

Institute of Management
Faculty of Security, Logistics and Management
Military University of Technology in Warsaw

Instytut Zarządzania
Wydział Bezpieczeństwa, Logistyki i Zarządzania
Wojskowa Akademia Techniczna w Warszawie

ISSN 1896-9380 | eISSN 2719-860X

Modern Management Systems
Volume 21 (2026)
No. 1 (January-March)
pp. 89-118

Nowoczesne Systemy Zarządzania
Zeszyt 21 (2026)
Nr 1 (styczeń-marzec)
s. 89-118

Digital transformation and its influence on sales growth, customer satisfaction, and retention among SMEs in Ondo State, Nigeria

Transformacja cyfrowa i jej wpływ na wzrost sprzedaży oraz satysfakcję i utrzymanie klientów wśród MŚP w stanie Ondo w Nigerii

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DOI: 10.37055/nasz/218593

A – Research concept/Koncepcja badania
B – Data collection/Gromadzenie danych
C – Data analysis/Analiza danych
D – Writing the article/Napisanie artykułu
E – Critical revision/Krytyczne zrecenzowanie
F – Final approval/Zatwierdzenie artykułu

Submission/Nadesłano: 24.11.2025
First review/Pierwsza recenzja: 8.12.2025
Second review/Druga recenzja: 8.12.2025
Acceptance/Zaakceptowano: 9.12.2025
Online publication/Opublikowano online: 28.02.2026
Publication/Opublikowano: 28.02.2026

Abstract:**Research objectives and hypothesis/research questions**

The aim of this study is to determine the impact of ongoing digital transformation on the performance of SMEs in Ondo State, Nigeria, between 2020 and 2025: (1) Identify the forms of digital transformation employed by SMEs in Ondo state; (2) Assess the effect of digital transformation on sales growth among SMEs in Ondo State; (3) Evaluate the impact of digital transformation on customer satisfaction among SMEs in Ondo State; and (4) Examine how digital transformation influences customer retention among SMEs in Ondo State. Research Hypotheses: H₀1: Digital transformation has no significant effect on sales growth among SMEs in Ondo State; H₀2: Digital has no significant effect on customers satisfaction among SMEs in Ondo State; H₀3: Digital transformation has no significant effect on customers retention among SMEs in Ondo State.

Research methods

The study employs a cross-sectional survey research design. Structured questionnaires were administered to 208 SME owners, supervisors, and managers, and the collected data were analyzed using multiple regression analysis.

Main results

The findings reveal that SMEs widely adopt digital tools such as POS machines, social media platforms, websites, and accounting software, while more advanced systems like CRM, ERP, and mobile applications are less common. The study shows that digital transformation positively affects sales growth, enhances customer satisfaction, and strengthens customer retention, with technological infrastructure, adoption of digital tools, and staff digital skills being critical enablers.

Implications for theory and practice

The study fills key theoretical and empirical gaps by providing evidence on how digital transformation influences sales growth, customer satisfaction, and customer retention. It also addresses a contextual gap, as limited research focuses on SMEs in Ondo State, Nigeria. These contributions offer clearer guidance for scholars and SME practitioners seeking to understand the strategic value of digital technologies.

Keywords:

technology, SME, digital tools, digital skills, digital transformation

Abstrakt:**Cel badań i hipotezy/pytania badawcze**

Celem badania jest określenie wpływu trwającej transformacji cyfrowej na wyniki MŚP w stanie Ondo w Nigerii w latach 2020-2025: (1) Identyfikacja form transformacji cyfrowej stosowanych przez MŚP w stanie Ondo; (2) Ocena wpływu transformacji cyfrowej na wzrost sprzedaży MŚP w stanie Ondo; (3) Ocena wpływu transformacji cyfrowej na satysfakcję klientów wśród MŚP w stanie Ondo; (4) Zbadanie, jak transformacja cyfrowa wpływa na utrzymanie klientów wśród MŚP w stanie Ondo. Hipotezy badawcze: H₀1: Transformacja cyfrowa nie ma istotnego wpływu na wzrost sprzedaży MŚP w stanie Ondo; H₀2: Cyfryzacja nie ma istotnego wpływu na satysfakcję klientów wśród MŚP w stanie Ondo; H₀3: Transformacja cyfrowa nie ma istotnego wpływu na utrzymanie klientów wśród MŚP w stanie Ondo.

Metody badawcze

Zastosowano badanie przekrojowe. Przeprowadzono ustrukturyzowane kwestionariusze wśród 208 właścicieli, kierowników i menedżerów MŚP, a zebrane dane przeanalizowano za pomocą analizy regresji wielokrotnej.

Główne wyniki

Wyniki pokazują, że MŚP wdrażają na szeroką skalę narzędzia cyfrowe, takie jak maszyny POS, platformy społecznościowe, strony internetowe i oprogramowanie księgowo, podczas gdy bardziej zaawansowane systemy, takie jak CRM, ERP i aplikacje mobilne, są rzadsze. Badanie pokazuje, że transformacja cyfrowa pozytywnie wpływa na wzrost sprzedaży, zwiększa satysfakcję klientów i wzmacnia ich utrzymanie, przy czym infrastruktura technologiczna, wdrażanie narzędzi cyfrowych oraz umiejętności cyfrowe personelu są kluczowymi czynnikami to umożliwiającymi.

Implikacje dla teorii i praktyki

Badanie wypełnia kluczowe luki teoretyczne i empiryczne, dostarczając dowodów na to, jak transformacja cyfrowa wpływa na wzrost sprzedaży, satysfakcję klientów oraz ich utrzymanie. Zajmuje się także luką kontekstową, ponieważ ograniczone badania koncentrują się na MŚP w stanie Ondo w Nigerii. Wyniki oferują klarowniejsze wskazówki dla naukowców i praktyków MŚP, którzy chcą zrozumieć strategiczną wartość technologii cyfrowych.

Słowa kluczowe:

technologia, MŚP, narzędzia cyfrowe, umiejętności cyfrowe, transformacja cyfrowa

Introduction

Background to the study

The global business climate has witnessed a tremendous transformation, mainly caused by rapidly emerging technologies and digital innovations. The technological revolution, including the digitization of business enterprises, has created a variety of opportunities as well as challenges for business operations (Unegbu, Yawas, Dan-Asabe, 2024). Small and medium enterprises (SMEs) have experienced rapid growth in the uptake of digital technology with the penetration of smartphones, financial technology, and government-supported digital programs (World Economic Forum, 2023).

