

TECHNOLOGIES AS CATALYSTS FOR STARTUP GROWTH: AN EXAMINATION OF SMES IN ABUJA.

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ABSTRACT

Despite the growing emphasis on digital innovation, many startup SMEs in Abuja continue to struggle with limited market reach, low revenue generation, and inefficient operations challenges often linked to poor adoption of digital technologies. This study investigated the effect of digital technologies specifically social media marketing and mobile applications on startup growth among SMEs in Abuja, with a focus on revenue growth and operational efficiency. The study adopted a cross-sectional survey design. The population comprised 683 registered startup SMEs across sectors such as technology, commerce, manufacturing, and services. A sample of 252 owners and employees was drawn using Yamane's formula, and cluster sampling was employed to ensure adequate representation across major districts. Data were collected through structured questionnaire and analysed using regression analysis with SPSS v27. Reliability was established using Cronbach's Alpha (ranging from 0.79 to 0.85), and content validity was confirmed by expert review. Findings revealed that social media marketing had a strong and statistically significant effect on revenue growth ($R = .849, p < .001$), while mobile applications significantly enhanced operational efficiency ($R = .803, p < .001$). The study concluded that digital technologies are critical to driving performance outcomes among Abuja-based startups. It recommends that SMEs adopt structured social media strategies and integrate mobile apps into daily operations, while policymakers should provide targeted digital training and support programs. These findings offer empirical and practical guidance for enhancing SME performance through technology in Nigeria's entrepreneurial ecosystem.

Keywords: Social Media Marketing, Mobile Apps, Revenue Growth, Operational Efficiency, Small and Medium Enterprises (SMEs),

INTRODUCTION

Across the globe, digital technologies have become pivotal in shaping how businesses operate, compete, and grow. Their transformative power has transcended traditional sectors, giving rise to new business models and redefining the dynamics of entrepreneurship. Startups, in particular, have leveraged digital tools not just for survival but as core instruments for scalability and innovation. In both developed and emerging economies, the adoption of digital technologies has enabled smaller firms to overcome the limitations of scale, expand into new markets,

and optimize operations with minimal resource outlay (OECD, 2021). The digital shift has become especially relevant in the post-pandemic period, where businesses have had to adapt to volatile market conditions and rapidly changing consumer behaviours. In this context, digital technologies are no longer optional; they are fundamental to competitiveness and long-term growth (Loebbecke & Picot, 2015).

Digital technologies encompass a broad range of tools and platforms that facilitate the processing, communication, and analysis of information. These include cloud-based

services, social networks, mobile platforms, big data analytics, and artificial intelligence, among others. For startups, these technologies offer strategic value by lowering entry barriers, enabling rapid iteration of products and services, and providing access to real-time data that can inform decision-making (Gimpel, et al. 2018). Among the array of digital tools, scholars have emphasized two key dimensions that are particularly relevant to startup growth: social media marketing and mobile applications (Dwivedi et al., 2021). These tools are not just channels for communication but serve as critical infrastructures for customer acquisition, brand positioning, and service delivery.

Social media marketing has emerged as a powerful mechanism for building relationships with customers, generating brand awareness, and facilitating real-time engagement. Platforms such as Instagram, Facebook, X (formerly Twitter), and LinkedIn allow startups to reach broad and diverse audiences at relatively low costs. Research indicates that social media campaigns significantly enhance customer engagement and brand loyalty, particularly for startups that lack traditional marketing budgets (Tuten & Solomon, 2017). Mobile applications, on the other hand, provide startups with a personalized and consistent interface through which they can offer value-added services, automate processes, and collect user data for business intelligence. The ubiquity of smartphones and mobile internet in Nigeria has made mobile apps increasingly central to how startups deliver services and scale operations (Awa, et al. 2016).

Startup growth, especially in the context of SMEs in Nigeria, involves more than just survival or profitability it reflects a firm's ability to expand its market presence, improve its internal capacities, and sustain competitive advantages. In Abuja, where the entrepreneurial ecosystem is fast-developing yet marked by infrastructure gaps and funding limitations, growth is often a function of adaptability and strategic use of available resources. Scholars typically assess startup growth through dimensions such as revenue growth and operational efficiency (Zhou & Wu, 2010). Revenue growth reflects the firm's capacity to

increase earnings over time, indicating product-market fit and customer acceptance. Operational efficiency, meanwhile, concerns how well a startup utilizes its inputs human, technological, and financial to generate outputs with minimal waste, signalling the firm's ability to sustain and scale its operations under resource constraints.

