technologies (including ICT, automation and data-driven systems) into entrepreneurial activities for improved productivity and sustainability. Over the decades there has been technological innovation ranging from industrial mechanization to digital change that has been characterized by the implementation of artificial intelligence (AI), the Internet of things (IoT), cloud computing, and cybersecurity frameworks (Olota, 2025). In the context of start-ups, innovation is not restricted to invention but involves the creative combination of existing technologies in response to emerging market needs in an efficient way (Mohammed, 2023).

Product, Process, and Business Model Innovation

Sometimes innovation takes the form of product-based innovation (innovating to improve or launch new products), process-based innovation (making things better and using the results to improve or make products), and business model based innovation (redefining how the business delivers value). Start-ups in fintech and other technology-driven markets are increasingly using a combination of these three dimensions to produce agile and scalable business solutions. For instance, process innovation by integrating payments via the web internet or boosting customer support automatics offer greater efficiency and market responsiveness (Mohammed & Sundararajan, 2023).

Digital and Platform-Based Innovation

The rise of digital platforms has redefined innovation and start-ups can use network effects and data analytics to gain market insights and personalization. According to Yuwono, Suro and Novandari (2024), digital innovation through ICT, enterprise resource programs (ERP) and cloud computing become a catalyst for entrepreneurial activities in competitive markets. Start-ups that use platform-based business models - e-commerce, financial technology, digital logistics, etc. - are able to scale faster and integrate ecosystems more effectively (Mohammed, 2023; Kumar et al., 2024).

Agile and Lean Innovation for Startups

Agile and lean methodologies are focused on iterations development, flexibility, and continuous improvement - important success factors for modern start-ups. Aliyu (2023) and Sundararajan, Mohammed, and Senthil Kumar (2023) emphasize that agile innovation helps start-up to adapt to uncertain environment, reduce waste and customer feedback will be responded rapidly. These principles also coincide in technological innovation by approving experimentation and rapid prototyping and customer-s instalment approaches to product evolution crucial in volatile digital markets.

Innovation Capabilities and R&D Inputs

R&D investments, human capital development and knowledge management systems are the backbone of innovation capability. A research on 9,171 Italian start-ups also showed that R&D expenditure does not account for guarantee of success, unless it is combined with skilled workforce and intellectual property assets (patents, software etc.) (The Journal of Technology Transfer, 2024). Similarly, Mohammed et al. (2024) underlined that strategic human resource management and entrepreneurial orientation reinforce the relationship between innovation and sustainable growth. This reinforces that innovation requires both tangible inputs (e.g. funding, infrastructure) and intangible resources (e.g. skills, creativity and culture).

Innovation Infrastructure (Cybersecurity, IoT, 5G, Cloud bases)

Technological infrastructure is an important enabler of innovation. Olota (2025) conducted a study which found that the following elements of connectivity had a significant impact on start-up sustainability: 5G networks (b = 0.363), the cyber security measures (b = 0.252) and the IoT systems (b = 0.223). These infrastructures do not just improve operational resilience, but they also support real-time data processing, automation and safe digital ecosystems. Furthermore, the cloud-based technologies offer scalable storage and computing powers that alleviate entry barriers for start-ups in the developing economies (Yuwono et al., 2024).

Role of Innovation in Competitive Advantage and Growth

Innovation is a strategic driver of competitiveness such as differentiation of product, cost reduction, and enhancement of service delivery. Within the framework of the Resource-Based View (RBV), technological innovation is viewed as a valuable, rare and inimitable capability which contributes to the performance and survival of firms (Mohammed & Sundararajan, 2023). Empirical data highlight the fact that the combination of technological innovation and ICT-driven agility shows start-ups grow faster and also have higher survival rates (Li et al., 2021; The Journal of Technology Transfer, 2024). Thus, innovation isn't only a catalyst for the success of start-ups but is a determinant of sustainable competitive advantage as well.

2.1.2 ICT Utilization

Concept of ICT Utilization in Startups

Information and Communication Technology (ICT) utilization is considered to refer to the effective adoption and use of digital tools, systems and networks in the interest of improving business operations, communications and decision-making. In the case of the startup ecosystem, the use of ICTs represents more than the deployment of a hardware and software solutions and has to be in accordance with

entrepreneurial strategy and innovation objectives (Yuwono, Suroso, & Novandari, 2024). ICT has added value in collaboration, knowledge sharing and data-driven decision-making that are important to start-up agility and growth (Mohammed, 2023). Moreover, utilization of ICTs offers an opportunity to bridge gaps in the operation and also providing scalability-that is, enabling small businesses to compete with large-to-established players (Li et al., 2021).