The adoption of digital technology and technological infrastructure tends to make SMEs more efficient, minimize costs, and increase customer satisfaction (Vrontis, Chaudhuri, Chatterjee, 2022). In addition, digital transformation fosters creativity through the capacity of SMEs to innovate by generating new goods, services, and business models to adapt to changes in the market (Shahadat, Nekomahmud, Ebrahimi et al., 2023). However, successful implementation relies on the digital skills of SME owners and workers.

Globally, the operational capacities of SMEs have been significantly influenced by the COVID-19 pandemic, compelling many enterprises to adopt technology and innovation rather than relying solely on traditional operational methods (Mishrif, Khan, 2023). During the pandemic, it became evident that digital transformation is vital for business resilience, with COVID-19 acting both as a catalyst for digital preparation and as a test of SMEs' adaptability. The post-pandemic period has seen an extraordinary acceleration of digital trends, with remote work, e-commerce, and digital communication becoming essential components of the new normal.

In this era, businesses no longer view digital transformation as optional; it is fundamental to survival in a dynamic and fiercely competitive market. Under these social and corporate conditions, information and communication technologies (ICT) have proven their relevance and are crucial for the continuity of personal and business services and interactions (Kutnjak, 2021). Increased investment in digital

infrastructure and the development of digital skills is therefore key to ensuring that businesses in rural and township economies remain competitive and adapt effectively to the evolving business landscape (Nkosi, 2020).

Although research by Stich, Zeller, Hicking et al. (2020), Hanelt, Bohnsack, Marz et al. (2020), and Teng, WU, YANG (2022) generally suggests that digital transformation improves company performance through efficiency, innovation, and market growth. However, the relationship between digital transformation and SMEs' performance in specific local contexts remains underexplored. Hence, there is a need for a context-specific empirical assessment among SMEs in Ondo State. Such a study would help address the existing literature gap and inform policies, capacity-building programs, and digital investment strategies that are relevant to the realities of subnational emerging economies, ultimately enhancing the performance and sustainability of SMEs.

Aims and objectives of the stud

The aim of this study is to determine the impact of ongoing digital transformation on the performance of SMEs in Ondo State, Nigeria, between 2020 and 2025. The specific objectives are to:

1. Identify the forms of digital transformation employed by SMEs in Ondo State.
2. Assess the effect of digital transformation on sales growth among SMEs in Ondo State.
3. Evaluate the impact of digital transformation on customer satisfaction among SMEs in Ondo State.
4. Examine how digital transformation influences customer retention among SMEs in Ondo State.

1. Conceptual review of literature

1.1. Digital transformation

Concept of digital transformation

Digital transformation is the use of digital technologies across all realms of a business and represents a shift in how businesses work and provide value to customers. Digital transformation allows firms to increase efficiency, decrease operational expenses, enter new markets, and gain competitive advantages in decision-making processes, promoting adaptability to operate in an ever more

volatile and uncertain global economic environment (OECD, 2020). It also entails the use of technologies like cloud computing, data analytics, artificial intelligence, and digital communication platforms to increase levels of operational efficiency and competitiveness” (Westerman, Bonnet, McAfee, 2014). Digital transformation is the prevalent and up-to-date business construct focused on incorporating digital technologies, such as data analytics, cloud computing, artificial intelligence, the Internet of Things (IoT), and digital tools and platforms, into various business areas (Vial, 2019). However, digital transformation is a comprehensive approach that is more than just the adoption of new technology; it encompasses a total restructuring of organizational processes, operations, and norms.

Technological infrastructure

Atlassian (2025) describes technology infrastructure as computer hardware, servers, network functions, business software, operating systems, security software, secure internet connectivity, data analysis tools, information storage, platforms such as payment gateways, and the regular IT services needed for businesses to function effectively. It comprises features such as the presence of the internet, telecommunications, data centers, hardware and software, and digital platforms required for innovation, productivity, and competitiveness in the economy (World Bank, 2020). Digitalization relies on technology infrastructure (Borowski, 2021), which includes access to the internet, availability of hardware, access to electricity, and blockchain technology. Globally, technological infrastructure has been recognized as a factor in economic development, business efficiency, and societal transformation (OECD, 2021).

Adoption of digital tools

The adoption of digital tools enables businesses to run automated daily operations, facilitate marketing to targeted audiences, monitor customer relationships, analyze market trends, streamline supply chains, and enable remote work. Thanks to advances in digital technology, SMEs today have greater access to social media platforms, digital marketing, artificial intelligence, e-commerce, virtual reality, and big data (Rindfleisch, O’Hern, Sachdev, 2017). With the use of the right tools, companies can perform better, work more efficiently, and focus on growth. Digital tools are a revolutionary force in every facet of society, from education, medicine, and business to individual communication (McCarthy, Maor, McConney et al., 2023). Software and services are manifestations of digital tools, and these technologies allow the processing, storing, creating, transmitting, and displaying of information (McCarthy, Maor, McConney et al., 2023).

Staff digital skills

Digital skills of staff refer to employees' knowledge, capacity, and operational ability to use digital tools, technologies, and platforms to carry out their organizational duties. Kadhim (2024) defines digital skills as the capacity to efficiently utilize and navigate digital tools and platforms, such as software, programs, and online communication tools. These skills can range from the general use of computers and the internet to advanced skill sets such as data analysis, online marketing, cloud-based collaboration, and protection against cybercrime. According to Herranen (2022), employers now require a range of digital skills in most jobs across all sectors of the United Kingdom's labor market. However, the demand for advanced digital skills is no longer limited to IT expert roles. These skills involve knowledge of social media, digital marketing, managing online stores, delivering customer service over the internet, creating content with Canva and other editing applications, and using digital tools for communication.

1.2. Measuring SME performance in the digital age

Sales growth

Sales growth refers to the increase in revenue generated from the sale of goods and services over a specific period. It is one of the simplest and most commonly used metrics for business performance and competitiveness (Business Enterprising, 2024). Sales growth is particularly critical to SMEs because it indicates their ability to enter markets, gain and retain customers, and sustain operations. Stable sales growth usually reflects effective business strategies, adequate product-market fit, and strong customer responsiveness. Measuring sales growth also enables SMEs to ascertain the return on investment in digital technologies, marketing, and customer service, among others, and to make appropriate decisions to thrive in the long term. It is also considered an indicator of overall growth and long-term business sustainability (Alzoubi, Alshurideh, Kurdi et al., 2022). However, Sales growth is not only a final outcome but also a driver of other favorable firm-level outcomes, such as profitability, employment generation, and investment. A consistent increase in sales allows SMEs to stabilize their positions in the market and reinvest in further product innovation and capacity development (Accario, 2025).