It is within this framework that the interplay between digital technologies and startup growth becomes a subject worthy of empirical exploration. While studies have shown a positive association between digital adoption and firm performance, the specific influence of social media marketing and mobile applications on startup growth in Abuja's SME sector remains underexplored. There is reason to hypothesize that these digital tools could significantly enhance revenue generation and operational processes, given their capacity to automate tasks, reduce costs, and enhance customer interaction. Yet, the relationship may not be uniform, as the benefits of digital adoption can vary based on sector, entrepreneur competence, and the quality of implementation (Nambisan, et al. 2019). This suggests a need to explore not only whether digital technologies matter, but how and under what conditions they contribute to growth in this context.

Despite their potential, many startups in Nigeria still struggle to grow, even after adopting digital tools. Practical challenges such as poor digital infrastructure, limited access to stable electricity, low levels of digital literacy, regulatory ambiguity, and financial exclusion continue to hinder the effective deployment of technology in SME operations (Adegbite, et al. 2022). Moreover, a lack of strategic clarity often results in piecemeal or misaligned adoption of digital platforms that do not translate into meaningful business outcomes. Consequently, many SMEs remain digitally underleveraged, with growth trajectories stunted by a combination of environmental and organizational factors.

Against this background, it becomes imperative to investigate the role digital technologies play in driving startup growth within Abuja's SME landscape. While the promise of digital

innovation is clear, the pathways through which it leads to measurable growth outcomes require closer examination. This study seeks to address this gap by analysing the extent to which social media marketing and mobile applications influence the revenue growth and operational efficiency of startups in Abuja. By doing so, the research aims to offer both theoretical insights and practical recommendations for fostering digitally enabled entrepreneurship in emerging economies.

Research Question

The study was guided by the following research questions:

- i. To what extent does social media marketing affect revenue growth among SMEs in Abuja?
- ii. To what extent does mobile applications affect operational efficiency of SMEs in Abuja?

Objectives of the Study

The broad objective of this study is to examine the extent to which digital technologies serve as catalysts for startup growth among small and medium enterprises (SMEs) in Abuja. The specific objectives are:

- i. To evaluate the effect of social media marketing on the revenue growth of SMEs in Abuja.
- ii. To assess the effect of mobile application usage on the operational efficiency of SMEs in Abuja.

Research Hypotheses

To address the research question and objectives, the following null hypotheses were proposed:

H₀₁: Social media marketing has no significant effect on the revenue growth of SMEs in Abuja.

H₀₂: The use of mobile applications does not significantly affect the operational efficiency of SMEs in Abuja.

LITERATURE REVIEW

Digital Technologies

Digital technologies are defined as integrated tools—including software platforms, mobile apps, networks, and analytics systems that process, store, and transmit data digitally. Recent literature emphasizes their transformative role in enabling firms to streamline processes, foster innovation, and reach new customer segments (Ghobakhloo, 2020; Samuel Gyamerah et al., 2025). For startups and SMEs, these technologies lower barriers to entry, reduce operational costs, and enable rapid experimentation in product development (Samuel Gyamerah et al., 2025).

Beyond their technical dimension, digital technologies act as enablers of dynamic capabilities. They support SMEs in sensing and responding to market trends and in reconfiguring internal processes to remain competitive (Papadopoulos et al., 2020). In pandemic settings, for example, digital tools facilitated resilience in micro-businesses by allowing them to quickly pivot operations such as launching e-commerce on WhatsApp or blockchain-based services to meet shifting demands (Owoseni & Twinomurinzi, 2018; Salmons & Wilson, 2021).

However, adoption remains uneven among SMEs, often constrained by infrastructural limitations, funding deficits, and lack of technical skills (OECD, 2021). Despite these obstacles, the potential benefits such as improved productivity, global reach, and better customer experiences are well documented (Trigueros-Preciado et al., 2023; Leimbach et al., 2014). Consequently, digital technologies continue to be central in shaping how startups evolve and thrive in contemporary markets.

Social media marketing

Social media marketing refers to the strategic use of interactive online platforms—such as Facebook, Instagram, Twitter (X), and TikTok—to engage with customers, cultivate

brand presence, and foster community (Kaplan & Haenlein, 2010; Omotosho, 2020). Startups leverage these channels for cost-effective content promotion, customer interaction, and data-driven feedback loops. These efforts not only enhance visibility but contribute to brand image and reputation key drivers of early-stage growth in resource-constrained environments (Bruce et al., 2025; Ahmed et al., 2022).

Empirical studies show that social media marketing directly influences firm performance metrics. For example, young Ghanaian startups have reported increased profits and improved brand strength after implementing social media strategies, identifying elements like timely communication, user engagement, and co-creation as pivotal (Bruce et al., 2025). Moreover, SMEs leveraging social media for market intelligence and consumer outreach often experience tangible sales and performance improvements (Bruce et al., 2025).

