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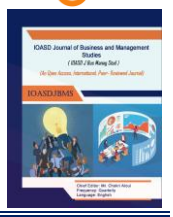

Technological Innovation and SME Growth in Benue South Senatorial District, Benue State, Nigeria: An Empirical Survey

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ABSTRACT

This study examined the effect of technological innovation on the growth of Small and Medium Enterprises (SMEs) in Benue South Senatorial District, Benue State, Nigeria. Technological innovation was operationalized in terms of digital tools adoption, production technologies, and mobile platform utilization, while SME growth was measured using sales growth and market expansion. The study was anchored on the Diffusion of Innovation Theory (Rogers, 2003). A descriptive survey research design was employed, and data were collected using a structured questionnaire administered to SME owners and managers across selected Local Government Areas in the senatorial district. A total of 430 questionnaires were distributed, out of which 415 were returned and found usable, representing a response rate of 96.5%. Data were analyzed using descriptive statistics and inferential techniques, including correlation and multiple regression analysis, with two separate regression models estimated for the disaggregated dependent variables. Diagnostic tests such as normality, multicollinearity, and autocorrelation were conducted to ensure the suitability of the data for regression analysis. The findings revealed that all three dimensions of technological innovation have significant positive effects on both sales growth and market expansion. Digital tools adoption emerged as the most influential predictor of sales growth, while mobile platform utilization had the strongest effect on market expansion. Production technologies also exhibited significant but comparatively weaker effects across both models. The study concluded that technological innovation plays a critical role in enhancing SME growth by improving operational efficiency, facilitating customer engagement, and enabling market access. It recommended that SME owners invest in digital tools, mobile platforms, and modern production technologies, while government and policy makers should provide supportive infrastructure, financing, and capacity-building initiatives to promote effective adoption of technological innovations among SMEs.

Keywords: Technological Innovation; Digital Tools Adoption; Production Technologies; Mobile Platform Utilization; SME Growth; Sales Growth; Market Expansion; Benue South Senatorial District, Nigeria.

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1.0 INTRODUCTION

1.1 Background to the Study

The contemporary business environment has become increasingly technology-driven, compelling enterprises across the world to adopt innovative technologies in order to remain competitive and sustain growth. Rapid globalization, the expansion of digital markets, the proliferation of mobile communication technologies, and increasing consumer demand for speed, efficiency, and convenience have significantly transformed the way businesses operate (Lokuge, 2021). For small and medium enterprises (SMEs), which often operate with limited financial and managerial resources, technological innovation has become a critical mechanism for improving operational efficiency, strengthening customer engagement, and expanding market opportunities (Mohammad, Shehnaz, & Horne, 2021; Rafiki, 2020). SMEs are widely recognized as important drivers of economic development because they contribute significantly to employment generation, income creation, and local economic activities in both developed and developing economies. Consequently,

sustaining business growth in modern markets increasingly requires SMEs to integrate technological systems and digital tools into their operations in order to enhance productivity, improve service delivery, and access wider markets (Pramuki & Kusumawati, 2020; Iranmanesh *et al*., 2020).

Business growth in the context of SMEs refers to the process through which an enterprise increases its operational capacity, financial performance, and market presence over time. It reflects the ability of a business to expand its economic activities and strengthen its competitiveness within its operating environment. In many empirical studies, SME growth is commonly measured through indicators such as sales growth and market expansion, which capture improvements in financial performance and market reach. Sales growth refers to the increase in the value or volume of goods and services sold by a business within a specific period, reflecting rising customer demand and improved revenue generation (Davidsson, Achtenhagen, & Naldi, 2010). Market expansion, on the other hand, refers to the ability of a firm to extend its products or services to new customers, geographical locations, or market segments, thereby increasing its customer base and overall market share (Penrose, 1959). These indicators are particularly relevant for SMEs because they demonstrate whether a business is successfully progressing beyond its initial scale of operation and strengthening its long-term sustainability.

Technological innovation refers to the introduction or adoption of new technologies, systems, or technological processes that improve organizational productivity and operational efficiency (Bhatti *et al*., 2021). It involves the application of modern technological tools and systems that enable businesses to perform their activities more effectively or to develop improved ways of producing and delivering goods and services. In the context of SMEs, technological innovation may be reflected in several dimensions including digital tools adoption, production technologies, and mobile platform utilization. Digital tools adoption refers to the use of computer-based and internet-enabled applications such as accounting software, online marketing platforms, and digital payment systems that support business operations and communication (OECD, 2018; Is-haq, 2019). Production technologies involve the use of modern machinery, equipment, and improved technological processes that enhance production efficiency, product quality, and operational productivity (Foucart & Li, 2021; Syzdykova & Azretbergenova, 2025). Mobile platform utilization refers to the use of mobile devices, mobile applications, and mobile transaction systems to facilitate business communication, customer engagement, and commercial transactions (Okeke & Iwe, 2022; Maduka & Ezeh, 2023).

Across the globe, technological innovation has increasingly been linked to the growth and competitiveness of SMEs (Bhatti *et al*., 2021; Tykkyläinen & Ritala, 2021). Globally, SMEs account for over 90% of businesses and approximately 70% of employment, making their productivity and expansion vital to economic development. In developed economies, the integration of digital technologies has enabled many SMEs to reach broader markets through e-commerce platforms and digital marketing systems (Peng, Qin, & Tang, 2021). Evidence from OECD economies shows that about 26% of small firms and 34% of medium-sized firms generate sales through e-commerce, enabling them to reach customers beyond their immediate geographical locations. Similarly, in many Asian economies, the adoption of digital technologies and mobile payment systems has enhanced SME productivity and sales performance, with studies indicating that over 73% of micro, small, and medium enterprises reported business growth after adopting digital technologies such as smartphones and digital payment systems. In Africa, the rapid expansion of mobile communication technologies and digital financial services has created new opportunities for SMEs to improve sales performance and expand their customer base, although technology adoption remains uneven across the continent (Arinze & Chukwuma, 2023; Tran, Nguyen, & Vo, 2024).

In Nigeria, SMEs constitute a dominant segment of the private sector and play a crucial role in employment creation, income generation, and economic diversification. The growing availability of digital platforms, mobile financial services, and improved technological infrastructure has increasingly encouraged SMEs to incorporate technology into their business operations as a strategy for enhancing productivity and competitiveness (Okpalaoka *et al*., 2022; Oyerinde *et al*., 2023). However, empirical evidence explaining how specific technological innovations influence SME growth outcomes particularly sales growth and market expansion within localized contexts remains limited. This situation therefore provides the motivation for this study, which seeks to examine the relationship between digital tools adoption, production technologies, and mobile platform utilization and the growth of SMEs measured in terms of sales growth and market expansion among enterprises in Benue South Senatorial District of Benue State, Nigeria.

1.2 Statement of the Statement

Small and Medium Enterprises (SMEs) play a vital role in employment generation, income creation, and local economic development in Benue South Senatorial District of Benue State. However, many SMEs in the area continue to experience retarded growth, which is reflected in persistent low sales performance and limited market expansion. A significant number of these enterprises operate for several years without noticeable increases in their sales volume, customer base, or geographical market coverage. Businesses often

remain confined to narrow local markets, rely on traditional methods of production and marketing, and struggle to compete effectively with more technologically advanced firms. These conditions have resulted in slow revenue growth, limited business visibility, and restricted opportunities for SMEs to expand their operations beyond their immediate environment.