Customer satisfaction

Customer satisfaction is the perceived difference between expected performance, meaning the level of performance customers anticipate when engaging in business with an organization, and the actual value received, reflected in the price paid for

a product or service. It encompasses the degree to which a company performs above or below customer expectations and can be assessed through surveys and feedback, enabling businesses to determine how well they satisfy customer needs and preferences. It also focuses on measurement that determines how happy clients are with a firm's products and competencies (Bassan, Kathuria, 2016; Gupta, 2016). Customer satisfaction consists of the desire for pleasure, the assessment of the actual outcome, and the evaluation of purchase experiences (Chikazhe, Makanyeza, Chigunhah, 2021). However, the concept of customer satisfaction is understood differently because it is based on individual needs and the extent of their fulfillment (Biesok, Wyród-Wróbel, 2011; Sharma, Gupta, Gera et al., 2020).

Customer retention

Customer retention is defined as the preferences, identification, commitment, trust, and intention of a consumer to remain with a brand. Similarly, Ranaweera and Neely (2003) describe customer retention as the willingness of a customer to stay loyal to their service provider. Customer retention may be regarded as a business sustainability concept that has fundamental effects on profitability and the long-term survival of businesses (Adekunle, Chukwuma-Eke, Balogun et al., 2023). However, with changing market realities and evolving consumer demands, organizations sometimes find it difficult to retain customers in the modern competitive business environment. The cost of customer retention is significantly lower than the cost of customer acquisition; as such, customer retention should be a priority for companies across all industries (Adekunle, Chukwuma-Eke, Balogun et al., 2023).

2. Theoretical review

This study explores the role of digital transformation in enhancing the performance of small and medium enterprises (SMEs) in Ondo State, Nigeria. To provide a strong theoretical foundation, the Technology-Organization-Environment (TOE) framework is adopted due to its close alignment with the study's objectives and variables. The TOE framework offers a comprehensive and structured lens for examining the determinants of digital transformation adoption. Unlike alternative models such as the Technology Acceptance Model (TAM), Diffusion of Innovation (DOI), or the Resource-Based View (RBV), the TOE framework integrates both internal and external factors influencing technology adoption. This makes it particularly suitable for the multidimensional nature of digital transformation among SMEs.

Tornatzky and Fleischer (1990) proposed the Technology-Organization-Environment (TOE) Framework, a holistic model for investigating the determinants of adoption and implementation of technological innovations within business

organizations. The theory is particularly relevant for SMEs, as it is founded on external and internal drivers that influence technology use (Aina, 2025). According to the framework, three key contexts, technological, organizational, and environmental, affect the decision to adopt digital transformation initiatives. The TOE framework has several advantages, making it widely applied to explore organizational use of technological solutions, including electronic data interchange (EDI), enterprise resource planning (ERP), supply chain management (SCM), customer relationship management (CRM) applications, and e-commerce (Baker, 2011; Malik, Chadhar, Vatanasakdakul et al., 2021).

The technological context describes the presence, applicability, and utility of digital devices and innovations, such as CRM software, e-commerce systems, mobile applications, and data analytics technologies. It considers the impact of current and future technologies on digital transformation adoption and the extent to which these technologies are effectively acquired to drive business performance and competitive advantage (Sin Tan, Choy Chong, Lin et al., 2010). Technological context encompasses all technologies relevant to the firm, including those currently in use and those introduced to the market but not yet implemented (Baker, 2011). For SMEs, this may include cloud services, point-of-sale systems, or online payment platforms. Through adopting digital tools and operational technologies, SMEs can enhance operational efficiency, customer satisfaction, and achieve sustainable growth in a highly competitive market (Edobor, Sambo-Magaji, 2025).

The organizational context emphasizes the nature of the firm regarding its scope, size, and resources (Tornatzky, Fleischer, Chakrabarti, 1990). It includes internal features such as organizational structure, employees' digital competencies, leadership support, financial resources, and overall readiness for innovation. These factors determine an organization's ability to acquire and leverage internal resources to implement and sustain digital change. Digital transformation is not merely about tools; it relies heavily on how employees and managers integrate and employ technologies to streamline processes, enhance service delivery, and generate customer value.

The environmental context represents the external setting within which an organization operates, including market conditions, regulatory requirements, and social and cultural norms. This dimension encompasses industry competition, availability of high-quality internet connectivity, government policies, consumer preferences, and general market and technological trends. Environmental factors affecting SMEs' adoption of digital technology include regulations, consumer behavior, and industry dynamics (Shahadat, Nekomahmud, Ebrahimi et al., 2023).

Among many other theories, the Technology-Organization-Environment (TOE) Framework underpins this study, providing a lens to examine factors influencing digital transformation in SMEs. The technological dimension focuses on digital tools and infrastructure, while the organizational dimension emphasizes employees'

digital skills. Although not directly measured, the environmental dimension, including customer expectations, market competition, and infrastructural conditions, shapes how effectively SMEs adopt digital technologies, thereby influencing sales growth, customer satisfaction, and customer retention. A key advantage of the TOE framework over other behavioral models is its ability to capture the collective influence of internal and external factors on technology adoption decisions across the three contextual dimensions of technology, organization, and environment (Nguyen, Le, Vu, 2022).

3. Empirical review

Several studies have analyzed the effect of digital transformation on organizational performance, specifically for small and medium-sized enterprises (SMEs). The concept of digital transformation, which encompasses the implementation of various digital technologies, including artificial intelligence, mobile platforms, social networks, automation, cloud computing, big data, and data analytics, has been studied globally to identify how these technologies contribute to the competitiveness and performance of firms (Devaraj, 2024; Eshov, Mamadiyarov, Makhmudov et al., 2024; Li, Yang, Jin et al., 2022; Tsou, Chen, 2021). For example, Pfister and Lehmann (2023) found that digital tools such as data analytics implemented by German SMEs led to increased revenue, customer and employee satisfaction, efficiency, and productivity. Similarly, Li, Yang, Jin et al. (2022) showed that the integration of digital technology improves the alignment of digital transformation strategies and drives organizational innovation, which in turn affects overall firm performance.