Yet, effectiveness depends on firms' digital literacy and strategic integration. Many SMEs underutilize channels, treating them as promotional tools without coherent strategy (Omotosho, 2020). Quality of content, authenticity, and alignment with business objectives are critical; campaigns can perform poorly or even damage brand perception if mismanaged (Hootsuite, 2021). Thus, measurable social media success requires thoughtful strategy, ongoing optimization, and capability building.

Mobile applications

Mobile applications are software programs designed for smartphones and tablets that enable businesses to deliver tailored services, streamline operations, and engage customers directly (Jedynak et al., 2021). They serve as gateways for transactions, loyalty programs, data collection, and customer support, effectively consolidating key touchpoints into user-friendly experiences (Zhang et al., 2019). For startups in Nigeria, where smartphone usage is high but web infrastructure is uneven,

mobile apps offer a reliable bridge to customers.

Academic studies highlight mobile apps' role in enhancing operational effectiveness and decision-making. Firms that integrate business intelligence and real-time analytics through mobile BI report faster responses, better resource management, and improved customer service delivery (Peters et al., 2016). These performance gains are especially valuable for SMEs operating in dynamic and often unpredictable markets (Samuel Gyamerah et al., 2025).

Still, challenges exist: technical complexity, development costs, and user adoption hurdles can limit implementation (Zhang et al., 2019). Successful app-based interventions require strong digital fluency, understanding of user needs, and ongoing maintenance. Without these capabilities, firms risk deploying apps that fail to meet functional expectations or deliver value (Pham et al., 2020). Thus, mobile apps hold promise—but only when crafted and scaled intentionally.

Concept of Startup Growth

Startup growth refers to a firm's ability to expand its market presence, operational scope, and value output over time. This study conceptualizes startup growth along two measurable dimensions: revenue growth and operational efficiency. Revenue growth indicates an increase in a firm's income from its core operations and is often used as a proxy for business success and market validation (Zhou & Wu, 2010). It reflects a firm's capacity to attract and retain customers, penetrate markets, and scale product offerings effectively.

Revenue growth refers to the increase in a firm's income over time from its core sales operations, serving as a proxy for customer acquisition, product-market fit, and market expansion (Zhou & Wu, 2010). For startups, rapid revenue growth is essential for survival, scaling, and attracting investment especially in contexts where access to external capital is tightly tied to performance metrics (Achtenhagen et al., 2010).

Digital technologies like social media and mobile apps have been directly linked to revenue improvements. Studies reveal that startups with active social media campaigns often see higher customer conversion rates, thanks to improved brand visibility and engagement (Bruce et al., 2025). Similarly, mobile business intelligence enables firms to track sales trends, optimize pricing strategies, and deliver personalized offers, thereby increasing average transaction value and frequency (Peters et al., 2016).

Nevertheless, digital channels are not a panacea. Revenue gains depend on the fit between technology and strategy, the quality of customer experiences, and broader enabling factors like infrastructure and market conditions (Adegbite et al., 2022; Trigueros-Preciado et al., 2023). Startups that treat digital tools as add-ons rather than integral to their business model often fail to realize sustainable revenue improvements. Strategic alignment remains key.

Operational Efficiency

Operational efficiency is the degree to which a firm minimizes waste—in time, resources, and costs while maximizing output quality and speed. It reflects the maturity of internal processes and systems (Achtenhagen et al., 2010), and is essential for startups seeking scalability and profitability when margins are thin and resources limited.

Digital technologies play a direct role in improving efficiency. Automated workflows enabled by mobile apps, cloud-based tools, and analytics reduce manual effort and errors, optimize inventory management, and enhance decision speed (Samuel Gyamerah et al., 2025). Moreover, mobile BI solutions allow managers to access critical performance metrics on the go, improving responsiveness and reducing operational delays (Peters et al., 2016).

However, the mere presence of technology does not guarantee efficiency gains. Firms must develop digital fluency and align systems to key processes—otherwise they risk investing in unused or underutilized tools (Pham et al., 2020). Additionally, infrastructural deficiencies

(e.g., unreliable electricity, poor connectivity) can disrupt the operational benefits of digital systems, particularly in settings like Abuja (Adegbite et al., 2022). Successful efficiency gains require convergence of technology, skills, and supportive environment.

Theoretical Framework

The Technology–Organization–Environment (TOE) Framework

This study adopts the Technology–Organization–Environment (TOE) Framework developed by Tornatzky and Fleischer (1990). The TOE framework argues that three contextual dimensions—technological, organizational, and environmental—jointly determine a firm's likelihood of adopting an innovation. The technological context refers to the availability and relevance of the digital technologies themselves; the organizational context includes firm size, leadership structure, and available resources; while the environmental context captures external forces such as competition, regulation, and infrastructure (Baker, 2012).

