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# E-Business Adoption and Customer Loyalty Among Small and Medium Enterprises (SMEs) in Nigeria

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# Abstract

This study examines the effect of e-business adoption on customer loyalty among small and medium enterprises (SMEs) in South-East Nigeria. The study focuses on four dimensions of e-business adoption: online presence and digital accessibility, electronic service quality, digital communication, and e-transaction efficiency. The study was anchored on the Technology Acceptance Model and the Technology–Organization–Environment framework. A quantitative cross-sectional survey design was adopted, and structured questionnaires were administered to 400 SME customers. Three hundred and fifty-four valid responses were retrieved and analysed, representing an 88.5% effective response rate. Data were analysed using descriptive statistics and multiple regression in SPSS Version 27. The regression model produced $R = .658$, $R^2 = .433$ and adjusted $R^2 = .427$, while the overall model was statistically significant, $F(4, 349) = 66.647$, $p < .001$. Online presence and digital accessibility had the largest standardized coefficient ($\beta = .411$, $p < .001$), followed by electronic service quality ($\beta = .302$, $p < .001$), e-transaction efficiency ($\beta = .194$, $p < .001$), and digital communication ($\beta = .141$, $p = .003$). The findings indicate that customer loyalty is associated with an integrated set of digital capabilities rather than a single technological investment. The study contributes context-specific evidence from Nigerian SMEs and highlights the importance of customer-centred digital integration for sustained patronage.


# 1. Introduction

Digital transformation has altered how small and medium enterprises create value, reach customers, communicate, and compete. Internet technologies, social media, electronic commerce, mobile applications, digital marketing and electronic payment systems have widened the channels through which SMEs can make their products and services visible and accessible. Gao et al. (2021) demonstrate the expanding scholarly importance of electronic marketing, while Van Veldhoven and Vanthienen (2022) explain digital transformation as an interaction among business, society and technology rather than as a simple acquisition of digital tools. Evidence from Ramdass and Karthikeyan (2021) further shows that e-commerce adoption among SMEs is shaped by multiple organisational and technological determinants, while Arshad et al. (2025) link e-commerce adoption with business performance. These developments suggest that digitalisation is increasingly embedded in SME competitiveness. Yet, as Giang et al. (2025) argue, adoption outcomes depend on the interaction of technological and organisational conditions, and Eyeregba Equitozia et al. (2025) similarly connect TOE-based digital marketing adoption with business growth and competitiveness. Thus, the contemporary e-business question is not simply whether SMEs use digital technologies, but whether those technologies are integrated into customer-facing processes in ways that generate sustained relational value.

The relevance of e-business becomes more pronounced when the outcome is customer loyalty rather than internal operational performance. Customer loyalty involves continued patronage, recommendation, preference, and willingness to maintain a relationship with a business, making it an important indicator of the durability of customer relationships. Mohammad (2022) found a positive relationship between successful digital marketing and customer loyalty, while Yachou et al. (2022) associated digital

marketing strategy with customer and organisational outcomes. Sharabati et al. (2024) likewise demonstrate that digital marketing can influence SME performance under contemporary digital transformation. In the Nigerian context, Adejuwon (2022) relates social media marketing to customer retention among SMEs, while Nwaka et al. (2025) report that digital relationship marketing can strengthen customer loyalty among Nigerian SMEs. These studies collectively indicate that digital engagement can influence customer outcomes, but they also reveal a conceptual fragmentation: some studies emphasise marketing, others adoption, performance, retention, or purchase intention. Agung Ayu Puty Andrina et al. (2022), Azizah et al. (2022), and Fitri and Wulandari (2020), for example, focus substantially on purchase intention and purchase decisions. The distinction matters because purchase intention is not equivalent to sustained loyalty. A customer may intend to purchase without developing the commitment reflected in repeat patronage, recommendation, and resistance to competing offers.

One important dimension of e-business adoption is online presence and digital accessibility. Customers increasingly encounter SMEs through websites, social-media pages, digital marketplaces and other online channels before or during the purchasing process. Accessibility therefore concerns more than mere visibility; it encompasses the ease with which customers can locate information, navigate digital platforms, access products or services and interact with the enterprise. Ali et al. (2024) identify technology-related and organisational factors relevant to social-commerce adoption in SMEs, while Nurqamarani et al. (2021) emphasise technology-acceptance factors that shape SME adoption. Mohd Basir et al. (2023) similarly examine e-commerce adoption through a technology-acceptance perspective, and Ramdass and Karthikeyan (2021) show that SME e-commerce adoption is influenced by several determinants. These studies provide a basis for viewing accessibility as a customer-facing consequence of digital adoption. Theoretically, the importance of accessibility is consistent with perceived usefulness and ease of use within technology-acceptance reasoning. However, much of the existing evidence remains oriented toward adoption itself, business performance or purchase behaviour. The present study therefore treats online presence and digital accessibility as an explanatory dimension of customer loyalty, asking whether customers who perceive SME digital channels as visible, current, convenient and accessible are more likely to remain loyal.