Digital Transformation Enablers

Digital transformation for start-ups is enabled by ICT as an integral enabler so that firms may digitalize their processes, reconfiguration of business models, and value delivery using innovative platforms. Some important enablers are connectivity, automation, artificial intelligence, and data analytics (Olota, 2025). Having a strong infrastructure for ICT (special, broadband network, cloud storage, cyber security etc.) is the basis for innovation and operational efficiency (Yuwono et al., 2024). In case of fintech business and technology oriented ventures, it is ICT-enabled change that brings in transparency, customer engagement, and financial inclusion, particularly within the emerging market of Nigeria (Mohammed and Sundararajan, 2023).

ICT Tools for Startup Operations (Cloud, Analytics, Social Media, E-commerce)

Startups use many different ICT tools to facilitate day-to-day operations and strategic growth. Cloud computing provides flexibility and scalability by implementing a way for businesses to manage their resources effectively and also to collaborate remotely (Yuwono et al., 2024). Data analytics is a way to support Evidence Based Decisions, this provides insights into customer behaviour, market trends, and financial performance.Data analytics supports evidence based decisions: which gives insight into customer behaviour, market trends and financial performance (Mohammed, 2023). Social media platforms serve as marketing and branding instruments and customer interaction tools that expand market reach and foster interaction with minimal cost (Sundararajan & Mohammed, 2022). E-commerce systems allow for digital sales and services, which are essential in reaching underserved and geographically spread out markets (Mohammed, 2023). Collectively, these tools add value to enhance competitiveness and responsiveness of start-ups in dynamic markets.

Models of Technology Adoption (TAM/UTAUT Perspective)

The adoption and use of ICT within the start-ups can be explained by the established theoretical models called the Technology Acceptance Model (TAM) (Davis, 1989) and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al, 2003). These models implicates the perceived useful and ease of use for adoption of ICT by entrepreneurs and employees. Studies such as the MDPI (2024) research on ICT and entrepreneurship in Africa confirm that when the percentage of ICT adoption increases, the positive effect of entrepreneurship on economic growth increases. Similarly, Yuwono et al. (2024) have noted that the effectiveness of ICT is not only necessary but on the capability and strategic intent of users. This illustrates the importance for start-ups to develop digital literacy and adaptive technological cultures.

Barriers to ICT Utilization in Developing Markets

Notwithstanding its potentials, the adoption and utilization of ICT in the developing economies is not without challenges. Limited availability of financial resources, obstacle in infrastructure, lack of ICT knowledge and reluctance to bring about change are fixed issues for small businesses (Yuwono, Suroso, & Novandari, 2024). The combination of high internet costs, unreliable power supply and regulatory obstacles is an additional factor that hinders ICT benefits from becoming fully realised in many African contexts (Li et al., 2021). Such limitations tend to result into the underuse of available technologies, or start-ups using older systems in their quest to achieve a competition. Mohammed (2024) also raises the point that making sure that the nature of these challenges are addressed requires specific

policies toward promoting digital inclusion, workforce upskilling, and public-private investment partnerships.

ICT as a Driver of Market Reach and Cost Efficiency

ICT utilization enables the startups to establish presence in the market, lower the operational expenses and improve customer satisfaction. By incorporating the use of ICT solutions in the supply chain management, marketing and communication sectors, start-ups can efficiently and competitively evolve their business by limited resources (Mohammed & Sundararajan, 2023). Empirical evidence from the Africa economies indicate that the adoption of ICT accentuates the effectiveness of entrepreneurship on economic growth through broader market access along with business process optimization (MDPI, 2024). Furthermore, ICT creates increased transparency and accuracy of data thus building a trust and credibility crucial attributes in young firms to obtain investor confidence and customer loyalty (Olota, 2025).

In essence, ICT utilization is both a technological and strategic collaborative force behind success of a start-up. Its potential to disrupt operational efficiency, market penetration and innovation outcomes, it is one of the cornerstones of sustainable entrepreneurship in the digital era.

2.1.3 Startup Success

Concept and Indicators of Startup Success

Startup success in business and statistics, startup success is the capacity of new ventures to reach sustainable operations, receive acceptance by the target market, and have a positive and sustained behavior over time. Success in startups is usually measured through various criteria, including survival of a business, production of innovation and financial profitability, as well as customer acquisition (The Journal of Technology Transfer, 2024). In the field of technology-driven enterprises, it is common that their success relies on how well companies can utilize digital tools and new capabilities to adapt to changing market demands (Mohammed, 2023).

Survival, Growth, Profitability, and Market Expansion

With the high rates of failure during the early years of startup operation, survival is the most fundamental indicator of startup success. Innovativeness in terms of patented technologies, software development and skilled workforce is shown to improve survival prospects by a large margin (The Journal of Technology Transfer, 2024) Growth in revenue and the number of employees is another indicator of performance progression and scalability. Profitability proves financial tenacity and further reinvestment and operations. Furthermore, expansion into new markets and customer segments serve as a signal for positioning competitively and having strong business capability Li et al. (2021).