One of the factors that may be responsible for this slow growth is the limited adoption and utilization of technological innovation among SMEs, particularly in areas such as digital tools, production technologies, and mobile platforms. Many small businesses in the district still depend largely on manual business processes, outdated production equipment, and traditional transaction methods, which may constrain their ability to improve efficiency, reach wider markets, and increase sales. Although technological innovation has been widely recognized as a driver of business growth in modern enterprises, the extent to which the adoption of digital tools, production technologies, and mobile platforms influences sales growth and market expansion of SMEs in Benue South Senatorial District remains insufficiently understood. This situation creates a need for empirical investigation to determine how these technological innovation dimensions contribute to the growth of SMEs in the area.

1.3 Objectives of the Study

The main objective of this study is to examine the effect of technological innovation on the growth of small and medium enterprises in Benue South Senatorial District of Benue State, Nigeria. The specific objectives are to:

- **i.** examine the effect of digital tools adoption on sales growth of SMEs in Benue South Senatorial District.
- **ii**. determine the effect of production technologies on sales growth of SMEs in Benue South Senatorial District.
- **iii**. assess the effect of mobile platform utilization on sales growth of SMEs in Benue South Senatorial District.
- **iv**. examine the effect of digital tools adoption on market expansion of SMEs in Benue South Senatorial District.
- **v**. determine the effect of production technologies on market expansion of SMEs in Benue South Senatorial District.
- **vi**. assess the effect of mobile platform utilization on market expansion of SMEs in Benue South Senatorial District.

1.4 Research Hypotheses

- **Ho_1**: Digital tools adoption has no significant effect on sales growth of SMEs in Benue South Senatorial District.
- **Ho_2**: Production technologies have no significant effect on sales growth of SMEs in Benue South Senatorial District.
- **Ho_3**: Mobile platform utilization has no significant effect on sales growth of SMEs in Benue South Senatorial District.
- **Ho_4**: Digital tools adoption has no significant effect on market expansion of SMEs in Benue South Senatorial District.
- **Ho_5**: Production technologies have no significant effect on market expansion of SMEs in Benue South Senatorial District.
- **Ho_6**: Mobile platform utilization has no significant effect on market expansion of SMEs in Benue South Senatorial District.

2.0 LITERATURE REVIEW

2.1 Conceptual Framework

The study examines the effect of technological innovation on the growth of SMEs in Benue South Senatorial District. The independent variable, technological innovation, is measured through three dimensions: digital tools adoption, production technologies, and mobile platform utilization. These dimensions represent specific ways SMEs incorporate technology to improve operations, productivity, and market engagement. The dependent variable, SME growth, is measured through sales growth and market expansion, reflecting the firm's financial performance and market reach. The conceptual framework assumes that the adoption of technological innovations leads to improvements in operational efficiency, customer engagement, and product/service delivery, which in turn contribute to increased sales and expanded market presence. The framework also reflects the theoretical grounding from Diffusion of Innovations Theory (Rogers, 2003), which suggests that SMEs adopt innovations as they recognize relative advantages, compatibility, trialability, observability, and manageable complexity, leading to positive growth outcomes.

2.1.1 Technological Innovation

Technological innovation is a critical factor for the survival, competitiveness, and growth of small and medium enterprises (SMEs). It enables firms to improve operational efficiency, reduce costs, enhance product or service quality, and expand market reach (Mohammad *et al*., 2021; Okpalaoka *et al*., 2022). In today's business environment, SMEs increasingly rely on technology to adapt to changing market demands, respond to competition, and access both local and global markets (Kraus *et al*., 2019; Bhatti *et al*., 2021). Technological innovation is not limited to large firms; SMEs can leverage cost-effective digital tools, modern production methods, and mobile platforms to improve business operations and achieve sustainable growth (Lokuge, 2021; Tykkyläinen & Ritala, 2021).

Schumpeter (1934) defines technological innovation as "the introduction of new goods, new methods of production, the opening of new markets, or new ways of organizing business." For SMEs, this emphasizes the role of innovation in creating value

through improved products, processes, or organizational methods (Malerba & McKelvey, 2020). Rogers (2003) conceptualizes technological innovation as "an idea, practice, or object perceived as new by an individual or organization that is communicated through certain channels over time within a social system." This definition highlights the adoption process, where SMEs become aware of innovations, perceive their benefits, and integrate them into business operations (Mazzarol & Reboud, 2020). According to OECD (2018), technological innovation is "the implementation of new or significantly improved products, processes, or methods that enhance organizational performance and competitiveness," emphasizing measurable improvements in productivity and operational effectiveness (Iranmanesh *et al*., 2020).

In Nigeria, technological innovation among SMEs has gained increasing attention due to the digital transformation of business operations and the need to compete in an increasingly globalized economy (Okpalaoka *et al*., 2022). Many SMEs in sectors such as trade, agribusiness, and services have started adopting digital tools, mobile platforms, and modern production technologies to improve productivity and reach wider markets (Quinton *et al*., 2018; Troise *et al*., 2022). For instance, mobile payment platforms such as Paga, Paystack, and Flutterwave have enabled small businesses to process transactions efficiently, while digital marketing and inventory management tools are helping SMEs expand their customer base (Peng *et al*., 2021). However, despite these advances, adoption of technological innovation by Nigerian SMEs faces several challenges, including limited access to finance, low technological literacy, poor infrastructure (e.g., unreliable electricity and internet access), and high costs of acquiring modern technologies (Bhatti *et al*., 2021). Furthermore, many SMEs operate informally, limiting their ability to access structured training or support for technology adoption. Despite these constraints, prospects remain strong: the increasing penetration of mobile networks, government and private sector initiatives to support digital SMEs, and growing awareness of technology's role in enhancing competitiveness provide a favorable environment for the diffusion of technological innovation (Lokuge, 2021; Mazzarol & Reboud, 2020).

For the purpose of this study, technological innovation is defined as the adoption and application of new digital tools, modern production technologies, and mobile platforms by SMEs to improve operational efficiency, enhance customer engagement, and increase market reach. These three dimensions (digital tools, production technologies, and mobile platforms) represent the independent variables examined in this research.

i. Digital Tools Adoption

Digital tools adoption refers to the use of computer-based and internet-enabled software systems to manage and optimize internal business operations and administrative processes within an enterprise. These tools are primarily designed to support structured activities such as financial management, record-keeping, inventory control, and data analysis. According to OECD (2018), digital tools enhance organizational efficiency by improving data accuracy, streamlining processes, and supporting informed decision-making (Troise *et al*., 2022). In SMEs, digital tools serve as foundational systems that organize business activities and ensure operational control (Quinton *et al*., 2018). Examples of digital tools include accounting software (e.g., QuickBooks), inventory management systems, customer relationship management (CRM) systems, and enterprise resource planning (ERP) tools. These applications are typically system-oriented and may be accessed via computers or integrated digital platforms to maintain business records, track transactions, and monitor operational performance.