A second dimension is electronic service quality. Digital adoption does not automatically create value merely because a platform exists; the service delivered through that platform must be reliable, responsive, usable and sufficiently secure to support positive customer experiences. Mehralian and Khazaee (2022) emphasise the role of customer relationship management in converting digital marketing into business performance, while Fuad et al. (2024) examine the contribution of digital marketing to SME outcomes. Kehinde and Naomi (2024) connect digital payment adoption with customer experience management, and Khan et al. (2025) show that digitalisation is an important consideration in e-commerce adoption among SMEs. The common implication is that technological availability must be accompanied by service quality and customer-oriented processes. This distinction is particularly important for SMEs because limited resources can encourage businesses to prioritise acquisition of digital tools without equivalent investment in maintenance, responsiveness and customer support. From a customer perspective, repeated exposure to reliable online services can reduce

uncertainty and build confidence, whereas slow responses, inaccurate information, poor usability or insecure transactions can weaken trust. The present study therefore conceptualises electronic service quality as a distinct dimension of e-business adoption rather than assuming that online presence alone captures the quality of customers' digital experiences.

Digital communication represents a third dimension because customer relationships increasingly depend on continuous interaction across digital channels. Social-media platforms, messaging applications, websites and other channels allow SMEs to disseminate information, answer enquiries, handle complaints, provide feedback and personalise communication. Adejuwon (2022) associates social-media marketing with customer retention, while Nwaka et al. (2025) emphasise digital relationship marketing as a mechanism for strengthening customer loyalty in Nigerian SMEs. Mohammad (2022) also identifies digital marketing success as relevant to loyalty, and Yachou et al. (2022) show that digital marketing strategy can produce customer and organisational outcomes. The analytical issue is therefore whether communication should be understood merely as promotional activity or as part of relationship management. Customer loyalty is more likely to be sustained where customers perceive communication as timely, useful, responsive and relational rather than as one-way advertising. The present study accordingly focuses on the interactive aspects of digital communication, including regular contact, useful online messages, complaint handling, personalised communication and feedback. This focus extends existing research by placing digital communication alongside accessibility, service quality and transaction efficiency within a single explanatory model of customer loyalty.

A fourth dimension is e-transaction efficiency, which concerns the convenience, speed, reliability and security of electronic transactions. Digital commerce creates customer value only when customers can move from information search and communication to actual transaction without excessive friction. Kehinde and Naomi (2024) demonstrate the importance of digital payment options for customer experience among retail SMEs, while Upadhyay et al. (2022) show that perceived security, severity, and self-efficacy are relevant to consumer adoption of mobile payment services. Singh et al. (2020), using an adapted technology-acceptance model, examine drivers of FinTech adoption, while Tapanainen (2020) reviews FinTech adoption in developing-country contexts. Nyanga and Eresia-Eke (2025) connect technology-acceptance-related antecedents with the performance outcomes of FinTech adoption among SMEs, and Subanidja et al. (2022) link FinTech capabilities with sustainable bank performance through competitive advantage. Taken together, these studies suggest that transaction technologies influence behaviour partly through perceptions of usefulness, reliability, security and convenience. Nevertheless, evidence on transaction adoption often emphasises intention to use, financial performance or competitive advantage. The present study extends this line of reasoning by examining whether efficient electronic transactions are associated with the more enduring outcome of customer loyalty among SMEs.

Although the literature provides substantial evidence concerning digital adoption, important gaps remain. First, much existing research focuses on organisational performance, competitiveness, technology adoption, customer experience, satisfaction, or purchase intention rather than customer

loyalty as the principal dependent outcome. This distinction is evident in the work of Agung Ayu Puty Andrina et al. (2022), Azizah et al. (2022) and Fitri and Wulandari (2020), which emphasise purchase-related outcomes, and in studies such as Arshad et al. (2025), Sharabati et al. (2024) and Fuad et al. (2024), which place considerable attention on business performance. Second, the literature often examines individual digital practices in isolation. Social media marketing, e-commerce, electronic payments, digital communication and service quality are frequently investigated separately, limiting understanding of how complementary customer-facing capabilities operate together. Third, evidence from Asian and other emerging economies cannot automatically be transferred to Nigerian SMEs because digital infrastructure, institutional conditions, customer expectations and business practices differ across contexts. Van Veldhoven and Vanthienen (2022) stress the interaction between technology, business and society, while Ali et al. (2024) and Eyeregba Equitozia et al. (2025) demonstrate the importance of contextual adoption factors. The present study addresses these gaps by integrating four dimensions of e-business adoption into one empirical model of customer loyalty among SMEs in South-East Nigeria.