Role of Innovation and ICT in Success

The use of ICTs and technological innovation are also enabling factors of a successful startup particularly in digital and fintech ecosystems. Well-developed technological infrastructure such as 5G connectivity, IoT infrastructure and cybersecurity systems has their part to play in enhancing improved operation efficiency, customer confidence and strategic flexibility (Olota, 2025). The use of ICT increases market coverage, constrained operating costs, and informed decision-making processes using data in assisting startups in maintaining competitiveness in changing environments (Yuwono, Suroso, and Novandari, 2024). Studies across African entrepreneurs demonstrate that ICT adoption positively increases the impact of entrepreneurship on economic growth on an indirect reflection of higher startup performance (MDPI Journal of Risk and Financial Management, 2024).

Sustainability as a Success Dimension (Economic, Social, Competitive)

Modern conceptualizations of business success go beyond the mere financial gain to include sustainability dimensions. Economic sustainability guarantees to be profitable and efficient in terms of resources long term. Social sustainability involves ethical practices and job

creation and encourages community development, which enhance legitimacy and stakeholder trust (Li et al., 2021). Competitive sustainability, refers to the capacity to continue innovation pace, technological development and enables startups to stay relevant in the market. For technology-driven businesses, integration of digital capabilities (resilience and human capital capabilities) is critical to achieve long-term sustainable success (Mohammed, Shanmugam, Subramani & Pal, 2024).

Success Challenges for Startups in Emerging Economies

Despite the known significance of innovation and ICT, it is proven that there are recurrent impediments to success for startups in places like Nigeria, an emerging market. Limited access to financing, poor digital infrastructure, skills shortage, and inconsistencies in policies are great operation burdens (Yuwono et al., 2024). Additionally, Tech Acquisition High Costs, Security Issues, and Limited Entrepreneurial Support Systems are common, limiting scalability and ability to survive often are common causes (Mohammed, 2023). The competitive nature of the developing economies further requires fast adaptability, but many startups have difficulty incorporating ICT and effective integration due to the resources and capabilities limitations (Sundararajan & Mohammed, 2023).

In summary, literature had confirmed that start-up success is multidimensional which has been influenced by innovation capacity, ICTadoption, operational efficiency and environmental support systems. The more digitally equipped and innovation-oriented the startups, the better their chances overall to thrive and maintain a competitive edge in the dynamic global economy.

2.2 Theoretical Framework

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), which was initially proposed by Davis (1989), describes the process of how a user will accept and use a specific technology. The model is based on the idea that two important beliefs - Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) conditions an individual's behavioral intention to adopt and use technology. In the context of start-ups, TAM forms a useful basis to understand how start-up entrepreneurs and employees embrace ICT tools and digital innovations in their work. Some of the perceived benefits of ICT utilization in start-ups include efficiency, effective communication and cost-effectiveness (Li et al., 2021; Kihombo, 2019). However, barriers, such as limited ic technology knowledge, poor infrastructure or resistance to change devices are limiting the usefulness perceived or ease of use (Yuwono, Suroso, & Novandari, 2024). Applying TAM in this study helps to explain the influence of acceptance and uptake of ICT systems on the outcome of operation and start-up success. Moreover, in emerging economies such as Nigeria the user's attitude towards use of technology often mirrors larger infrastructural and cultural limitations (Masenyetse & Manamathela, 2023). Therefore, TAM offers a lens for examining the role of beliefs of start-up founders, technological competence as well as access to enabler ecosystems in determining their ability to effectively adopt and integrate ICT for the purpose of gaining competitive advantage.

Resource Based View (RBV) Theory

The Resource-Based View (RBV) pioneered by Wernerfelt (1984) and refined by Barney (1991) argues that firms gain sustainable competitive advantage because of: the acquisition and effective use of valuable, rare, inimitable, and non-substitutable (VRIN) resources. Within the context of start-ups, technological innovation and ICT capabilities possess strategic resources that can lead to better performance and long-term growth (Okpalaoka et al., 2022; Olota, 2025). From the RBV perspective, the capacity of a start-up to integrate advanced digital systems (e.g., IoT, AI, 5G, cloud computing) and turn them into operational competencies generates barriers to imitation and supports unique competitive positioning. Empirical evidence backs this up - firms that have better technological capabilities, human capital and digital infrastructure repeatedly outperform their peers (Machiri et al. 2023; Alam et al. 2022). Intangible technological

capabilities, including innovation routines, ICT competence, and digital strategic orientation, take center stage in generating success in the realm of the emerging economies in which presence in and access to tangible assets is generally limited (Afawubo and Noglo, 2022; Mohammed et al., 2024). Therefore, the conclusions made in the end of this article are founded on the RBV theory.