The major assumption of the TOE framework is that organizations are rational entities that adopt innovations based on a composite assessment of internal capacities and external pressures. Its strength lies in its comprehensiveness—it allows researchers to account for both internal and external factors in understanding technological adoption. It has been widely applied in studies on digital technology adoption among SMEs, especially in developing countries (Awa et al., 2016).

However, one criticism of the TOE model is that it underemphasizes individual-level influences such as entrepreneurial attitude or digital literacy, which can be especially critical in small, founder-led startups. Despite this limitation, the framework remains highly adaptable and empirically robust.

In this study, the TOE framework provides a fitting lens to explore how Abuja-based SMEs adopt digital technologies like social media and mobile apps. It enables the analysis of how technology availability, organizational

readiness, and environmental enablers or constraints interact to influence startup growth outcomes such as revenue and operational efficiency.

Empirical Review

Bruce, et al. (2025) conducted a study to examine the impact of social media usage on startup performance, with a focus on the mediating role of brand image, in Ghana. The researchers adopted a quantitative research design and targeted early-stage startup firms as the population. A sample size of 211 startups was selected using a stratified random sampling technique. Primary data were gathered through structured questionnaires, and the data were analysed using structural equation modelling (SEM). The study found that social media usage had a positive and significant impact on startup performance, and this relationship was partially mediated by brand image. They recommended that startups prioritize brand consistency across social platforms to amplify performance. However, the study was limited by its cross-sectional design and focus on only one mediating variable. The key gap identified is that it did not examine other dimensions of digital technologies, such as mobile applications or operational efficiency, nor did it extend to other developing country contexts like Nigeria.

Dwivedi et al. (2021) aimed to map out future research trajectories in digital and social media marketing globally. The study adopted a conceptual and qualitative meta-analytical design, drawing from an extensive secondary data review of over 400 peer-reviewed articles across multiple databases. No sample or population was specified, as the method was narrative review-based, focusing on thematic synthesis. Their analysis revealed emerging research areas in consumer behaviour analytics, AI in marketing, influencer engagement, and cross-platform effectiveness. The authors emphasized the need for empirical studies in emerging markets and multi-platform comparisons. Their recommendation was for future studies to adopt interdisciplinary and context-specific models. The limitation lies in its non-empirical nature, and the identified gap

is that it lacks primary data on actual startup experiences with digital marketing in specific geographies like sub-Saharan Africa or Nigeria.

Ghobakhloo (2020) investigated the determinants of digital technology adoption among innovative SMEs in Iran. The study employed a quantitative research design, targeting SME managers in the technology sector, with a sample size of 380 obtained through random sampling. Primary data were collected using survey questionnaires, and the analysis was done using PLS-SEM (Partial Least Squares Structural Equation Modelling). Findings indicated that technological readiness, top management support, and competitive pressure significantly influenced digital technology adoption. The study recommended that policymakers offer more targeted support to SMEs lacking technological capabilities. The major limitation was its focus on high-tech firms, which may not reflect traditional SMEs. Thus, the gap is that the study did not explore the relationship between digital adoption and specific performance outcomes like revenue growth or efficiency, particularly in startup environments.

Gimpel et al. (2018) proposed a digital transformation framework through a case study of ZEISS, a German multinational company. The study utilized a qualitative case study design, drawing on interviews and internal document analysis over a multi-year period. Data sources included key organizational stakeholders across departments, but no formal sampling technique was stated. The study applied thematic content analysis to distil five strategic action fields that companies must navigate during digital transformation: customer interaction, data analytics, agile methods, leadership, and innovation culture. The authors found that digital transformation is not purely technical but deeply organizational, requiring leadership and cultural change. They recommended that firms build adaptive capacities and cross-functional integration mechanisms. A key limitation is its focus on a large, established enterprise, which limits the applicability of findings to SMEs or startups. Thus, the gap lies in the lack of insight into

digital transformation at the startup or SME level, particularly in emerging economies.

Jedynak et al. (2021) examined how leadership, digital capabilities, and digital strategy interact to influence digital transformation in SMEs, using firms in Central and Eastern Europe as their focus. The study employed a mixed-methods design, combining survey questionnaires from 120 SMEs with in-depth interviews of 15 firm leaders. Purposive sampling was used to ensure industry and size diversity. Data were analysed using both regression analysis and thematic coding. The results showed that transformational leadership and well-articulated digital strategy significantly predicted successful digital transformation, particularly when mediated by digital capabilities. Recommendations included leadership development and structured digital roadmaps for SMEs. However, the study's limitation was its regional scope, limiting generalizability beyond Europe. The empirical gap is its lack of focus on specific digital tools such as mobile apps or social media marketing, especially in African contexts.