Teng, Wu, Yang (2022) conducted a study in China, highlighting the roles of digital transformation through digital technology, employee skills, and strategic fit in the sustainability and financial performance of SMEs. However, Jardak and Ben Hamad (2022), in their study of Swedish firms, observed a more complex effect: whereas digital maturity negatively affected short-term profitability (ROA, ROE), other studies by Omrani, Rejeb, Maalaoui et al. (2024) and Chen, Jaw, Wu (2016) adopt a deeper structural perspective. Based on frameworks such as Technology-Organization-Environment (TOE) and Resource-Based View (RBV), these studies indicate that digital transformation is influenced by firm-level resources (e.g., skills, IT infrastructure) and environmental conditions (e.g., regulation, market dynamism). Nevertheless, in developing countries, researchers note a slower and more gradual approach to change.

The study by Isichei and Onyemachi (2025) investigated the effect of digital transformation strategies on the resilience of SMEs in Abuja. The findings showed that each of the three components played a significant role in determining resilience,

with digital infrastructure playing the largest role. Similarly, within the Nigerian context, several studies (e.g. Unegbu, Yawas, Dan-Asabe, 2024; Giwa, Oyenuga, Folorunsho et al., 2024; Ochinawata, Ochinawata, 2023) have examined digital transformation in relation to resilience, competitiveness, customer satisfaction, marketing effectiveness, and trust-building in SMEs.

However, despite the valuable insights offered by these studies, notable gaps in the literature remain. Most studies examine SME performance metrics such as sales growth, customer satisfaction, or customer retention in isolation, rather than simultaneously as outcomes of digital transformation. This gap in the literature provides a basis for formulating hypotheses on how digital transformation may collectively influence these key performance indicators.

3.1. Research hypotheses

The following hypotheses in null form were tested in order to answer the research questions. These include:

- H₀1: Digital transformation has no significant effect on sales growth among SMEs in Ondo State.
- H₀2: Digital has no significant effect on customers satisfaction among SMEs in Ondo State.
- H₀3: Digital transformation has no significant effect on customers retention among SMEs in Ondo State.

3.2. Conceptual framework

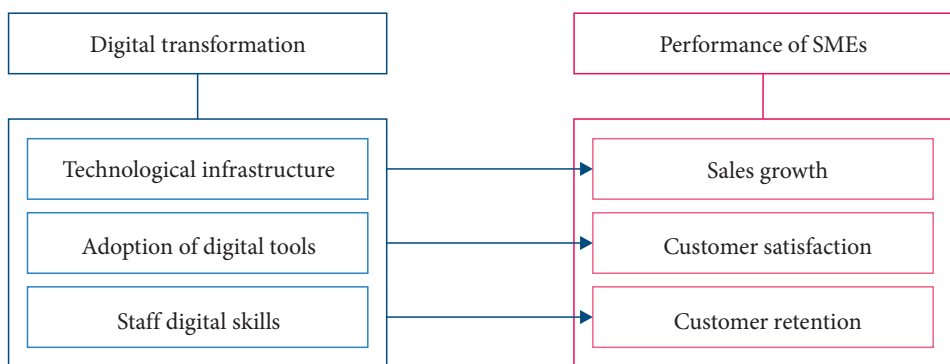


Fig. 1. Conceptual framework of digital transformation and SMEs performance

Source: own elaboration

4. Research methodology

4.1. Research design

The study utilizes a cross-sectional survey research design. The survey technique is appropriate for this study due to its ability to capture quantifiable data from a convenient sample of SME owners and managers, aligning with the study's objective of developing a statistical connection between digital transformation and SME performance indicators.

4.2. Population and sample size

The study population consists of all SMEs registered within the identified Local Government Areas (LGAs), encompassing the trade, manufacturing, and service sectors. SMEs were classified according to the SMEDAN/NBS (2021) guidelines as well as the criteria established by the Ondo State Ministry of Commerce. Based on official records retrieved from the Ministry of Commerce, Industry, and Cooperative Services, the total population of SMEs in Owo, Akure South, and Okitipupa is 432.

Table 1. Distribution of registered SMEs across senatorial districts in Ondo State

Senatorial district	Local government area (LGA)	Number of registered (SMEs)
Ondo North Senatorial District	Owo	146
Ondo Central Senatorial District	Akure South	227
Ondo South Senatorial District	Okitipupa	59
Total		432

Source: Ministry of Commerce, Industry and Cooperative Services (2025)

4.3. Sample size determination

To ensure an adequate sample size, two previously established methods were employed: the simplified sample size formula of Yamane (1967) and the sample size determination approach of Krejcie and Morgan (1970). These methods provided a statistical basis for selecting a sample that would yield valid and generalizable results.

Using Yamane's Formula (1967):

$$n = \frac{N}{1 + Ne^2},$$

where: n – sample size,

N – population size (432),

e – margin of error (0.05),

$$n = \frac{432}{1 + 432(0.05)^2} = \frac{432}{1 + 1.08} = \frac{432}{2.08} \approx 208.$$

Similarly, according to Krejcie and Morgan (1970), a population of 432 with 95% confidence and a 5% margin of error requires a sample size of 203. Because the value obtained using Yamane's formula is slightly higher and more representative, a sample size of 208 respondents was adopted. Therefore, the total sample size equals 208 respondents.

Proportional allocation formula:

Sample for an LGA = $\left(\frac{\text{SMEs in LGA}}{\text{Total SMEs}} \right) \times \text{Total sample size}$:

1. Owo sample size = $\left(\frac{146}{432} \right) \times 208 \approx 70$.
2. Akure South sample size = $\left(\frac{227}{432} \right) \times 208 \approx 109$.
3. Okitipupa sample size = $\left(\frac{59}{432} \right) \times 208 \approx 29$.

The sample for each Local Government Area (LGA) was determined using proportional allocation based on the number of SMEs in each area. Accordingly, Owo, with 146 SMEs, was allocated 70 respondents; Akure South, with 227 SMEs, was allocated 109 respondents; and Okitipupa, with 59 SMEs, was allocated 29 respondents.

4.4. Sampling method

A multi-stage sampling technique was employed to ensure representativeness across the senatorial districts of Ondo State:

- **Stage 1 – purposive sampling:** Three LGAs – Owo, Akure South, and Okitipupa – were selected to represent the North, Central, and South senatorial districts, respectively, based on their commercialization levels and SME density;

- **Stage 2 – proportional allocation:** The total sample of 208 respondents was distributed proportionally across the selected LGAs according to the number of registered SMEs in each;
- **Stage 3 – stratified sampling:** SMEs were categorized into five major economic sectors. As shown in Table 2, a combination of real sectoral data and expert judgment guided the stratification to ensure diverse sectoral representation and analytical relevance. This approach allowed SMEs to be sorted according to business activities and similarities in digital transformation potential, creating categories suitable for meaningful performance comparisons;
- **Stage 4 – digital transformation screening (purposive):** Within each stratum, only SMEs that had engaged in digital transformation between 2020 and 2025 – including the use of social media platforms, Google My Business, e-commerce systems, cloud services, and data analytics tools – were considered, ensuring alignment with the independent variable, digital transformation;
- **Stage 5 – simple random sampling:** Eligible SME owners/managers were randomly selected to minimize bias and ensure all digitally active SMEs had an equal chance of participation.