Rationale for Theory Selection

The integration of TAM and RBV provides a way to explain in a comprehensive the impact of technological innovation and use of ICT to the success of startups. TAM describes both behavioral and the perceptual aspect of technology adoption - why the ICT tools are being used by start-ups and how the perceived usefulness or the perceived ease of use are affecting adoption. Looking at the difference, RBV describes the strategic and performance consequences - how the acquired technologies become an important internal resource that leads to sustainable competitive advantage. These theories are used together to integrate and reduce the micro (user-level acceptance) and macro (organizational resource capability) viewpoints. There is much to this two-theoretical basis, in the context of the complementarities between the use of ICT and technological innovation in the serve of the growth, sustainability, and expansion of start-ups, particularly within resources-limited contexts such as in Nigeria and more than West Africa (Li et al., 2021; Yuwono et al., 2024; Olota, 2025).

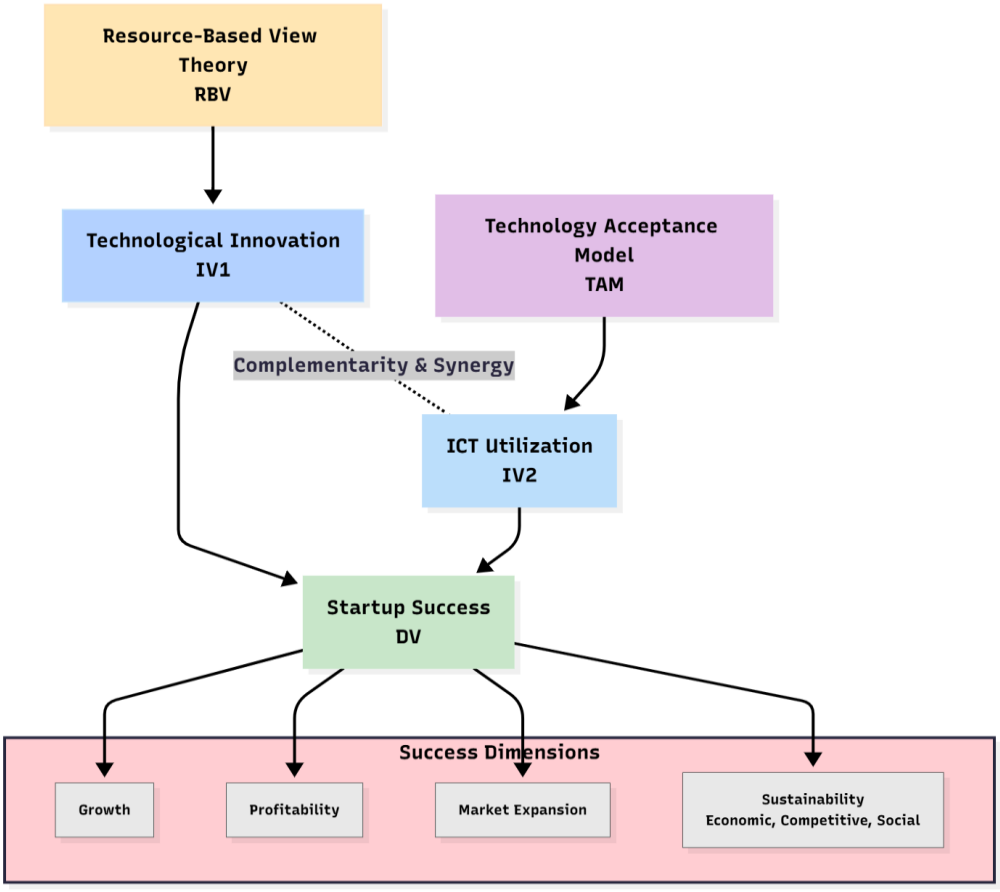

Figure 1: Integrated Theoretical Linkage Model on Technological Innovation, ICT Utilization, and Startup Success

Source: This is a compilation of Afawubo and Noglo (2022); Okpalaoka et al. (2022); Alam et al. (2022); Li et al. (2021); Masenyetse and Manamathela (2023); Usman and Sun (2023); Olota (2025); Journal of Technology Transfer (2024)

The conceptual model shows that technological innovation and ICT utilisation are two strategic enabling factors of success of start-ups guided respectively by the Resource- Based View (RBV) and Technology Acceptance Model (TAM). The innovation of technology contributes to special valuable competences that can include product development, process refinement, R&D investments, and digital infrastructure - which may boost the competitive advantage and increase the probability of survival. ICT is utilized to enhance the operational productivity, accessibility to the market, and any type of digital scalability of the operations using instruments such as cloud platform, social media, analytics, and e-commerce. The model identifies a complementary interaction further as ICT turns into a multiplier force that ensures the commercialization effect and productivity of innovation activities, and innovation demands more ICT interaction in their delivery and advancement. Combined, the constructs can affect multidimensional startup success i.e. growth, profitability, expansion in the market, and long term sustainability specifically in resource constrained entrepreneurial ecosystems.