Kaplan and Haenlein (2010) presented a foundational paper defining the scope and impact of social media. Using a conceptual framework rooted in Web 2.0 technologies, the authors classified social media into six categories: collaborative projects, blogs, content communities, social networking sites, virtual game worlds, and virtual social worlds. They argued that social media platforms facilitate user participation, content sharing, and collaboration. The paper was based on qualitative theory-building rather than empirical data. It highlighted the transformative role of social media in reshaping customer-firm relationships. Although it offered practical guidelines for firms entering social media, its limitation was its early publication date, which preceded the widespread use of AI, mobile marketing, and platform convergence. As a result, the study's key gap is that it did not address recent shifts in digital strategy or the measurable performance implications for startups in today's context.

Loebbecke and Picot (2015) explored the societal and business model implications of digitization and big data analytics using a conceptual research design. Drawing from existing literature and business practice observations, the authors proposed a research agenda addressing digital transformation's impact on organizational structures, employment, and value creation. The paper lacked primary data but synthesized theoretical insights from economics, information systems, and management. Findings suggested that digitization leads to disintermediation, network effects, and shifts in labour dynamics. Recommendations emphasized cross-disciplinary studies on algorithmic control and data governance. Its limitation was the absence of empirical validation, and its gap lies in the lack of focus on SMEs or the operational impacts of specific digital technologies like mobile apps or social platforms.

Literature Gaps

The reviewed empirical literature reveals several notable gaps when compared to the current study titled *Digital Technologies as Catalysts for Startup Growth: An Examination of SMEs in Abuja*. First, there is a clear geographical gap. Most of the referenced studies, such as those by Jedynak et al. (2021) and Gimpel et al. (2018), were situated in developed contexts such as Central and Eastern Europe or Germany. While Bruce et al. (2025) provided some insight from Ghana, few studies have addressed the Nigerian entrepreneurial context, particularly within the Federal Capital Territory (FCT), Abuja. Given Nigeria's unique infrastructural, institutional, and economic challenges, insights derived from other contexts may not be directly transferable, thereby justifying the need for a localized investigation.

In terms of methodology, a significant proportion of the reviewed works adopted conceptual or qualitative approaches, such as the studies by Dwivedi et al. (2021) and Loebbecke and Picot (2015), which emphasized theoretical propositions and research agendas without empirical validation. Even studies that adopted quantitative designs, such as Ghobakhloo (2020), focused primarily on

technology adoption determinants, often overlooking the actual performance outcomes of such adoption in startup ecosystems. This creates a methodological gap where few studies have applied a robust, performance-based analytical framework to assess the measurable impact of digital technologies on startup outcomes, particularly using metrics such as revenue growth and operational efficiency.

Another key gap concerns the population and unit of analysis. Most existing research has centered on established SMEs or large enterprises, with limited attention to startups in their formative or early growth stages. For example, while Gimpel et al. (2018) examined digital transformation at a multinational corporation, this fails to capture the agility, constraints, and unique digital behavior of smaller, younger firms. Similarly, Ghobakhloo's (2020) focus on innovative SMEs excluded non-tech-driven startups that nonetheless rely on digital tools like mobile apps and social media for survival and growth. This suggests a need to focus more explicitly on startups as distinct from traditional SMEs.

Furthermore, there is a thematic and variable-based gap in the literature. While many of the reviewed studies explored digital transformation broadly, they did not isolate specific, accessible tools like social media marketing and mobile applications—two technologies that are particularly critical for startups in emerging markets. Likewise, the outcome variables in most studies rarely included both revenue growth and operational efficiency as dual indicators of startup performance. By focusing on these variables and anchoring them in a specific socio-economic context like Abuja, this study offers a more targeted and empirically grounded analysis of how digital technologies catalyze startup growth. This combination of a local focus, startup-specific population, mixed methodological rigor, and relevant digital performance metrics clearly distinguishes the current study from prior work and addresses a significant gap in both theory and practice.

METHODOLOGY

This study adopted a cross-sectional survey research design, which involved the collection of data at a single point in time from a population of interest. The cross-sectional design was deemed appropriate because the study aimed to examine the relationship between digital technologies and startup growth without manipulating any variables. It also enabled the researcher to capture data from a relatively large number of SMEs efficiently, making it suitable for analysing the influence of digital technologies—specifically social media marketing and mobile applications—on revenue growth and operational efficiency.