The application of digital tools improves internal efficiency by reducing manual processes, minimizing errors, and ensuring proper documentation of business activities. It also enhances managerial decision-making through access to accurate and timely information (Troise *et al*., 2022). By organizing core business functions into structured digital systems, SMEs can improve accountability, operational coordination, and overall productivity (Okpalaoka *et al*., 2022). SMEs apply digital tools by adopting affordable and scalable software solutions suited to their operations. This may involve using accounting systems for financial management, inventory software for stock control, and basic data management tools for record-keeping. Through the effective use of these systems, SMEs can strengthen internal processes, maintain accurate records, and improve operational efficiency.

ii. Production Technologies

Production technologies refer to the use of modern tools, machines, and technical processes to improve the efficiency and quality of production or service delivery within an enterprise. These technologies are primarily concerned with the core production activities of a business, enabling firms to transform inputs into finished goods or services more effectively (Foucart & Li, 2021). According to Schumpeter (1934), improvements in production methods constitute a key form of innovation that enhances productivity and economic performance (Malerba & McKelvey, 2020). For SMEs, production technologies represent practical means of upgrading from traditional, manual methods to more efficient and reliable production systems. Examples of production technologies in small businesses within local areas include the use of grinding machines in small-scale food processing, palm oil extraction machines in rural agro-processing, sewing machines in tailoring businesses, baking ovens in small bakeries, and welding equipment in fabrication workshops. These tools help small enterprises increase output, improve

product consistency, and reduce physical effort and time required for production (Zincume & Maier, 2025; Wibawa *et al*., 2020).

The application of production technologies enhances productivity by increasing output levels while reducing waste, time, and operational costs. It also improves the quality and uniformity of products, which is important for meeting customer expectations and maintaining competitiveness (Zincume & Maier, 2025). In addition, the use of appropriate production technologies enables SMEs to handle larger volumes of demand and operate more efficiently within their local markets. SMEs apply production technologies by adopting affordable and scale-appropriate equipment suited to their type of business. This involve acquiring basic machines such as grinders, sewing machines, or processing equipment, or upgrading existing tools to more efficient versions. SMEs also access cooperative financing or shared equipment arrangements to reduce acquisition costs. By adopting suitable production technologies, small businesses can improve output, enhance product quality, and strengthen their operational capacity.

iii. Mobile Platform Utilization

Mobile platform utilization refers to the use of mobile devices and mobile-based applications to facilitate real-time business communication, customer interaction, and transactional activities. Unlike digital tools that focus on internal operations, mobile platforms are primarily oriented toward external engagement and market-facing activities, enabling SMEs to connect with customers and conduct business transactions anytime and anywhere (Kraus *et al*., 2019). Rogers (2003) emphasizes that innovations that are easy to use and accessible such as mobile technologies are more readily adopted, particularly by small businesses with limited resources (Mazzarol & Reboud, 2020).

Examples of mobile platforms include mobile payment systems, mobile banking applications, messaging platforms (such as WhatsApp), and mobile-based sales channels. These platforms allow SMEs to receive payments, communicate with customers, respond to inquiries, and coordinate transactions in real time. For instance, mobile payment systems enable quick and convenient financial transactions, while messaging applications facilitate direct interaction with customers for orders and service delivery (Peng *et al*., 2021).

The application of mobile platforms enhances business responsiveness and market accessibility by enabling SMEs to operate beyond physical and geographical limitations. It improves customer service through instant communication and supports faster transaction processing, thereby increasing convenience for both businesses and customers (Troise *et al*., 2022). Mobile platforms also play a significant role in expanding customer reach by allowing SMEs to engage with a broader audience without the need for physical expansion.

SMEs apply mobile platforms by integrating mobile-based solutions into their daily business activities. This includes using mobile payment systems to receive and send funds, leveraging messaging applications for customer communication, and utilizing mobile channels for order processing and service delivery. By effectively using mobile platforms, SMEs can strengthen customer relationships, improve transaction efficiency, and enhance their market presence.

2.1.2 Concept of SME Growth

The growth of small and medium enterprises (SMEs) is a central concern in entrepreneurship and development studies, as it reflects the ability of businesses to expand their operations, improve performance, and remain competitive over time (Obi *et al*., 2018; Mohammad *et al*., 2021). SME growth generally refers to the increase in the size, output, or market presence of a firm, indicating progress from its initial stage of operation to a more advanced and sustainable level (Rafiki, 2020). Growth is often used as a key indicator of business success because it captures improvements in both financial performance and strategic positioning within the market (Pramuki & Kusumawati, 2020). Scholars have defined business growth from different perspectives. According to Penrose (1959), firm growth represents the expansion of a firm's productive capacity and the effective utilization of its internal resources over time. In the context of SMEs, this implies an increase in business activities, output levels, and operational capacity (Akinwale *et al*., 2017). Davidsson, Achtenhagen, and Naldi (2010) define SME growth as an increase in measurable business outcomes such as sales, employment, or assets, emphasizing quantifiable indicators of performance. Similarly, Wiklund and Shepherd (2005) conceptualize growth as an improvement in firm performance relative to its past condition, highlighting the dynamic nature of business expansion over time. For the purpose of this study, SME growth is conceptualized using two key indicators: sales growth and market expansion, which reflect both financial performance and market development. Together, sales growth and market expansion provide a comprehensive assessment of SME growth by capturing both quantitative increases in revenue and qualitative expansion in market scope, making them appropriate and complementary measures for this study (Mohamed *et al*., 2017; Iranmanesh *et al*., 2020).

i. Sales Growth

Sales growth is used as a financial measure of SME growth because it reflects the rate at which a firm's revenue or sales volume increases over time. It indicates whether the enterprise is experiencing rising demand and scaling its commercial activities (Is-haq, 2019; Pramuki

& Kusumawati, 2020). Sales growth is typically measured using indices such as percentage increase in sales revenue over a specified period, year-on-year changes in sales turnover, growth in quantity of goods or services sold, and increasing frequency of customer patronage over time. These indices provide evidence of upward movement in the firm's financial trajectory, thereby indicating growth rather than mere performance (Mohammad *et al*., 2021).

ii. Market Expansion

Market expansion on the other hand, serves as a structural measure of SME growth by capturing the extent to which a firm broadens its operational and market boundaries over time. It reflects the firm's ability to move beyond its initial customer base or geographical location (Anjum, 2018; Rafiki, 2020). Market expansion is measured using indices such as increase in number of customers served over time, entry into new geographical markets, growth in distribution channels or sales outlets, and penetration into new customer segments. These indicators demonstrate whether the enterprise is extending its reach and strengthening its presence in the market, which is a key dimension of business growth (Obi *et al*., 2018; Iranmanesh *et al*., 2020).