Table 2. Stratified sampling frame by sector

Sector	Sample size
Retail	43
Services	35
Production and Agriculture	49
Hospitality & Entertainment	32
Technology Enterprises	28
Others	21
Total	208

Source: own elaboration

4.5. Data collection instrument

A structured questionnaire served as the primary data collection tool and was administered in both physical format (hand-delivered) and electronic format (via email and Google Forms). The questionnaire was divided into three sections: Section A, covering demographic and firm profile information; Section B, addressing digital transformation indicators; and Section C, capturing SMEs' performance metrics.

All items in Sections B and C were measured using a 5-point Likert scale, ranging from 1 = Strongly Disagree to 5 = Strongly Agree, allowing respondents to indicate the extent of their agreement with each statement. In addition to primary data, secondary data on the number and distribution of registered SMEs were obtained from the Ministry of Commerce, Industry, and Cooperative Services, Alagbaka, Akure, to facilitate the sampling process and ensure representativeness.

4.6. Method of data analysis

The Statistical Package for the Social Sciences (SPSS) was used to analyse the collected data. The analysis was conducted in two steps:

- **Descriptive statistics:** This summarizes and describes demographic data and trends in digital transformation;
- **Inferential statistics:** Multiple linear regression was used to examine the influence of the dimensions of digital transformation on each measure of SME performance.

4.7. Reliability and validity test

The study ensured that the instrument was designed to measure the relevant variables aligned with the study’s objectives before data collection. A pilot test with 30 SME managers was conducted to refine the questionnaire. Validity was ensured through expert review and alignment with the literature to confirm that all important aspects of the constructs were captured. The instrument’s reliability was confirmed using Cronbach’s Alpha, with all constructs exceeding the 0.70 threshold (see Table 3).

Table 3. Reliability test

Construct	Number of items	Cronbach’s Alpha
Infrastructure	5	0.78
Digital Tools	5	0.83
Staff Skills	5	0.85
Sales Growth	5	0.79
Customer Satisfaction	5	0.75
Customer Retention	5	0.71
Total scale	30	

Source: own elaboration

The reliability analysis shows that all subscales of the questionnaire recorded Cronbach's alpha values above the widely accepted minimum threshold of 0.70, demonstrating acceptable to good internal consistency. Specifically, alpha values between 0.70 and 0.80 are generally regarded as acceptable (Taber, 2017).

4.8. Model specification

To empirically examine the study's objectives, multiple regression analysis was employed. In this study, Digital Transformation represents the independent variable, conceptualized as a multidimensional construct measured using three dimensions:

$$X = (X_1, X_2, X_3),$$

where: X_1 – Technological Infrastructure,
 X_2 – Staff Digital Skills,
 X_3 – Adoption Digital Tools.

These variables are postulated to determine the level of performance of SMEs across three key dimensions (dependent variables):

$$Y = (Y_1, Y_2, Y_3),$$

where: Y_1 – Sales Growth,
 Y_2 – Customer Satisfaction,
 Y_3 – Customer Retention.

Each model has a constant (β_0), the independent variables (X_1, X_2, X_3), and an error term (ε_i), which reflects the unexplained variability in the dependent variable.

The general model is specified as:

$$Y = \beta_{0i} + \beta_{1i}X_1 + \beta_{2i}X_2 + \beta_{3i}X_3 + \varepsilon_i,$$

where: Y – dependent variable representing SMEs' performance outcomes,
 β_{0i} – intercept,
 $\beta_{1i}, \beta_{2i}, \beta_{3i}$ – coefficients of the predictors,
 X_1, X_2, X_3 – dimensions of digital transformation,
 ε_i – stochastic error term.

4.9. Regression models by hypothesis

H₀₁: Digital Transformation has no significant effect on Sales Growth of SMEs in Ondo State, Nigeria.

$$Y_1 = \beta_{0_1} + \beta_{1_1}X_1 + \beta_{2_1}X_2 + \beta_{3_1}X_3 + \varepsilon_1.$$

H₀₂: Digital Transformation has no significant effect on Customer Satisfaction of SMEs in Ondo State, Nigeria.

$$Y_2 = \beta_{0_2} + \beta_{1_2}X_1 + \beta_{2_2}X_2 + \beta_{3_2}X_3 + \varepsilon_2.$$

H₀₃: Digital Transformation has no significant effect on Customer Retention of SMEs in Ondo State, Nigeria.

$$Y_3 = \beta_{0_3} + \beta_{1_3}X_1 + \beta_{2_3}X_2 + \beta_{3_3}X_3 + \varepsilon_3.$$

5. Results and discussion

The survey questionnaires were directly administered to the owners, supervisors, and managers of SMEs in Ondo State. Out of the 208 questionnaires distributed, 198 were successfully retrieved from the field.

5.1. Years of operation of businesses

Table 4 shows that 32% of businesses have been in operation for more than six years, 3% for 4-6 years, and 29% for 1-3 years. Only 8% had been in operation for less than one year. This distribution indicates that the majority of SMEs in the sample (72%) are well-established in the market, making these firms more likely to have undertaken digital transformation initiatives to enhance their competitiveness. The dominance of older-established firms suggests that the responses reflect the experiences of businesses with a long history of operation.

Table 4. Years of operation of businesses

Years of operation	Frequency	Percent (%)
<1 year	16	8.0
1-3 years	58	29.0
4-6 years	61	31.0
>6 years	63	32.0
Total	198	100.0

Source: own elaboration

5.2. Descriptive analysis of digital transformation

Table 5 shows that digital tools were adopted by all SMEs surveyed (100%), indicating full uptake of digital tools within the sample. This universal adoption highlights the growing awareness of the importance of digital technologies as essential for business survival and competitiveness in the contemporary market.

Further details, shown in Table 5, indicate that Point of Sale (POS) machines (78%) and social media platforms (66%) were the most commonly used tools by SMEs. Websites (51%) and accounting software (41%) were also widely adopted, whereas e-commerce platforms (35%), CRM/ERP systems (29%), and mobile applications (25%) received moderate adoption. Only 11% of respondents reported using other tools not listed.