2.4 Empirical Review

Empirical research indicates that the use of software engineering practices is increasingly becoming relevant in enhancing performance of organizations, productivity, and value creation. Agile practices, DevOps and continuous quality assurance have been observed to achieve the efficiency of product delivery and dynamic business environment flexibility (Bakar and Dorasamy, 2023; Sundararajan, Mohammed and Senthil Kumar, 2023). Moreover, it was also discovered through the study that user-centric design methodologies and systematic documentation minimize both operation-related risks and help organizations to maintain technology-based operations continuously and in the long run. Equally, efficiency and responsibility in internal processes are enhanced by strategic digital structural qualities because of ERP, CRM, and automated testing systems, which also allow the advanced sophistication of competitive advantage and business continuity (Obiki-Osafiele et al., 2024).

The embracing of technology has been one of the leading forces of sustaining businesses in the global arena. According to the recent evidence, it demonstrated that the innovations of cloud computing, artificial intelligence, and FinTech application help to increase the level of operational agility, reduce the cost structure, and ensure the digital transformation is secured at an accelerated pace (Voorneveld, 2024; Gharpure and Ghodke, 2021). Empirical studies also suggest that technology adoption is highly correlated with market competitiveness, customer satisfaction and general sustainability impacts with varying extents in different industries and economies (Endrodi-Kovacs et al., 2024; Maluleke and Mutoko, 2024). Access to finance and readiness in digital capability has also been identified as enabling mechanism for business growth in SME ecosystems (Kurniasari et al., 2025).

In the developing regions of the world, evidence shows that there are large disparities in technology readiness and adoption. Nigerian and African businesses continue to be constrained by limited infrastructure, high cost of digital tools, low digital literacy and cultural resistance to change reducing the operational benefits of technology initiatives (Okoye et al., 2023; Abdul-Majid et al., 2024). Although it has shown its benefits in productivity and sustainability with the adoption of IT by other sectors such as agriculture, finance and telecommunications, the absence of policy support and internal management competencies is still hindering the long term results (Abdul-Majid et al., 2024; Bakar & Dorasamy, 2023). The empirical research work seems to suggest that organisational model should build better innovation model, skills development and system integration capability to support sustainable technology enabled growth (Seidel et al, 2010; Ch'ng et al., 2021).

2.5 Research Gap

Despite growing interest from the

scholarly community, there are still several gaps that need to be filled. Conceptually, combining software engineering practices and technology adoption as joint predictors of business sustainability has been less investigated in the past with a focus on performance and productivity more than sustainability outcomes (Gharpure and Ghodke, 2021; Endrodi-Kovacs and et al., 2024). Contextually, little has been empirically done about the emerging markets, especially in Sub-Saharan Africa, where the problems of adoption and infrastructural problems add unique dynamics to the picture (Okoye et al., 2023). Theoretically most of the studies are applying either RBV or technology adoption perspectives separately rather than borrowing a coherent framework that explains the integration of data internal engineering capacity to work for digital sustainability. Methodologically, the literature review is largely weighted towards quantitative cross-sectional research with inadequate triangulation, mixed-method approaches, and validation in various business sectors (Kurniasari et al., 2025; Maluleke and Mutoko, 2024).

This research thus addresses a significant gap in the knowledge system by suggesting the development of a holistic conceptual framework for the relationship of the practices of software engineering, and technology adoption with business sustainability -- using RBV and TAM -- but specifically in focusing on organizations in developing economies such as Nigeria, that engage in technology.

2.6 Conceptual Framework

This conceptual framework suggests that technological innovation and ICT utilization are very important strategic enablers that are considerably predictive of startup success. Guided by the Resource-Based View (RBV), innovation capabilities such as advanced infrastructure and R&D are seen as rare and valuable assets to startups and elevate their competitiveness. Meanwhile, Technology Acceptance Model (TAM) argue for the role of ICT, which holds that perceived usefulness and ease of use have a positive impact on operational productivity and the growth of digital. The framework assumes both direct effects whereby each independent variable contributes to improved survival, profitability, and sustainability and interactive reinforcement, as ICT adoption contributes to strong commercialization and scalability of innovative outputs. Together, these constructs are projected to provide superior performance implications particularly in emerging economies.