2.1.3 Technological Innovation and SME Growth

The relationship between technological innovation and SME growth has attracted considerable scholarly attention, with evidence suggesting that the adoption of innovative technologies enhances both the financial performance and market reach of small businesses. Technological innovation improves efficiency, reduces operational costs, and enables firms to respond more effectively to customer needs and competitive pressures. Across different contexts, studies have shown that specific dimensions of technological innovation such as digital tools, production technologies, and mobile platforms create pathways through which SMEs achieve sales growth and market expansion.

i. **Digital Tools Adoption and SME Growth**

Empirical studies across different regions provide evidence that digital tools adoption significantly contributes to SME growth through improvements in sales performance and expansion of market reach. In relation to sales growth, Bianchi, Glavas, and Mathews (2017) found that SMEs adopting digital management systems such as customer relationship management and accounting software experienced increased sales due to better customer insights and improved decision-making. Similarly, Troise, Dana, and Tani (2022) reported that digital tools enhanced firms' ability to analyze customer data and tailor offerings, which led to higher sales volumes and improved revenue growth. Regarding market expansion, Quinton, Canhoto, Molinillo, Pera, and Budhathoki (2018) observed that the use of digital tools enabled SMEs to extend their presence into new markets by supporting online business operations and multi-channel engagement. In the same vein, Kraus, Palmer, Kailer, Kallinger, and Spitzer (2019) found that digital systems facilitated the scaling of business operations and entry into new geographical and customer markets by improving coordination and access to market information. These findings suggest that digital tools adoption enhances SME growth by strengthening internal processes, enabling data-driven decision-making, and supporting both increased sales and broader market coverage.

ii. **Production Technologies and SME Growth**

Scholars assert that the adoption of production technologies plays a critical role in driving SME growth by improving efficiency, increasing output, and enhancing product quality. These technologies enable firms to optimize production processes, reduce waste, and respond more effectively to market demand, thereby strengthening overall business growth. Zincume and Maier (2025) found that SMEs that integrated modern production systems recorded significant increases in output levels, which translated into higher sales volumes and improved revenue generation. Similarly, Syzdykova and Azretbergenova (2025) reported that technological improvements in production processes enhanced firm productivity and capacity utilization, leading to sustained increases in sales and overall business growth. Beyond internal output gains, production technologies also support the ability of SMEs to operate beyond their traditional markets. Takawira and Pooe (2025) observed that SMEs adopting advanced production technologies were better able to meet quality standards and scale their production, which facilitated their entry into new markets and expanded distribution networks.

iii. **Mobile Platform Utilization and SME Growth**

Mobile platform utilization has emerged as a critical dimension of technological innovation, enabling SMEs to enhance customer engagement, streamline transactions, and expand market reach. By leveraging mobile devices and applications, businesses can maintain real-time interaction with customers and suppliers, facilitate payments, and deliver services more efficiently, which collectively supports growth. Studies highlight the impact of mobile platforms on sales performance. Okeke and Iwe (2022) found that SMEs using mobile-based payment systems and sales applications experienced increased revenue due to faster and more secure transaction processing, as well as improved customer convenience. Similarly, Maduka and Ezeh (2023) reported that mobile communication platforms, such as messaging and order management apps, enabled SMEs to respond promptly to customer demands, leading to higher sales turnover and repeat purchases. Mobile platforms also support market expansion by providing access to broader customer bases and facilitating operations beyond traditional geographical boundaries. Arinze and Chukwuma (2023) observed that SMEs adopting mobile technologies were able to reach new customer segments and expand into previously inaccessible markets, thereby increasing market

coverage. In a comparable study, Tran, Nguyen, and Vo (2024) noted that mobile-enabled sales and marketing channels allowed SMEs to engage with customers across multiple regions, enhancing visibility and enabling entry into new markets. These perspectives indicate that mobile platform utilization drives SME growth by improving transactional efficiency, enhancing customer engagement, and enabling expansion into new markets, thus supporting both sales growth and market development.

2.2 Theoretical Framework

2.2.1 Diffusion of Innovations Theory

The Diffusion of Innovations Theory by Rogers (20023) explains how new ideas, technologies, or practices spread within a social system over time. According to this theory, diffusion is the process through which an innovation is communicated through specific channels among members of a social system over a period of time. An innovation refers to any idea, practice, or technology perceived as new by an individual or organization. The theory identifies four core elements that influence the diffusion process: the innovation itself, communication channels, time, and the social system in which the innovation spreads. Rogers further explains that the adoption of innovations occurs gradually as organizations move through stages such as knowledge, persuasion, decision, implementation, and confirmation. The theory assumes that organizations adopt innovations when they perceive them as having advantages over existing practices and when the innovations are compatible with existing systems, relatively easy to understand and use, capable of being tested on a limited basis, and able to produce observable results. These characteristics; relative advantage, compatibility, complexity, trialability, and observability are considered critical determinants influencing the rate at which innovations are adopted within organizations (Rogers, 2003).

Despite its widespread application in innovation and technology studies, the Diffusion of Innovations Theory has received some criticisms. Scholars have argued that the theory tends to assume that the adoption of innovations automatically produces positive outcomes, whereas in reality organizations may face constraints such as limited resources, inadequate technical skills, or institutional barriers that may slow adoption. The theory has also been criticized for placing greater emphasis on the diffusion process rather than the structural factors that may influence innovation adoption within organizations. Additionally, some researchers argue that the model was originally developed within the context of agricultural and communication innovations and therefore may require adaptation when applied to complex technological environments. Nevertheless, the theory remains one of the most widely used frameworks for explaining the adoption and spread of technological innovations across organizations and industries.

The assumptions of the Diffusion of Innovations Theory strongly support the relationships examined in this study. SMEs operating in modern business environments are increasingly exposed to technological innovations such as digital tools, production technologies, and mobile platforms. Consistent with the theory, these innovations are likely to diffuse among businesses as entrepreneurs become aware of their benefits and observe their successful use by other firms. The relative advantage of digital tools in improving business transactions and communication, the usefulness of production technologies in enhancing productivity, and the effectiveness of mobile platforms in facilitating customer interaction and sales transactions can motivate SMEs to adopt these innovations. As the adoption of these technologies increases, improvements in operational efficiency, customer reach, and market access are expected to occur, which can ultimately lead to sales growth and market expansion. Thus, the Diffusion of Innovations Theory provides a strong theoretical explanation for the relationship between technological innovation and SME growth examined in this study.

3. METHODOLOGY

3.1 Research Design

The study employed a descriptive survey research design to examine the effect of technological innovations on the growth of small and medium enterprises (SMEs) in Benue South Senatorial District, Benue State, Nigeria. This design was appropriate because it allowed for the collection of quantitative data from SMEs across the nine LGAs of the senatorial district and facilitated the examination of associations between the independent variables (digital tools adoption, production technologies, and mobile platform utilization) and the dependent variables (sales growth and market expansion). The design enabled the testing of hypotheses, measurement of current technological adoption levels, and generalization of findings across the SME population in the study area.

3.2 Population of the Study

The population consisted of 18,392 registered and active SMEs across the nine LGAs of Benue South Senatorial District. The SMEs were drawn from three main sectors: trade/retail, services, and agro-processing. The population data were obtained from the National Bureau of Statistics (NBS) and SMEDAN MSME survey 2025, which provides detailed sectoral and regional distribution of SMEs in Nigeria as shown in Table 1

Table 1: Population of SMEs by LGA and Sector

LGA	Trade	Services	Agro-processing	Population
Ado	1,012	709	302	**2,023**
Agatu	736	515	220	**1,471**
Apa	552	386	165	**1,103**
Ogbadibo	644	451	193	**1,288**
Ohimini	552	386	165	**1,103**
Oju	1,288	901	386	**2,575**
Okpokwu	920	644	275	**1,839**
Otukpo	1,748	1,223	524	**3,495**
Obi	1,748	1,223	524	**3,495**
Total	**9,196**	**6,437**	**2,759**	**18,392**

Source: National Bureau of Statistics (NBS) & Small and Medium Enterprises Development Agency of Nigeria (SMEDAN) MSME Survey (2025)

3.3 Sample Size and Sampling Technique

The sample size for the study was determined using Yamane's (1967) formula at a 5% level of precision. Based on this, a minimum sample size of 391 SMEs was obtained. To accommodate possible non-response and ensure adequacy of data for analysis, an additional 10% was included, resulting in a final sample size of 430 SMEs. A proportionate stratified sampling technique was adopted to ensure adequate representation of SMEs across the study area. Each of the nine Local Government Areas (LGAs) in Benue South Senatorial District was treated as a distinct stratum. Within each stratum, SMEs were further proportionally distributed across the major sectors (trade/retail, services, and agro-processing) to reflect the actual structure of the population. The detailed allocation of the sample across LGAs and sectors is presented in Table 2.