The distribution suggests that SMEs prioritize digital tools directly linked to sales transactions and customer interactions. The popularity of POS systems and social media underscores the importance of payment processing and marketing visibility. Conversely, more resource-intensive technologies, such as CRM/ERP systems (29%) and mobile applications (25%), were less adopted, likely due to factors such as cost, technical expertise, or operational scale.

Table 5. Overall adoption and forms of digital transformation (multiple responses allowed)

Adoption/Tool	Frequency	Percent of respondents (%)
Overall Adoption	198	100.0
POS Machine	154	78.0
Social media	131	66.0
Website	101	51.0
Accounting Software	81	41.0
E-commerce Platform	69	35.0
CRM/ERP	58	29.0
Mobile App	50	25.0
Others	22	11.0

Source: own elaboration

5.3. Multiple regression analysis

Test of Hypothesis 1

H_01 : Digital Transformation has no significant effect on Sales Growth of SMEs in Ondo State, Nigeria.

Table 6. Model summary

Model	R	R square	Adjusted R square	Std. error of the estimate
1	0.845 ^a	0.714	0.709	2.081

a. Predictors: (Constant), Staff digital_skills, technological_infrastructure, Adoption_of_digital_tools

Source: own elaboration

Table 6 presents the model summary of the regression analysis. The correlation coefficient (R) of 0.845 indicates a very strong positive relationship between digital transformation and sales growth. The coefficient of determination (R^2) is 0.714, suggesting that 71.4% of the variation in sales growth can be attributed to technological infrastructure, adoption of digital tools, and staff digital skills. The Adjusted R^2 of 0.709 further confirms the reliability of the model. The standard error of the estimate is 2.081, representing the average distance between the observed sales growth values and the values predicted by the model.

Table 7. ANOVA^a

Model	Sum of squares	df	Mean square	F	Sig.	
1	Regression	2092.899	3	697.633	161.109	0.000 ^b
	Residual	840.056	194	4.330		
	Total	2932.955	197			

a. Dependent Variable: Sales_growth

b. Predictors: (Constant), Staff digital_skills, Technological_infrastructure, Adoption_of_digital_tools

Source: own elaboration

Table 7 presents the ANOVA results, which were used to examine the overall fit of the regression model. The regression sum of squares (2092.899) compared to the residual sum of squares (840.056) indicates that a significant portion of the total variation in sales growth is explained by the predictors. The F-statistic ($F = 161.109$, $p < 0.05$) demonstrates that the regression model is statistically significant. This means that the combined effect of the independent variables, including technological infrastructure, adoption of digital tools, and staff digital skills, significantly explains the variance in sales growth among SMEs. Therefore, the model exhibits a satisfactory general fit and can be used to interpret the regression coefficients further.

The coefficients of the model are provided in Table 8. All three predictors are significant at the 5% level or better. The strongest predictor is adoption of digital tools ($\beta = 0.410$, $p < 0.05$), indicating that SMEs that adopt digital tools such as POS systems, websites, and social media platforms are more likely to experience sales growth. Staff digital skills ($\beta = 0.346$, $p < 0.05$) also play a significant role, reflecting that highly trained individuals proficient in digital tools significantly enhance productivity and sales opportunities. Technological infrastructure ($\beta = 0.270$, $p < 0.05$)

complements these efforts by providing reliable internet and electricity, which are essential for sustaining digital operations. Collectively, these findings demonstrate that digital transformation is a significant driver of sales performance in SMEs.

Table 8. Coefficients

Model	Unstandardized coefficients		Standardized coefficients	<i>t</i>	Sig.
	B	Std. error	Beta		
1 (Constant)	-2.010	0.968		-2.077	0.039
1 Technological_infrastructure	0.291	0.052	0.270	5.599	0.000
1 Adoption_of_digital_tools	0.455	0.054	0.410	8.481	0.000
1 Staff digital_skills	0.370	0.050	0.346	7.473	0.000

a. Dependent Variable: Sales_growth

Source: own elaboration

Decision on Hypothesis: The null hypothesis (H_0) is rejected since the predictors (jointly) are significant. Digital transformation significantly improves sales growth among SMEs in Ondo State.

Test of Hypothesis 2

H_0 2: Digital Transformation has no significant effect on Customer Satisfaction of SMEs in Ondo State, Nigeria.

Table 9. Model summary

Model	R	R square	Adjusted R square	Std. error of the estimate
1	0.842 ^a	0.709	0.705	2.118

a. Predictors: (Constant), Staff digital_skills, Technological_infrastructure, Adoption_of_digital_tools

Source: own elaboration

Table 9 presents the summary of the regression analysis model for customer satisfaction. The relationship between customer satisfaction and digital transformation is strong and positive, as indicated by the correlation coefficient ($R = 0.842$). The coefficient of determination ($R^2 = 0.709$) shows that 70.9% of the variation in customer satisfaction is explained by technological infrastructure, adoption of digital tools, and staff digital skills. The adjusted R^2 (0.705) further confirms the reliability of the model by accounting for the number of predictors. The standard error of the estimate (2.118) reflects the average difference between the observed and predicted customer satisfaction values, indicating a reasonable fit of the model.

Table 10. ANOVA

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	2123.675	3	707.892	157.733	0.000 ^b
	Residual	870.654	194	4.488		
	Total	2994.328	197			

a. Dependent Variable: customer_satisfaction

b. Predictors: (Constant), Staff_digital_skills, Technological_infrastructure, Adoption_of_digital_tools

Source: own elaboration

The ANOVA results in Table 10 evaluate the overall significance of the regression model. The regression sum of squares (2123.675) compared to the residual sum of squares (870.654) indicates that a significant portion of the total variance in customer satisfaction is explained by the predictors. The F-statistic ($F = 157.733$, $p < 0.05$) confirms that the model is statistically significant. This suggests that the combined effect of the three independent continuous variables – technological infrastructure, adoption of digital tools, and staff digital skills – explains a substantial percentage of customer satisfaction among SMEs in Ondo State.

Table 11. Coefficients

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. error	Beta		
1	(Constant)	-2.144	0.985		-2.176	0.031
	Technological_infrastructure	0.274	0.053	0.252	5.186	0.000
	Adoption_of_digital_tools	0.346	0.055	0.308	6.333	0.000
	Staff_digital_skills	0.497	0.050	0.460	9.863	0.000

a. Dependent Variable: customer_satisfaction

Source: own elaboration

Table 11 presents the regression coefficients for customer satisfaction. All three predictors are statistically significant at the 5% level. Staff digital skills ($\beta = 0.460$, $p < 0.05$) is the most influential factor, indicating that customer experience and satisfaction are substantially improved when staff are proficient in using digital tools. Adoption of digital tools ($\beta = 0.308$, $p < 0.05$) also has a significant impact, highlighting that platforms such as customer relationship management (CRM) systems and e-commerce tools enhance customer engagement by automating processes and accelerating transactions and service delivery. Technological infrastructure ($\beta = 0.252$,

$p < 0.05$) further supports these efforts by ensuring reliable internet connectivity and consistent power supply, both critical for digital operations. Collectively, these predictors demonstrate that digital transformation positively and significantly affects customer satisfaction among SMEs in Ondo State.