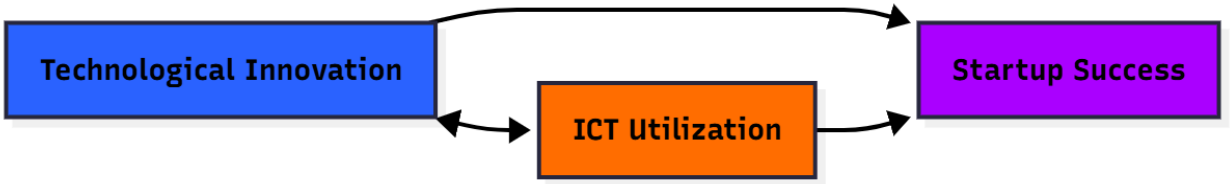

Figure 2.1: Conceptual Framework Linking Technological Innovation and ICT Utilization to Startup Success

Source: Adapted from Okpalaoka et al. (2022); Alam et al. (2022); Afawubo & Noglo (2022); Olota (2025); Li et al. (2021)

The direct and complementary paths in which technological innovation and ICT utilization can affect the success of startups are shown in Figure 2.1. Technological innovation guarantees strategic internal resources to better differentiate and grow better, ICT utilization ensures operational efficiency and market expansion while offering better customer engagement. The two constructs complement each other in a synergistic way, whereby the results of innovation need ICT for scalability and top commercialization, while ICT adoption enhances innovation capabilities. This two-way and mutually reinforcing effects acts in favor of both stronger financial performance, competitive advantage, and long-term survival, representing

both RBV and TAM approaches in developing market entrepreneurship contexts.

3.0 Research Methodology

This research takes a conceptual research study approach, which is related to synthesizing the theoretical arguments and empirical understandings to establish a stronger perception of understanding relationships between the technological innovation and ICT utilization in the success of startups. As the goal is not to gather primary sources, but to contribute to theoretical knowledge, the methodology is directed towards the critical review, integration and interpretation of previous contributions to the field. The literature selection strategy applied a systematic review of the latest academic sources such as peer reviewed journal articles, conference papers and recent industry reports that are related to innovation, ICT adoption and entrepreneurial performance. Priority was given to studies that have been published within the last ten years and to those with empirical evidence from developing and emerging economies including Nigeria and the African region in general. Specifically, the mentioned materials include the author's previously published works and other credible global studies that are relevant to technology-driven entrepreneurship.

Conceptual analysis approach involves defining important constructs, drawing out the relationships based on the theories, and assembling different results into a consistent system to build on the available knowledge. The methodology assumes an integrative model making strategy between the understanding of RBV and TAM in the context of suggesting the directional relationship of innovation capacity and availability of ICT application enhancing the performance and sustainability of the startup. Instead, this methodology will ensure that it has a scholarly background that will then be used to legitimize the findings empirically and policy implications.

4.0 Findings of the Study

Based on the literature and theoretical suspense reviews above, the following are anticipated in this conceptual study:

1. The role of technology innovation in enhancing the performance of the startups and their sustainability is very relevant especially when it is combined with strong innovation capabilities like R&D investments, manpower, and secure technology infrastructures.

2. The use of ICT will increase operational efficiency, access to the market digitally and by the customers and cost saving to enable the startups scale up with much faster rates.

3. Innovation and ICT have a synergy effect when used together and this has led to better survival rates, competitiveness as well as long run developments in the startups.

4. Infrastructure quality, regulatory favour, cybersecurity preparedness, and digital skills are some of the contextual ecosystem factors expected to characterise the influences of innovation brought about by ICT-enabled innovation within the crushing markets of the developing world e.g. Nigeria.

5. Evidence will suggest that strategic alignment and advanced capacity building are critical for entrepreneurs, investing and policymakers to reap the benefits of technological innovation and ICT for startup success.

5.0 Recommendations and Implications

To reinforce the success of startups in emerging economies, the following recommendations are suggested in accordance with the research purposes:

1. Entrepreneurs should focus on a constant technological innovation, through investments in product improvement, digital security, and business models that are scalable to improve sustainability and competitive advantages.

2. Startups should embed the use of ICTs like cloud computing, digital payment, analytics and social platforms, to make things better and faster to penetrate the market.

3. An integrated approach to innovation-ICT strategy should be adopted, where the use of technology plays a role in commercializing and growing the ideas of the innovator.

4. Government and ecosystem stakeholders need to address hindrances such as lack of ICT skills,

haphazard infrastructure, poor cybersecurity policies among others in order to support the ICT-led entrepreneurial development for Nigeria and West Africa.

5. Future research and policy frameworks need to ensure the promotion of evidence-based strategies, capacity development, and funding initiatives encouraging innovation, digital transformation and success of startups at scale in emerging markets.