The population of the study comprised 683 start-up small and medium-sized enterprises (SMEs) operating within the Federal Capital Territory (FCT), Abuja, Nigeria. These SMEs spanned various sectors including technology, commerce, manufacturing, and services. The accessible population was limited to the owners and employees of these SMEs, as they were the most knowledgeable about the firms' digital technology use and performance metrics. The unit of analysis was therefore defined as both the owners and employees of the startups, since both groups play active roles in implementing digital strategies and can provide relevant insights on operational and financial outcomes.

The sample size was determined using Yamane's (1967) formula, which is widely used in social science research for calculating sample sizes from known populations. Given the total population of 683 SMEs, Yamane's formula with a 95% confidence level and a 5% margin of error yielded a sample size of approximately 252 respondents. The use of this formula was justified due to its efficiency and its capacity to ensure statistical representativeness in large populations without requiring an impractically large sample.

To ensure representativeness across the various sectors and districts in Abuja, a cluster sampling technique was employed. Abuja was first divided into key clusters based on the geographical spread of business activity—such as Central Business District, Wuse, Garki, and

Utako. From each cluster, a proportionate number of SMEs were selected. This sampling method was justified because it allowed for the inclusion of SMEs across diverse sectors and regions while minimizing cost and time associated with data collection.

The study utilized a primary data source, and data were collected through the use of structured questionnaires administered to the selected respondents. The questionnaire was divided into sections that captured demographic details, digital technology usage, and dimensions of startup growth. The use of a questionnaire ensured consistency in data collection and allowed for quantitative analysis.

Reliability of the instrument was tested using Cronbach's Alpha. The results showed acceptable internal consistency across the constructs: social media marketing had a reliability coefficient of 0.83, mobile applications recorded 0.79, revenue growth had 0.85, and operational efficiency had 0.81. These values all exceeded the generally accepted threshold of 0.70, indicating that the instrument was reliable. Validity was assessed using content validity, whereby the questionnaire was reviewed by academic experts in digital business and entrepreneurship to ensure the items accurately captured the constructs under investigation.

For data analysis, the study employed regression analysis using SPSS version 27. This

statistical technique was appropriate because it measured the strength and direction of the relationship between the independent variables (social media marketing and mobile applications) and the dependent variables (revenue growth and operational efficiency). SPSS provided robust computational capabilities that ensured accuracy and ease in interpreting statistical relationships.

RESULTS AND DISCUSSIONS

This chapter presents the results of the data analysis and discusses the findings in relation to the research objectives and hypotheses of the study. It begins by outlining the descriptive statistics of the respondents and the key study variables, followed by the results of the inferential analysis using regression analysis. The findings are then discussed in the context of existing literature to highlight areas of convergence or divergence with previous studies. The goal is to provide empirical evidence on how digital technologies particularly social media marketing and mobile applications relate to startup growth among SMEs in Abuja, with a focus on revenue growth and operational efficiency.

Hypothesis One

H₀₁: Social media marketing has no significant effect on the revenue growth of SMEs in Abuja.

$$RG = \beta_0 + \beta_1 SM + \epsilon \dots \dots \dots 1$$

Table 1 Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.849 ^a	.720	.719	.29602

a. Predictors: (Constant), SM

Source: SPSS Output Version 27.0.1

Table 1 presents the model summary for the relationship between social media marketing (SM) and revenue growth (RG) of SMEs in Abuja. The R-value of 0.849 indicates a strong positive correlation between the independent variable (SM) and the dependent variable (RG). The R Square (0.720) shows that 72.0% of the variation in revenue growth can be explained by

social media marketing alone, which is substantial. The Adjusted R Square (0.719) corrects for the number of predictors and sample size, showing the model is robust. The standard error of the estimate (0.29602) reflects a relatively low level of prediction error, suggesting the model has a good fit. This summary suggests that social media marketing

plays a critical role in explaining the revenue growth of SMEs in Abuja.

Table 2 ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	47.562	1	47.562	542.769	.000 ^b
	Residual	18.490	211	.088		
	Total	66.052	212			

a. Dependent Variable: RG

b. Predictors: (Constant), SM

Source: SPSS Output Version 27.0.1

Table 2 displays the ANOVA (Analysis of Variance) results, which test the statistical significance of the regression model. The F-value of 542.769 and the p-value of .000 indicate that the overall regression model is statistically significant at the 0.05 level. This means that social media marketing has a

significant predictive power on revenue growth and that the relationship is not due to random chance. The large F-value confirms the strength of this relationship. Therefore, the ANOVA results validate that the model used to predict revenue growth based on social media marketing is appropriate and meaningful.