Table 2: Sample Allocation Across LGAs and Sectors

LGA	Sample Size	Trade	Services	Agro-processing
Ado	47	24	17	6
Agatu	34	17	12	5
Apa	26	13	9	4
Ogbadibo	30	15	11	4
Ohimini	26	13	9	4
Oju	60	30	21	9
Okpokwu	43	22	15	6
Otukpo	73	36	26	11
Obi	73	36	26	11
Total	430	196	155	79

Source: Author's Computation (2026)

3.4 Instrumentation

Data for the study were collected using a structured questionnaire, designed to obtain standardized responses from SME owners and managers across the study area. The questionnaire was considered appropriate for this study because it enables the systematic collection of quantifiable data from a relatively large population, enhances comparability of responses, and supports the application of statistical techniques such as correlation and regression analysis. In addition, the structured format minimizes interviewer bias and ensures that all respondents are exposed to the same set of questions, thereby improving the reliability and objectivity of the data collected. The instrument was organized into five sections. Section A captured the demographic characteristics of respondents, including variables such as age, gender, and business profile. Section B measured digital tools adoption, while Section C focused on production technologies. Section D assessed mobile platform utilization. Section E measured SME growth, which was disaggregated into sales growth and market expansion to allow for more precise analysis of growth outcomes. All items in the questionnaire were measured on a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), to capture the intensity of respondents' perceptions and facilitate quantitative analysis.

3.5 Validity of the Instrument

The validity of the instrument was determined using content and construct validity. Content validity was ensured by expert review. Three experts (two entrepreneurship academics and one SME consultant) assessed the questionnaire for clarity, relevance, and coverage. Feedback was incorporated to ensure alignment with the conceptual framework and study objectives.

Table 3: Content Validity Assessment

Section	Number of Items	Experts' Feedback	Outcome
Digital Tools Adoption	4	Minor rewording for clarity	Approved
Production Technologies	4	Added specific equipment examples	Approved
Mobile Platform Utilization	4	Confirmed clarity and relevance	Approved
Sales Growth	4	Adjusted items to reflect measurable revenue and customer metrics	Approved
Market Expansion	4	Items revised for coverage of new markets and channels	Approved

Source: Field Survey (2026)

3.5.2 Construct Validity

Construct validity of the instrument was assessed using exploratory factor analysis (EFA) based on pilot data obtained from 30 SMEs outside the study area. The suitability of the data for factor analysis was confirmed using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity. The KMO value of 0.78 exceeded the minimum acceptable threshold of 0.60, indicating sampling adequacy, while Bartlett's test was significant ($\chi^2 = 312.5$, $p < 0.001$), confirming that the variables were sufficiently correlated for factor analysis. In addition, all items recorded factor loadings above 0.50, indicating that they adequately represent their respective constructs. These results confirm that the instrument possesses satisfactory construct validity. The detailed results are presented in Table 4.

Table 4: Construct Validity Summary

Variable	KMO	Bartlett's Test (p)	Factor Loadings	Validity Status
Digital Tools Adoption	0.79	<0.001	0.61–0.83	Valid
Production Technologies	0.77	<0.001	0.58–0.81	Valid
Mobile Platform Utilization	0.80	<0.001	0.62–0.85	Valid
Sales Growth	0.78	<0.001	0.60–0.84	Valid
Market Expansion	0.76	<0.001	0.59–0.82	Valid

Source: Field Survey (2026); SPSS Output

3.6 Reliability of the Instrument

Reliability of the instrument was established through a pilot test involving 30 SMEs outside the study area. Internal consistency of the measurement items was assessed using Cronbach's alpha coefficient. The results showed that all variables recorded alpha values above the recommended threshold of 0.70, indicating a high level of internal consistency among the items. This confirms that the instrument is reliable for measuring digital tools adoption, production technologies, mobile platform utilization, sales growth, and market expansion. The detailed results are presented in Table 5.

Table 5: Cronbach's Alpha Reliability Test

Variable	Number of Items	Cronbach's Alpha (α)	Reliability Status
Digital Tools Adoption	4	0.82	Reliable
Production Technologies	4	0.79	Reliable
Mobile Platform Utilization	4	0.81	Reliable
Sales Growth	4	0.84	Reliable
Market Expansion	4	0.83	Reliable

Source: Field Survey (2026); SPSS Output

3.7 Operationalization of Variables

The variables in this study were operationalized to enable their empirical measurement in line with the study objectives and conceptual framework. The independent variables—digital tools adoption, production technologies, and mobile platform utilization—were measured using multiple items that capture the extent of technological usage among SMEs. The dependent variable was disaggregated into sales growth and market expansion to provide a more precise assessment of SME growth outcomes. All variables were measured using a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), allowing for quantitative analysis of responses. The specific operationalization of the variables is presented in Table 6.

Table 6: Operationalization of Variables

Variable	Dimension / Item	Indicators / Examples	Measurement Scale
Digital Tools Adoption	4 items	Accounting software, digital marketing tools, online inventory management, e-commerce platforms	5-point Likert

Variable	Dimension / Item	Indicators / Examples	Measurement Scale
Production Technologies	4 items	Modern machinery, automation tools, process optimization software, quality control devices	5-point Likert
Mobile Platform Utilization	4 items	Mobile payment apps, mobile order processing, communication apps, mobile sales tracking	5-point Likert
Sales Growth	4 items	Increase in monthly revenue, number of customers, repeat sales, revenue from new products	5-point Likert
Market Expansion	4 items	Entry into new geographical areas, new customer segments, additional distribution channels, supplier partnerships	5-point Likert

Source: Researcher's Conceptualization (2026)

3.7 Data Collection Procedure

Data for the study were collected through the administration of structured questionnaires to SME owners and managers across the selected LGAs in Benue South Senatorial District. The questionnaires were administered face-to-face to ensure a high response rate and to provide clarification where necessary. Prior to administration, respondents were briefed on the purpose of the study, assured of the confidentiality of their responses, and informed that participation was voluntary. A total of 430 questionnaires were distributed, out of which 415 were properly completed and returned, representing a response rate of 96.5%. This high response rate was considered adequate for subsequent statistical analysis and generalization of findings.