Decision on Hypothesis: The null hypothesis (H_02) is rejected since the predictors (jointly) are significant. Digital transformation significantly improves Customer Satisfaction among SMEs in Ondo State.

Test of Hypothesis 3

H_03 : Digital Transformation has no significant effect on Customer Retention of SMEs in Ondo State, Nigeria.

Table 12. Model summary

Model	R	R square	Adjusted R square	Std. error of the estimate
1	0.877 ^a	0.769	0.765	1.921

a. Predictors: (Constant), Staff digital_skills, Technological_infrastructure, Adoption_of_digital_tools

Source: own elaboration

Table 12 presents the model summary of the regression analysis. There is a strong positive correlation between digital transformation and customer retention, as indicated by the correlation coefficient ($R = 0.877$). The coefficient of determination ($R^2 = 0.769$) shows that 76.9% of the variance in customer retention is explained by technological infrastructure, adoption of digital tools, and staff digital skills. The adjusted R^2 value of 0.765 further confirms the robustness of the model, accounting for the number of predictors and indicating substantial explanatory power. The standard error of the estimate (1.921) reflects the average distance between the observed customer retention values and those predicted by the model, suggesting a reasonable fit.

Table 13. ANOVA

Model	Sum of squares	df	Mean square	F	Sig.	
1	Regression	2384.042	3	794.681	215.305	0.000 ^b
	Residual	716.044	194	3.691		
	Total	3100.086	197			

a. Dependent Variable: customer_retention

b. Predictors: (Constant), Staff digital_skills, Technological_infrastructure, Adoption_of_digital_tools

Source: own elaboration

Table 13 presents the ANOVA results of the regression model. The regression sum of squares (2384.042) compared to the residual sum of squares (716.044) indicates that a large portion of the variation in customer retention is explained by the predictors. The *F*-statistic ($F = 215.305, p < 0.05$) confirms that the model is statistically significant. This suggests that the combined effect of technological infrastructure, adoption of digital tools, and staff digital skills provides a meaningful explanation of customer retention among SMEs in Ondo State. The high *F*-value demonstrates that the model has strong explanatory power, and the predictors collectively play a significant role in improving customer retention.

Table 14. Coefficients

Model		Unstandardized coefficients		Standardized coefficients	<i>t</i>	Sig.
		B	Std. error	Beta		
1	(Constant)	-3.586	0.894		-4.013	0.000
	Technological_infra-structure	0.295	0.048	0.267	6.160	0.000
	Adoption_of_digi-tal_tools	0.458	0.050	0.402	9.250	0.000
	Staff_digital_skills	0.437	0.046	0.397	9.556	0.000

a. Dependent Variable: customer_retention

Source: own elaboration

The regression coefficients are presented in Table 14. All three predictors are significant at the 5% level. Among them, the use of digital tools ($\beta = 0.402, p < 0.05$) has the greatest influence, highlighting the importance of platforms and tools such as CRM systems, loyalty applications, and social media interactions in strengthening long-term customer relationships. Staff digital skills ($\beta = 0.397, p < 0.05$) are also critical, as they enable the delivery of efficient, personalized services that build customer trust and confidence. Technological infrastructure ($\beta = 0.267, p < 0.05$) provides the foundational support for stable connectivity through reliable internet and power supply, allowing seamless interactions. Collectively, these findings establish that digital transformation is a significant predictor of customer retention among SMEs in Ondo State.

Decision on Hypothesis: Given the statistical significance of the predictors and the overall model, the null hypothesis (H_03) is rejected. Digital transformation has a significant positive effect on customer retention among SMEs in Ondo state.

6. Discussion of findings

The study found that SMEs in Ondo State primarily adopt digital transformation tools such as POS machines (78%), social media platforms (66%), websites (51%), and accounting software (41%), while advanced systems like CRM, ERP, and mobile applications are less commonly used. This indicates that SMEs focus on digital payment, online presence, and social media marketing. These findings are consistent with previous studies (Ogunsuyi, Tejumade, 2021; Akerejola, Okpara, Ohikhenana et al., 2019), which highlight the importance of POS systems for sales and transaction efficiency, and Wabara, Udu, Nwekpa et al. (2023), which emphasizes social media for marketing and customer engagement. The lower adoption of sophisticated systems aligns with OECD (2021), suggesting that SMEs typically begin with simple, low-cost tools before progressing to more advanced technologies. Overall, despite increased uptake of digital technologies among SMEs in Ondo State, a significant gap remains in the implementation of more complex digital solutions.

Regarding Hypothesis 1, the regression analysis indicates that digital transformation has a strong and statistically significant effect on sales growth. All three predictors were statistically significant, namely technological infrastructure, adoption of digital tools, and staff digital skills. These results suggest that SMEs with robust technological infrastructure, active adoption of digital tools, and digitally competent staff exhibit better sales performance. Notably, the adoption of digital tools had the strongest effect, implying that while infrastructure and workforce skills are essential prerequisites, the greatest improvements in performance occur when SMEs actively leverage digital platforms to expand market coverage and optimize operations, thereby driving sales growth.

These findings are consistent with previous studies (Ganotakis, Angelidou, Saridakis et al., 2023; Kusuma, Syarief, Sukmawati et al., 2024; Teng, Wu, Yang, 2022; Pfister, Lehmann, 2023), all of which emphasized the positive impact of digital transformation on sales. Similarly, Subedi and Bhatt (2025) found that digital transformation has a positive and statistically significant impact on sales growth and operational efficiency. Pellegrino and Abe (2023) concluded that SMEs adopting e-commerce and social media platforms experience substantial improvements in market presence and revenue generation, while Ojobo, Orga, Okechukwu (2023) established that digital literacy has a statistically significant positive effect on the scale of business transactions and highlighted that digital competence is essential to converting technology adoption into measurable sales results.