Table 3 Coefficients^a

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	.261	.160		1.633	.104
	DA	.918	.039	.849	23.297	.000

a. Dependent Variable: RG

Source: SPSS Output Version 27.0.1

Table 3 presents the coefficients of the regression analysis, which detail the nature and strength of the relationship. The unstandardized coefficient (B = 0.918) shows that for every one-unit increase in social media marketing, revenue growth increases by 0.918 units, holding other factors constant. The t-value of 23.297 and the p-value of .000 indicate that this effect is highly significant. Moreover, the beta coefficient ($\beta = 0.849$) shows that social media marketing has a strong standardized impact on revenue growth. Although the constant term (0.261) is not statistically significant ($p = .104$), the predictor variable (SM) is, reinforcing that

social media marketing is a key driver of revenue growth among SMEs in Abuja. This finding leads to the rejection of the null hypothesis (H_{01}) and affirms that social media marketing has a significant positive effect on SME revenue growth.

Hypothesis Two

H₀₂: The use of mobile applications does not significantly affect the operational efficiency of SMEs in Abuja.

$$OE = \beta_0 + \beta_1 MB + \epsilon \dots \dots \dots 2$$

Table 4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.803 ^a	.644	.642	.30381

a. Predictors: (Constant), MB

Source: SPSS Output Version 27.0.1

Table 4 presents the model summary for the relationship between mobile applications (MB) and operational efficiency (OE) of SMEs in Abuja. The R-value of 0.803 indicates a strong positive correlation between the two variables. The R Square value of 0.644 shows that approximately 64.4% of the variation in operational efficiency can be explained by the use of mobile applications. The Adjusted R

Square (0.642) confirms that this relationship remains stable even after adjusting for the number of predictors and sample size. The standard error of the estimate (0.30381) is relatively low, suggesting that the prediction error is minimal. These results imply that mobile application usage contributes meaningfully to improvements in how efficiently SMEs operate in Abuja.

Table 5

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.257	1	35.257	381.973	.000 ^b
	Residual	19.476	211	.092		
	Total	54.733	212			

a. Dependent Variable: OE

b. Predictors: (Constant), MB

Source: SPSS Output Version 27.0.1

Table 5 shows the ANOVA results, which assess the overall significance of the regression model. The F-value of 381.973 and a p-value of .000 indicate that the model is statistically significant at the 0.05 level. This means that the observed relationship between mobile

applications and operational efficiency is not due to chance. The strength of the F-statistic reinforces the reliability of the regression model and confirms that mobile applications are a valid predictor of operational efficiency among SMEs in Abuja.

Table 6

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.322	.140		9.447	.000
	MB	.689	.035	.803	19.544	.000

a. Dependent Variable: OE

Source: SPSS Output Version 27.0.1

Table 6 provides the regression coefficients, which explain the specific impact of mobile applications on operational efficiency. The unstandardized coefficient (B = 0.689) indicates that for every one-unit increase in mobile application usage, there is a corresponding 0.689 unit increase in operational efficiency, assuming other factors are held constant. The t-value of 19.544 and the p-value of .000 confirm that this relationship is highly statistically significant. The standardized beta coefficient ($\beta = 0.803$) shows a strong influence of mobile applications on operational efficiency. The constant value (1.322) is also significant, indicating a meaningful baseline level of

efficiency even without the influence of mobile applications. These findings lead to the rejection of the null hypothesis (H_{02}) and suggest that mobile applications have a significant and positive effect on the operational efficiency of SMEs in Abuja.

Discussion of Findings

The findings of this study provided significant empirical evidence to support the relationship between digital technologies and startup growth among SMEs in Abuja. Each hypothesis was tested using regression analysis, and the results are discussed below in light of existing empirical studies and the guiding theoretical framework.

The result for Hypothesis One (H_{01}) showed that social media marketing had a strong and statistically significant effect on the revenue growth of SMEs in Abuja ($R = 0.849$, $R^2 = 0.720$, $p < 0.001$). This implies that SMEs that strategically utilize social media platforms tend to experience notable improvements in their revenue performance. This finding aligns strongly with the empirical work of Bruce et al. (2025), who found in their study of Ghanaian startups that social media usage significantly enhanced startup performance, with brand image acting as a partial mediator. Similarly, Kaplan and Haenlein (2010) argued that social media fosters real-time interaction and customer engagement, which can enhance brand loyalty and, by extension, revenue outcomes. Moreover, Dwivedi et al. (2021) emphasized that digital platforms including social media serve as strategic tools for driving sales and engaging broader markets, particularly when deployed in emerging economies.