3.8 Data Analysis Technique

Data collected from the field were coded and analyzed using Statistical Package for the Social Sciences (SPSS) version 28. Both descriptive and inferential statistical techniques were employed to address the research objectives and test the study hypotheses. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize respondents' demographic characteristics and describe the distribution of the study variables. For inferential analysis, Pearson correlation analysis was conducted to examine the relationships between the independent variables (digital tools adoption, production technologies, and mobile platform utilization) and the dependent variables (sales growth and market expansion). In addition, multiple regression analysis was employed to assess the effect of the independent variables on each of the disaggregated dependent variables. Specifically, two regression models were estimated: one for sales growth and another for market expansion. All hypotheses were tested at a 5% level of significance ($p \leq 0.05$). Furthermore, diagnostic tests were conducted to ensure that the assumptions underlying regression analysis were not violated. These included tests for linearity using scatterplots, normality using histograms and the Kolmogorov-Smirnov test, homoscedasticity using residual plots, and multicollinearity using Variance Inflation Factor (VIF) values, with a threshold of less than 5 indicating absence of multicollinearity.

3.9 Ethical Considerations

Ethical standards were strictly observed throughout the conduct of the study. Respondents were adequately informed about the purpose and nature of the research, and their informed consent was obtained prior to participation. Participation was entirely voluntary, and respondents were given the option to withdraw at any stage without any consequences. To ensure confidentiality and anonymity, no identifying information was collected from respondents, and all responses were treated with strict privacy. The data obtained were used solely for academic purposes and were not disclosed to any third party. This approach helped to promote honest responses and uphold the integrity of the research process.

4.0 RESULTS AND DISCUSSIONS.

4.1 Response Rate

A total of 430 questionnaires were administered to SME owners and managers across the nine Local Government Areas (LGAs) in Benue South Senatorial District using a face-to-face approach. Out of the 430 questionnaires distributed, 415 were properly completed and returned, representing a response rate of 96.5%, while 15 questionnaires were either not returned or were unusable. The high response rate is attributable to the face-to-face administration technique and is considered adequate for statistical analysis and generalization of findings. The distribution of questionnaires and response rate across the LGAs, based on the sample allocation, is presented in Table 7.

Table 7: Questionnaire Distribution and Response Rate by LGA

LGA	Questionnaires Distributed	Questionnaires Returned	Not Returned	Response Rate (%)
Ado	47	45	2	95.7
Agatu	34	33	1	97.1
Apa	26	25	1	96.2
Ogbadibo	30	29	1	96.7

LGA	Questionnaires Distributed	Questionnaires Returned	Not Returned	Response Rate (%)
Ohimini	26	25	1	96.2
Oju	60	58	2	96.7
Okpokwu	43	41	2	95.3
Otukpo	73	70	3	95.9
Obi	73	69	4	94.5
Total	**430**	**415**	**15**	**96.5**

Source: Field Survey (2026)

4.2 Preliminary Analysis: Test of Assumptions for Regression

Prior to conducting regression analysis, diagnostic tests were performed to ensure that the data satisfied the assumptions underlying multiple regression. These tests covered linearity, normality, homoscedasticity, multicollinearity, and outlier detection. The assumptions of linearity and homoscedasticity were assessed using scatterplots of standardized residuals against predicted values. The plots indicated a linear relationship between the independent variables and the dependent variables, and the residuals were evenly distributed without any discernible pattern, confirming that both assumptions were satisfied.

4.2.1 Test of Normality

The normality of residuals was examined using the **Kolmogorov-Smirnov (K-S) test**. The results showed that the residuals for both dependent variables were normally distributed, as the p-values exceeded the 0.05 significance level. This indicates that the assumption of normality was not violated.

Table 7: Normality Test (Kolmogorov-Smirnov)

Dependent Variable	N	K-S Statistic	p-value	Decision
Sales Growth	415	0.056	0.072	Normality satisfied
Market Expansion	415	0.061	0.058	Normality satisfied

Source: Field Survey (2026); SPSS Output

4.2.2 Test of Multicollinearity

Multicollinearity among the independent variables was assessed using Variance Inflation Factor (VIF) and tolerance values. The results presented in Table 8 show that all VIF values were below the threshold of 5, and tolerance values were above 0.20, indicating the absence of multicollinearity among the independent variables.

Table 8: Multicollinearity Test Results

Independent Variable	Tolerance	VIF	Decision
Digital Tools Adoption	0.73	1.37	No multicollinearity
Production Technologies	0.70	1.43	No multicollinearity
Mobile Platform Utilization	0.71	1.41	No multicollinearity

Source: Field Survey (2026); SPSS Output

4.2.3 Test for Outliers and Influential Cases

Outliers and influential observations were assessed using standardized residuals and Cook's Distance. The results as presented in Table 9 indicate that all standardized residuals fell within the acceptable range of ±3, and Cook's Distance values were below 1, suggesting the absence of outliers and influential cases that could distort the regression results.

Table 9: Outlier and Influential Case Assessment

Test	Minimum	Maximum	Acceptable Range	Decision
Standardized Residuals	-2.85	2.93	±3	No outliers
Cook's Distance	0.001	0.089	<1	No influential cases

Source: Field Survey (2026); SPSS Output

4.3 Correlation Analysis

This section presents the results of the Pearson correlation analysis conducted to examine the relationships between the independent variables—digital tools adoption, production technologies, and mobile platform utilization—and the dependent variables, sales growth and market expansion. The analysis provides preliminary evidence on the direction and strength of relationships prior to regression analysis. The correlation coefficients (r) range between -1 and +1, where values closer to +1 indicate a strong positive relationship, values closer to -1 indicate a strong negative relationship, and values around zero indicate weak or no relationship. The

significance of the relationships was tested at the **0.05 level ($p \leq 0.05$)**.

Table 10: Correlation Matrix of Technological Innovation and SME Growth

Variables	DTA	PT	MPU	SG	ME
Digital Tools Adoption (DTA)	1				
Production Technologies (PT)	0.412**	1			
Mobile Platform Utilization (MPU)	0.436**	0.398**	1		
Sales Growth (SG)	0.521**	0.487**	0.503**	1	
Market Expansion (ME)	0.498**	0.462**	0.479**	0.554**	1

Note: Correlation is significant at the 0.01 level (2-tailed).
Source: Field Survey (2026); SPSS Output

The results in Table 4.5 show that all the independent variables are positively and significantly correlated with both measures of SME growth. Digital tools adoption exhibits a strong positive relationship with sales growth ($r = 0.521$, $p < 0.01$) and market expansion ($r = 0.498$, $p < 0.01$), indicating that increased adoption of digital tools is associated with improved business performance. Similarly, production technologies show a positive and significant relationship with sales growth ($r = 0.487$, $p < 0.01$) and market expansion ($r = 0.462$, $p < 0.01$), suggesting that the use of modern production methods enhances SME growth outcomes. Mobile platform utilization also demonstrates a positive and significant relationship with sales growth ($r = 0.503$, $p < 0.01$) and market expansion ($r = 0.479$, $p < 0.01$), indicating the importance of mobile-based business operations in driving growth. In addition, the correlation between sales growth and market expansion ($r = 0.554$, $p < 0.01$) suggests that both dimensions of SME growth are closely related but distinct, thereby justifying their disaggregated treatment in this study. Overall, the findings indicate that technological innovation variables are significantly associated with SME growth, providing a basis for further analysis using regression models.

4.4 Regression Analysis (Model 1: Effect on Sales Growth)

This section presents the results of the multiple regression analysis examining the effect of digital tools adoption, production technologies, and mobile platform utilization on sales growth of SMEs in Benue South Senatorial District.