Overall, the current study confirms that digital transformation has a significant positive effect on sales growth among SMEs in Ondo State. Firms that strategically invest in technological infrastructure, actively implement relevant digital tools, and enhance the digital literacy of their employees are better positioned to expand market reach, increase transactional productivity, drive sales growth, and achieve a sustainable competitive advantage.

The regression analysis for Hypothesis 2 revealed that digital transformation has a strong and statistically significant effect on customer satisfaction. All three predictors, namely technological infrastructure, adoption of digital tools, and staff digital skills, were found to be significant. Among these, staff digital skills emerged as the most influential predictor, indicating that customer satisfaction largely depends on employees' ability to effectively implement digital tools and deliver quality services. While technological infrastructure and the adoption of digital tools provide the necessary foundation, the effective utilization of these technologies by staff ultimately shapes the overall customer experience.

These results are consistent with prior studies (Ingsih, Astuti, Riyanto, 2024; Pfister, Lehmann, 2023; Demirel, 2022; Ramasubbu, Mithas, Krishnan, 2008), which emphasize that staff digital competence positively affects customer satisfaction by improving service delivery, trust, and reliability. Similarly, Adam, Ibrahim, Ikramuddin et al. (2020) suggested that SMEs adopting digital platforms can provide quicker and more dependable services, enhancing customer satisfaction. Jain, Sheth, Mogaji et al. (2023) also found that customer-oriented technology, such as web-based support and online communication, makes services more responsive, leading to greater satisfaction. Additionally, Setia, Setia, Venkatesh et al. (2013) highlighted that digitally skilled employees directly enhance customer experiences by delivering timely, convenient, and personalized services. Collectively, the current study confirms that digital transformation significantly improves customer satisfaction among SMEs in Ondo State.

For Hypothesis 3, the regression analysis revealed that digital transformation strongly and positively affects customer retention, accounting for a substantial proportion of the variance. The three predictors, namely technological infrastructure, adoption of digital tools, and staff digital skills, were all statistically significant. Among them, adoption of digital tools emerged as the strongest determinant, implying that platforms such as social media, customer relationship management software, and e-commerce solutions play an important role in retaining customers and fostering long-term loyalty.

These findings are consistent with prior empirical studies. Adam, Ibrahim, Ikramuddin et al. (2020) reported that digital adoption enhances customer relationships and repeat patronage, while Ahungwa, Ogbo, Chinda et al. (2024) observed that SMEs utilizing digital tools for social media marketing, such as WhatsApp and Instagram, experienced higher levels of customer loyalty. In the same vein, Oludoyi, Adesuyi, Ayo et al. (2024) demonstrated that the use of digital tools for social media marketing exerts a significant positive influence on customer retention. The significant impact of staff competence further emphasizes that digitally proficient employees are better able to handle customer queries, resolve complaints, and foster enduring relationships. Additionally, Jeza and Lekhanya (2022) highlighted the essential role of digital transformation in supporting customer retention for SMEs.

Overall, the study confirms that digital transformation is a key determinant of both customer satisfaction and customer retention among SMEs in Ondo State.

Consequently, the study establishes that digital transformation is a key enabler of customer retention. By effectively leveraging robust infrastructure, digital tools, and staff competencies, SMEs can strengthen long-term customer relationships, enhance loyalty, and secure repeat business in a competitive environment.

The study, therefore, concludes that digital transformation is a critical catalyst for SME performance. While adoption varies across digital tools, SMEs primarily focus on technologies that deliver immediate benefits in payments, marketing, and customer communication. Nonetheless, the limited use of more advanced digital solutions suggests that most SMEs in Ondo State remain in the early stages of digital maturity.

7. Recommendations

Based on the findings of this study, the following recommendations are proposed:

I. Enhance the use of digital payment systems

The use of digital payment systems, in particular, POS machines and mobile money, should be enhanced by SMEs since they were found to be the most commonly used and most successful in enhancing the efficiency of transactions and improving sales performance. To achieve this, practical steps include:

- **Subsidy programs:** Policymakers or trade associations could provide partial subsidies or discounts on POS devices and mobile money registration to reduce cost barriers for SMEs;
- **Training and capacity building:** SMEs should participate in workshops on POS operations, mobile payment integration, and digital transaction management to address competence-related barriers;
- **Partnerships with technology providers:** Collaborating with banks, fintech companies, and mobile network operators can improve access to digital payment systems and provide ongoing technical support.

II. Expand online presence beyond social media

SMEs should diversify their digital presence to include websites, e-commerce platforms, and customer management systems, which will improve visibility, customer retention, and long-term competitiveness. To ensure feasibility, the following practical steps should be considered: Address Cost Barriers, Build Digital Competence and Evaluate Platform Efficiency. By identifying and addressing these barriers, SMEs can realistically expand their online presence and maximize the benefits of digital transformation.

III. Enhancing staff digital skills in SMEs

Owners and managers of SMEs should prioritize staff training and development in digital skills. Since employee digital competencies have a significant impact on customer satisfaction, SMEs should invest in continuous training in areas such as digital marketing, customer support, and data-driven decision-making to strengthen overall business performance.

IV. Creating enabling environments for SME digital transformation

Policymakers, technology hubs, and business associations should create enabling environments for digital transformation by ensuring stable electricity supply, affordable internet services, and support for collaborative initiatives. Such initiatives could help SMEs exchange experiences, access low-cost digital solutions, and receive practical assistance in deploying innovative tools, including CRM and ERP systems, thereby addressing infrastructural and capacity-related bottlenecks to full utilization of digital platforms.

8. Contribution to knowledge

The research is relevant to the body of knowledge as it offers empirical data on the type of digital transformation implemented by SMEs in Ondo State, thus contributing to the existing literature on digital transformation of SMEs in developing countries. It also determines a clear statistical correlation between digital transformation, measured through technological infrastructure, adoption of digital tools, and staff digital skills, and SME performance, measured through sales growth, customer satisfaction, and customer retention. Moreover, the study emphasizes the imbalanced digital maturity of SMEs, with the majority prioritizing simple digital tools over more sophisticated enterprise solutions, the study provides contextual insights that contribute to global discussions on digital transformation in emerging economies.

9. Suggestions for further studies

Future research should classify enterprises according to their stage of digital transformation and perform comparative analyses based on digital maturity levels. Such categorization would enable a deeper understanding of differences in the outcomes of technology adoption. The scope of the study should also broaden the scope of the study to include SMEs in various states or a comparative study of different countries to increase the generalizability of the findings. Moreover, future studies may explore the other aspects of performance, including innovation, cost-effectiveness, and market growth, to deliver a more comprehensive perspective on the issue of how digital transformation serves SME competitiveness.

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