REFERENCES

1. Ahmad, I., Akagha, O. V., Dawodu, S. O., Obi, O. C., Anyanwu, A. C., & Onwusinkwue, S. (2024). *Innovation management in tech start-ups: A review of strategies for growth and sustainability*. International Journal of Science and Research Archive, 11(01), 807–816.

2. Alam, K., Ali, M. A., Erdiaw-Kwasie, M., Shahiduzzaman, M., Velayutham, E., Murray, P. A., & Wiesner, R. (2022). *Impact of ICTs on innovation and performance of firms: Do start-ups, regional proximity and skills matter?* Sustainability, 14(10), 5801.

3. Aliyu Mohammed. (2023). *A study on HR strategies for managing talents in global perspective*. Paper submitted to the University of Belgrade, Technical Faculty in Bor, XIX International May Conference on Strategic Management (IMCSM23), Hybrid Event.

4. Aliyu Mohammed. (2023, May 11). *An agile performance management system for achieving sustainable Industry 4.0*. Paper presented at the One-Day Hybrid International Conference on Sustainability in Industry 4.0, MSNM Manel Srinivas Nayak Institute of Management (MSNIM) in association with Limkokwing University Malaysia.

5. Aliyu Mohammed. (2024). *Investigating reskilling and up-skilling efforts in the information technology and software development sector: A case study of Kano State, Nigeria*. Paper presented at the International Conference on Paradigm Shift Towards Sustainable Management & Digital Practices: Exploring Global Trends and Innovations.

6. Arcuri, M. C., Russo, I., & Gandolfi, G. (2024). *Productivity of innovation: The effect of innovativeness on start-up survival.* The Journal of Technology Transfer, 50, 1111–1169. https://doi.org/10.1007/s10961-024-10069-7

7. Autio, E. (2017/2018). *Digitalisation, ecosystems, entrepreneurship and policy*. [Review Article].

8. Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). *Digital business strategy: Toward a next generation of insights*. MIS Quarterly, 37(2), 471–482.

9. Choi, D. S., Sung, C. S., & Park, J. Y. (2020). *How does technology start-ups increase innovative performance? The study of technology start-ups on innovation focusing on employment change in Korea*. Sustainability, 12(2), 551. https://doi.org/10.3390/su12020551

10. Cohen, W. M., & Levinthal, D. A. (1990). *Absorptive capacity: A new perspective on learning and innovation*. Administrative Science Quarterly, 35(1), 128–152.

11. Faiz, F. (2024). *Determinants of digital technology adoption in innovative start-ups*. [Journal article].

12. Kaewsuwan, N., & Kajornkasirat, S. (2023). *Factors affecting success in information technology utilization in business operations of Agri-tech start-ups in Southern Thailand*. International Journal of Innovative Research and Scientific Studies, 6(3), 594–606.

13. Kihombo, G. (2019). *ICT usage to enhance firms' business processes in Tanzania*. Journal of Global Entrepreneurship Research, 9(46).

14. Koellinger, P. (2008). *The relationship between technology, innovation, and firm performance*. Research Policy, 37(8), 1317–1328.

15. Kumar, M. A., Mohammed, A., Raj, P., & Sundaravadivazhagan, B. (2024). Entrepreneurial strategies for mitigating risks in smart manufacturing environments. In *Artificial intelligence solutions for cyber-physical systems* (pp. 165–179). Auerbach Publications.

16. Lawal, T. O., Abdulsalam, M., Mohammed, A., & Sundararajan, S. (2023).

Economic and environmental implications of sustainable agricultural practices in arid regions: A cross-disciplinary analysis of plant science, management, and economics. *International Journal of Membrane Science and Technology, 10*(3), 3100–3114. https://doi.org/10.15379/ijmst.v10i3.3027

17. Li, Z., Akouatcha, H. G., Akram, U., & Aganda Anaba, O. (2021). *Information and communication technology and organizational performance during COVID-19 pandemic: The role of organizational commitment, growth mindset, and entrepreneurial orientation*. Frontiers in Psychology, 12, 752193.

18. Machiri, N. S., Oloko, M., Ngugi, J. K., & Odhiambo, R. (2023). *Corporate technological capability as a driver to firm performance: A study on firms listed at the Nairobi Securities Exchange*. Rowter Journal, 2(2).

19. Masenyetse, R., & Manamathela, M. (2023). *Firm growth, exporting and information communication technology (ICT) in Southern Africa*. Journal of Innovation and Entrepreneurship, 12, Article 8.

20. MDPI Journal of Risk and Financial Management. (2024). *Does ICT adoption moderate the impact of entrepreneurship on economic growth in Africa?* 15(3), 88.

21. Mohammed, A. (2023). Analyzing global impacts and challenges in trade management: A multidisciplinary study. *Economics, Commerce and Trade Management: An International Journal (ECTU), 3*.