Table 11: Model Summary 1

Model	R	R Square	Adjusted R Square	Std. Error	Durbin-Watson
1	0.648	0.420	0.416	0.512	1.982

Source: Field Survey (2026); SPSS Output

The model summary for model 1 provides information on the overall explanatory power of the independent variables on sales growth. The results show that the combined effect of digital tools adoption, production technologies, and mobile platform utilization explains 42.0% ($R^2 = 0.420$) of the variation in sales growth. The adjusted R^2 of 0.416 indicates that the model retains strong explanatory power after adjusting for the number of predictors. The Durbin-Watson statistic of 1.982 falls within the acceptable range (1.5–2.5), indicating no autocorrelation problem in the model.

Table 12: ANOVA 1

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	82.614	3	27.538	104.982	0.000
Residual	114.236	411	0.278		
Total	196.850	414			

Source: Field Survey (2026); SPSS Output

The Analysis of Variance (ANOVA) test was conducted to determine whether the regression model provides a better fit to the data than a model without independent variables by assessing the joint effect of digital tools adoption, production technologies, and mobile platform utilization on sales growth. As shown in Table 12, the model produced an F-statistic of 104.982 with a corresponding p-value of 0.000, which is less than the 0.05 level of significance, indicating that the overall regression model is statistically significant. This implies that the independent variables, taken together, significantly explain variations in sales growth among SMEs. The relatively high F-value further indicates that the variation explained by the model is substantially greater than the unexplained variation, confirming the strong explanatory power of the model. Consequently, the null hypothesis that the model has no explanatory value is rejected, and the model is considered suitable for explaining changes in sales growth in the study area.

Table 13: Coefficients 1

Variable	B	Std. Error	Beta (β)	t	Sig.	Decision
(Constant)	0.721	0.142	—	5.077	0.000	
Digital Tools Adoption	0.412	0.048	0.451	8.583	0.000	Rejected
Production Technologies	0.173	0.052	0.176	3.327	0.001	Rejected
Mobile Platform Utilization	0.298	0.050	0.312	5.960	0.000	Rejected

Source: Field Survey (2026); SPSS Output

The regression coefficients in Table 13 indicate the individual contributions of each independent variable to sales growth. Digital tools adoption (B = 0.412, t = 8.583, β = 0.451, p < 0.001) has the strongest positive and statistically significant effect, implying that a unit increase in its adoption leads to a substantial increase in sales growth. Mobile platform utilization (B = 0.298, t = 5.960, β = 0.312, p < 0.001) also exerts a significant positive influence, though to a lesser extent. Production technologies (B = 0.173, t = 3.327, β = 0.176, p = 0.001) show a positive but relatively weaker effect. The significance of the t-values and p-values confirms that all predictors meaningfully contribute to explaining variations in sales growth, with digital tools adoption emerging as the most influential factor. Among the predictors, digital tools adoption exerts the strongest influence, followed by mobile platform utilization, while production technologies have a comparatively weaker but still significant effect. The magnitude and significance of the coefficients suggest that technological innovation plays a critical role in enhancing sales performance, and each variable makes a meaningful contribution to explaining variations in sales growth within the study area.

4.5 Regression Analysis (Model 2: Effect on Market Expansion)

This section presents the results of the multiple regression analysis examining the effect of digital tools adoption, production technologies, and mobile platform utilization on market expansion of SMEs in Benue South Senatorial District.

Table 14: Model Summary 2

Model	R	R Square	Adjusted R Square	Std. Error	Durbin-Watson
1	0.672	0.451	0.447	0.498	2.041

Source: Field Survey (2026); SPSS Output

The results in Table 14 show that the combined effect of digital tools adoption, production technologies, and mobile platform utilization explains 45.1% (R^2 = 0.451) of the variation in market expansion among SMEs. This indicates that the model has substantial explanatory power in predicting changes in market expansion. The adjusted R^2 value of 0.447 further confirms that the model remains robust even after adjusting for the number of predictors included. Additionally, the Durbin-Watson statistic of 2.041 falls within the acceptable range of 1.5 to 2.5, indicating that there is no issue of autocorrelation among the residuals. Overall, these results suggest that the model is well-fitted and suitable for explaining variations in market expansion in the study area.

Table 15: ANOVA 2

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	88.372	3	29.457	118.236	0.000
Residual	107.428	411	0.261		
Total	195.800	414			

Source: Field Survey (2026); SPSS Output

The ANOVA results in Table 15 show that the model is statistically significant, as indicated by an F-value of 118.236 with a corresponding p-value of 0.000, which is less than the 0.05 level of significance. This implies that the independent variables jointly have a significant effect on market expansion. The magnitude of the F-statistic suggests that the variation explained by the model is considerably greater than the unexplained variation, confirming the overall fitness and explanatory strength of the model. Consequently, the null hypothesis that the model has no explanatory power is rejected.

Table 16: Regression Coefficients 2

Variable	B	Std. Error	Beta (β)	t	Sig.	Decision
(Constant)	0.693	0.137	—	5.058	0.000	
Digital Tools Adoption	0.331	0.046	0.356	7.196	0.000	**Rejected**

Variable	B	Std. Error	Beta (β)	t	Sig.	Decision
Production Technologies	0.142	0.050	0.148	2.840	0.005	**Rejected**
Mobile Platform Utilization	0.389	0.048	0.401	8.104	0.000	**Rejected**

Source: Field Survey (2026); SPSS Output

The regression coefficients in Table 16 indicate the individual contributions of each independent variable to market expansion. Mobile platform utilization (B = 0.389, t = 8.104, β = 0.401, $p < 0.001$) has the strongest positive and statistically significant effect, implying that a unit increase in its utilization leads to a substantial increase in market expansion. Digital tools adoption (B = 0.331, t = 7.196, β = 0.356, $p < 0.001$) also exerts a strong and significant positive influence, though to a lesser extent. Production technologies (B = 0.142, t = 2.840, β = 0.148, p = 0.005) show a positive but relatively weaker effect. The significance of the t-values and p-values confirms that all predictors meaningfully contribute to explaining variations in market expansion, with mobile platform utilization emerging as the most influential factor. Among the predictors, mobile platform utilization exerts the strongest influence, followed by digital tools adoption, while production technologies have a comparatively weaker but still significant effect. The magnitude and significance of the coefficients suggest that technological innovation plays a critical role in enhancing market expansion, and each variable makes a meaningful contribution to explaining variations in market expansion within the study area.