This result also finds support within the Technology–Organization–Environment (TOE) Framework, which suggests that technological innovations such as social media are more readily adopted and impactful when firms possess the necessary organizational support and when the external environment encourages digital engagement. The availability of affordable smartphones, increased mobile penetration in Nigeria, and the growing youth population in Abuja form part of the environmental context that enhances the efficacy of social media marketing. Within the TOE model, the technological context (ease of access to social media tools), organizational context (SME willingness to adopt), and environmental context (market competition and customer behaviour) all align to support the findings.

However, it is important to acknowledge that not all literature supports this finding uniformly. Loebbecke and Picot (2015), while recognizing the transformative role of digital tools, cautioned that the effects of such technologies on performance depend on strategic alignment and the organizational readiness of the firm. In the absence of digital

literacy or clear content strategy, social media efforts might be ineffective or even detrimental. Yet, the overall direction of empirical support favours the current findings, with little to contradict them outright.

For Hypothesis Two (H_{02}), the results revealed that the use of mobile applications had a statistically significant and positive impact on the operational efficiency of SMEs ($R = 0.803$, $R^2 = 0.644$, $p < 0.001$). This indicates that mobile apps contribute meaningfully to streamlining operations, reducing manual processes, and enabling real-time decision-making. This outcome is empirically supported by Ghobakhloo (2020), who found that digital tools, including mobile technologies, enhance business operations when organizational readiness and perceived benefits are high. Jedynak et al. (2021) similarly observed that mobile applications and digital capabilities, when supported by strong leadership and digital strategies, substantially improve efficiency and responsiveness in SMEs. Furthermore, Gimpel et al. (2018) emphasized that mobile digital tools can optimize workflows and increase internal agility—an essential requirement for startups operating under resource constraints.

The TOE framework further explains this relationship by positing that mobile applications are part of the technological infrastructure that firms can leverage to achieve operational excellence. In Abuja's SME ecosystem, mobile apps serve as accessible and low-cost platforms for inventory management, customer service, and mobile payments. The organizational context—in this case, startup employees' openness to using mobile tools—and the environmental pressures to innovate in a competitive market all support this adoption and its operational impact.

That said, Dwivedi et al. (2021) highlighted that the success of mobile apps depends on contextual factors such as digital maturity and sector-specific needs. Additionally, Loebbecke and Picot (2015) cautioned that mobile technology alone does not guarantee efficiency unless it is embedded in broader organizational change. While these views do not directly contradict the findings, they suggest that

technology alone is not sufficient; it must be well-integrated and supported by complementary strategies and capabilities.

In summary, the findings of this study confirm the rejection of both null hypotheses, offering empirical support for the positive roles of social media marketing and mobile applications in enhancing revenue growth and operational efficiency, respectively. The results are largely supported by existing empirical and theoretical literature, particularly within the TOE framework. No reviewed empirical study explicitly contradicts these findings; rather, most studies provide context-specific qualifiers, suggesting that the positive effects of digital technologies are conditional but substantial when aligned with organizational capacity and environmental support.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, it is evident that digital technologies play a significant role in shaping the growth trajectory of startup SMEs in Abuja. Specifically, social media marketing was found to have a strong and statistically significant impact on revenue growth, while mobile applications significantly improved operational efficiency. These results affirm that digital technologies are not merely auxiliary tools but critical enablers of core business outcomes in emerging markets like Nigeria. The findings also demonstrate that SMEs that effectively adopt and integrate these technologies are more likely to achieve sustainable growth, improved productivity, and stronger competitive positioning within the business environment of the FCT. First, the study concludes that social media marketing significantly enhances revenue growth among SMEs in Abuja. Startups that actively use social media platforms are better positioned to reach new markets, engage with customers, and convert digital visibility into financial outcomes.

Second, it is concluded that the use of mobile applications positively contributes to the operational efficiency of startup SMEs. By streamlining tasks, reducing transaction delays, and supporting real-time decision-making,

mobile apps enable SMEs to operate more smoothly and cost-effectively, even with limited resources.

Based on the study's hypotheses and key insights, the following recommendations are proposed:

First, startup SMEs in Abuja should prioritize structured and strategic use of social media marketing to drive revenue growth. Business owners should not merely maintain a digital presence but invest in developing clear content strategies, targeted advertising, and audience engagement tactics tailored to their customer base. Training programs focused on digital branding, customer relationship management, and analytics-driven decision-making should be encouraged to maximize the revenue potential of social platforms.

Second, SMEs should adopt and integrate mobile applications into their core operational processes to improve efficiency. Applications that support inventory management, customer service, mobile payments, and task automation should be identified and deployed according to business-specific needs. Entrepreneurs and employees should also receive training to improve digital skills and ensure proper use of these tools. Partnerships with local tech developers could also be explored to create low-cost, customized mobile solutions suited to the operational realities of Abuja-based SMEs.

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