22. Mohammed, A. (2023). Navigating the digital marketplace: Strategies for entrepreneurship in electronic commerce. *Computer Applications: An International Journal (CAIJ), 10*(3/4). Retrieved from https://airccse.com/caij/papers/10423caij06.pdf

23. Mohammed, A. (2023). Strategic utilization of management information systems for efficient organizational management in the age of big data. *Computer Applications: An International Journal (CAIJ), 10*(3/4). Retrieved from https://airccse.com/caij/papers/10423caij02.pdf

24. Mohammed, A., & Sundararajan, S. (2023). Analyzing policy challenges in the financial sector: Implications for effective financial management. In *Digitalization of the banking and financial system* (October 2023 edition, pp. 32–43). ISBN: 978-93-91772-80-2

25. Mohammed, A., & Sundararajan, S. (2023). Emerging trends of business transformation. *MSNIM Management Review, 1*, 36–44.

26. Mohammed, A., & Sundararajan, S. (2023). Exploring the dynamic interplay between startups and entrepreneurship: A conceptual analysis. In *Digital startup: A multidisciplinary approach in technology and sustainable development* (pp. 1–7). ISBN: 978-93-93376-66-4

27. Mohammed, A., Jakada, M. B., & Lawal, T. O. (2023). Examining the impact of managerial attitude on employee performance and organizational outcomes: A conceptual analysis. *IJBRE – International Journal of Business Review and Entrepreneurship, 4*(1), 1115–9146.

28. Mohammed, A., Shanmugam, S., Subramani, S. K., & Pal, S. K. (2024). Impact of strategic human resource management on mediating the relationship between entrepreneurial ventures and sustainable growth. *Serbian Journal of Management*. https://doi.org/10.5937/IMCSM24044M

29. Muhammed, A., Sundararajan, S., & Lawal, T. (2022). The effect of training on the performance of small and medium-sized enterprises (SMEs) in Kano Metropolis. *Seybold Report, 17*(6).

30. Okpalaoka, C., Ogunnaike, O., Kalu, A., et al. (2022). *Effect of technological innovation capabilities on the performance of selected manufacturing small and medium enterprises in Lagos State*. F1000Research, 11, 256.

31. Olota, O. O. (2025). *Technological infrastructure and connectivity on start-up sustainability: A study of selected fintech industries*. University Economic Bulletin, 20(1), 61–72.

32. Shanmugam Sundararajan, S., Rajkumar, T., Senthil Kumar, T., Mohammed, A., & Prince Martin, V. (2024). An analytical study on factors influencing individual investors' investment decisions on selecting private commercial banks at Kano City in Nigeria. *European Chemical Bulletin, 12*(1), 3706–3717. https://doi.org/10.31838/ecb/2023.12.s1-B.372

33. Sundararajan, S., & Mohammed, A. (2022). Entrepreneurial opportunities for women. In *Proceedings of the conference on gender equality and women empowerment. European Journal of Humanities and Educational Advancements, Special Issue 1*, 112–115. ISSN (E): 2660-5589

34. Sundararajan, S., & Mohammed, A. (2023). Evaluation of teachers – History to current era. *Samzodhana – Journal of Management Research, 13*(2). Retrieved from http://eecmbajournal.in

35. Sundararajan, S., Mohammed, A., & Lawal, T. (2023). Role of human resource management in the post COVID-19 era: Experiential study. *Bio Gecko: A Journal for New Zealand Herpetology, 12*(2). ISSN: 2230-5807

36. Sundararajan, S., Mohammed, A., & Senthil Kumar, S. (2023). A perceptual study on the impact of agile performance management system in information technology companies. *Scandinavian Journal of Information Systems, 35*(1), 3–38. https://doi.org/10.5281/SJIS.77516

37. Sundararajan, S., Mohammed, M. A., & Senthil Kumar, S. (2022). A perceptual study on impact of agile performance management system in the information technology companies. *Scandinavian Journal of Information Systems, 34*(2), 3–38.

38. Usman, M. A., & Sun, X. (2023). *The impact of digital platforms on new start-up performance: Strategy as moderator*. Heliyon, 9(12), e22159.

39. Xu, W., Inthurit, D., Kungwon, S., & Sinnarong, N. (2025). *The impact of digital innovation capability on the digital innovation performance of science and technology-based SMEs: Mediating effect of open innovation*. Rajapark Journal, 19(64), 98–120.

40. Yuwono, T., Suroso, A., & Novandari, W. (2024a). *Digital innovation and entrepreneurship: A review of challenges in competitive markets*. Journal of Innovation and Entrepreneurship.

Yuwono, T., Suroso, A., & Novandari, W. (2024b). *Information and communication technology in SMEs: A systematic literature review*. Journal of Innovation and Entrepreneurship, 13, Article 31.