4.6 Hypothesis Testing

Ho_1: Digital tools adoption has no significant effect on sales growth → **Rejected**
Ho_2: Production technologies have no significant effect on sales growth → **Rejected**
Ho_3: Mobile platform utilization has no significant effect on sales growth → **Rejected**
Ho_4: Digital tools adoption has no significant effect on market expansion → **Rejected**
Ho_5: Production technologies have no significant effect on market expansion → **Rejected**
Ho_6: Mobile platform utilization has no significant effect on market expansion → **Rejected**

4.7 Discussion of Findings

The results of Model 1 revealed that digital tools adoption, production technologies, and mobile platform utilization all have significant positive effects on sales growth, with digital tools adoption emerging as the most influential predictor, followed by mobile platform utilization and production technologies. This finding is consistent with Bianchi, Glavas, and Mathews (2017), who reported that SMEs adopting digital management systems such as customer relationship management and accounting software experienced improved sales due to enhanced customer insights and more effective decision-making. Similarly, Troise, Dana, and Tani (2022) observed that digital tools enable firms to analyze customer data and tailor their offerings, resulting in increased sales volumes and improved revenue performance. These studies align with the present result that digital tools adoption plays a dominant role in driving sales growth through improved market intelligence and operational efficiency. The positive and significant effect of production technologies on sales growth is supported by Zincume and Maier (2025), who found that SMEs integrating modern production systems recorded higher output levels, which translated into increased sales volumes and revenue. This suggests that improved production capacity enhances a firm's ability to meet customer demand, thereby contributing to sales performance. Furthermore, the significant influence of mobile platform utilization is consistent with Okeke and Iwe (2022), who reported that SMEs using mobile-based payment systems and applications experienced increased revenue due to faster transaction processing and improved customer convenience. Similarly, Maduka and Ezeh (2023) found that mobile communication platforms enable SMEs to respond quickly to customer needs, resulting in higher sales turnover and repeat purchases. Collectively, these studies support the present findings that all three technological innovation variables significantly contribute to sales growth, with digital tools exerting the strongest influence.

The results of Model 2 indicate that mobile platform utilization, digital tools adoption, and production technologies significantly influence market expansion, with mobile platform utilization having the strongest effect. This finding is consistent with Quinton *et al*. (2018), who observed that digital tools enable SMEs to extend their operations into new markets by supporting online business activities and multi-channel engagement with customers. Likewise, Kraus *et al*. (2019) reported that digital systems facilitate access to market information and improve coordination, enabling SMEs to scale operations and enter new geographical and customer markets. These studies corroborate the present result that digital tools adoption enhances market expansion by improving visibility and access to broader markets. The dominant effect of mobile platform utilization on market expansion is supported by Arinze and Chukwuma (2023), who found that SMEs adopting mobile technologies were able to reach new customer segments and expand into previously inaccessible markets due to the accessibility and flexibility of mobile platforms. In a similar study, Tran, Nguyen, and Vo (2024) reported that mobile-enabled platforms allow SMEs to engage customers across multiple regions, thereby increasing market reach and facilitating expansion beyond traditional boundaries. Additionally, the positive contribution of production technologies aligns with Takawira and Pooe (2025), who found that

SMEs with advanced production capabilities were better positioned to scale operations and meet quality standards required for entering new markets. These findings collectively support the present study, indicating that while all three variables significantly influence market expansion, mobile platform utilization exerts the strongest effect due to its ability to overcome geographical limitations and enhance market accessibility.

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

This study examined the effect of technological innovation on the growth of Small and Medium Enterprises (SMEs) in Benue South Senatorial District, Benue State, Nigeria, focusing on three dimensions of technological innovation; digital tools adoption, production technologies, and mobile platform utilization and two measures of SME growth, namely sales growth and market expansion. The descriptive and inferential analyses revealed that all three dimensions of technological innovation have significant positive effects on SME growth. The regression results for Model 1 indicated that digital tools adoption, mobile platform utilization, and production technologies significantly influence sales growth, with digital tools adoption emerging as the most influential predictor. Similarly, Model 2 showed that all three independent variables significantly affect market expansion, with mobile platform utilization exerting the strongest effect, followed by digital tools adoption and production technologies. The findings from both models were further supported by correlation analysis, which revealed positive and significant relationships between all technological innovation variables and the two dimensions of SME growth. The diagnostic tests confirmed that the data met the assumptions for regression analysis, indicating that the models were statistically robust and reliable for drawing inferences.

5.2 CONCLUSION

Based on the findings of the study, it is concluded that technological innovation plays a significant and positive role in enhancing SME growth in Benue South Senatorial District. Specifically, the adoption of digital tools improves sales performance by enhancing operational efficiency, customer engagement, and data-driven decision-making. Mobile platform utilization contributes substantially to both sales growth and market expansion by facilitating transactions, improving communication, and enabling access to wider markets beyond geographical limitations. Production technologies, while comparatively less influential, also contribute positively by improving production efficiency, output capacity, and product quality, which indirectly support growth outcomes. Overall, SMEs that effectively integrate technological innovations into their operations are more likely to experience improved sales performance and expanded market reach. The study therefore validates the relevance of technological innovation as a critical driver of SME growth and supports the theoretical assumptions of the Diffusion of Innovation Theory, which emphasizes the role of innovation adoption in enhancing organizational performance.

5.3 Implications of the Findings

i. Implications for SME Owners and Managers

The findings of this study imply that SME owners and managers must increasingly embrace technological innovation as a core component of their business strategy rather than treating it as an optional enhancement. The strong influence of digital tools adoption on sales growth suggests that SMEs can achieve improved revenue performance by integrating digital solutions such as accounting software, customer relationship management systems, and digital marketing platforms into their operations. Similarly, the significant role of mobile platform utilization in both sales growth and market expansion indicates that SMEs should leverage mobile-based technologies for transactions, communication, and customer engagement to enhance accessibility and responsiveness. Furthermore, although production technologies showed a relatively weaker effect, their positive contribution implies that investment in modern production systems can improve efficiency, product quality, and output capacity, which indirectly supports growth. Overall, SME operators who strategically adopt and effectively utilize technological innovations are more likely to enhance competitiveness, increase sales performance, and expand into new markets.

ii. Implications for Government and Policy Makers

The findings also have important implications for government and policy makers, particularly in designing interventions that promote SME development through technological innovation. Since technological innovation significantly influences both sales growth and market expansion, government support should focus on creating an enabling environment that facilitates access to digital technologies. This includes investments in digital infrastructure such as reliable electricity, improved internet connectivity, and affordable broadband services, which are essential for effective technology adoption. Additionally, policies that support capacity building, training programs, and digital literacy initiatives for SME operators will enhance their ability to adopt and effectively utilize technological tools. Financial support mechanisms, such as low-interest loans, grants, and incentives, can also help SMEs overcome the cost barriers associated with acquiring modern production technologies and digital systems. By implementing such supportive measures, government agencies can strengthen SME performance, promote innovation diffusion, and contribute to sustainable economic growth and employment generation within the region and the country at large.

5.4 Recommendations

Based on the findings of the study, the following recommendations are made:

i. SME owners and managers should prioritize the adoption of digital tools such as accounting software, customer relationship management systems, and digital marketing platforms, as these have been shown to significantly enhance sales growth through improved efficiency and customer targeting.

ii. SMEs should increase their utilization of mobile platforms, including mobile payment systems and mobile-based communication tools, as these technologies facilitate faster transactions, improve customer engagement, and enable businesses to expand into new markets.

ii. Investment in production technologies should be encouraged among SMEs to improve production efficiency, product quality, and output capacity, which will support both sales growth and the ability to meet increasing market demand.

5.6 Contribution to Knowledge

This study contributes to existing knowledge by providing empirical evidence on the combined effect of digital tools adoption, production technologies, and mobile platform utilization on two distinct dimensions of SME growth (sales growth and market expansion) within the context of Benue South Senatorial District in Nigeria. By disaggregating SME growth and examining multiple dimensions of technological innovation simultaneously, the study offers a more nuanced understanding of how different forms of technological innovation influence SME growth.

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