The Nigerian SME environment provides a particularly relevant setting for this investigation because digital channels have become increasingly important for market visibility, customer interaction, service delivery and payment. However, the presence of digital technologies does not by itself establish that customers will remain with an enterprise. The relevant issue is whether customers experience digital capabilities as accessible, reliable, responsive, communicative and transactionally efficient. This study therefore draws conceptually on the Technology Acceptance Model, which emphasises perceived usefulness and perceived ease of use as central to technology-related behavioural responses, and the Technology–Organization–Environment framework, which situates technological adoption within organisational and environmental conditions. Evidence from Nurqamarani et al. (2021), Mohd Basir et al. (2023), Singh et al. (2020) and Nyanga and Eresia-Eke (2025) demonstrates the continuing relevance of technology-acceptance reasoning across SME and financial-technology contexts. At the same time, Giang et al. (2025), Khan et al. (2025) and Arshad et al. (2025) show that organisational and technological readiness can shape digital adoption outcomes. Against this background, the present study examines whether online presence and digital accessibility, electronic service quality, digital communication, and e-transaction efficiency significantly influence customer loyalty among SMEs in Nigeria. The study contributes empirical evidence from 354 SME customers and provides an integrated perspective on customer-facing digital capabilities.

**Objectives of the Study**

The main objective of this study is to examine the effect of e-business adoption on customer loyalty among SMEs in South-East Nigeria. The specific aims were to:

1. examine the effect of online presence and digital accessibility on customer loyalty among SMEs in South-East Nigeria.
2. determine the effect of electronic service quality on customer loyalty among SMEs in South-East Nigeria.
3. evaluate the effect of digital communication on customer loyalty among SMEs in South-East Nigeria.
4. assess the effect of e-transaction efficiency on customer loyalty among SMEs in South-East Nigeria.

## 2. Theoretical Foundation and Hypothesis Development

# 2.1 Technology Acceptance Model

The Technology Acceptance Model (TAM) explains technology-related behavioural responses through perceived usefulness and perceived ease of use. In the context of e-business, these principles provide a basis for understanding why customers may respond positively to digital platforms that make information, service and transactions more useful and easier to access. The model is relevant to the present study because online accessibility, service usability and transaction convenience are customer-facing characteristics of digital systems. Existing SME research has applied technology-acceptance reasoning to e-commerce and digital technology adoption, including Nurqamarani et al. (2021), Mohd Basir et al. (2023), and Singh et al. (2020). The present study extends this reasoning from technology adoption and usage toward customer loyalty, arguing that perceived usefulness and ease of interaction can contribute to continuing patronage.

# 2.2 Technology–Organization–Environment Framework

The Technology–Organization–Environment (TOE) framework explains organisational technology adoption through technological, organisational and environmental contexts. Its relevance to SMEs lies in recognising that adoption is embedded within organisational capabilities and environmental pressures rather than being determined by technology alone. Eyeregba Equitozia et al. (2025) apply TOE reasoning to digital marketing adoption and SME competitiveness, while Giang et al. (2025) use the framework to examine e-commerce adoption and marketing performance. Arshad et al. (2025) likewise show the business-performance implications of e-commerce adoption. In the present study, TOE complements TAM by shifting attention from individual perceptions of technology to the organisational capacity to integrate digital tools into customer-facing processes. The combined theoretical perspective therefore supports an integrated examination of online accessibility, service quality, communication and transaction efficiency as dimensions through which e-business adoption can influence customer loyalty.

# 2.3 Hypothesis Development

## 2.3.1 Online Presence and Digital Accessibility

Online presence and digital accessibility reduce the effort required for customers to find information, locate products, and interact with an SME. Ali et al. (2024) identify factors influencing social-commerce adoption, while Ramdass and Karthikeyan (2021) and Mohd Basir et al. (2023) demonstrate the relevance of accessibility, usefulness, and adoption conditions in SME e-commerce. Arshad et al. (2025) further connect digital adoption with business performance. In a customer-loyalty context, an accessible and consistently available digital presence can support convenience and repeated interaction. Therefore, the study hypothesises that: H1: Online presence and digital accessibility significantly influence customer loyalty among SMEs in South-East Nigeria.

## 2.3.2 Electronic Service Quality

Electronic service quality concerns the reliability, responsiveness, usability, security, and support associated with digital service delivery. Mehralian and Khazaee (2022) emphasise customer relationship management as a mechanism through which digital marketing can generate business outcomes, while Fuad et al. (2024) identify digital marketing as relevant to SME outcomes. Kehinde and Naomi (2024) further link digital payment adoption with customer experience. These findings support the proposition that customers are more likely to maintain relationships where digital services consistently meet expectations. Therefore, H2: Electronic service quality significantly influences customer loyalty among SMEs in South-East Nigeria.

## 2.3.3 Digital Communication

Digital communication facilitates continuing interaction, feedback, complaint management, and relationship maintenance. Adejuwon (2022) links social-media marketing with customer retention, while Nwaka et al. (2025) demonstrate the relevance of digital relationship marketing to loyalty among Nigerian SMEs. Yachou et al. (2022) similarly associate digital marketing strategy with customer outcomes. These findings imply that responsive and personalised communication can reinforce customers' relational connection with SMEs. Therefore, H3: Digital communication significantly influences customer loyalty among SMEs in South-East Nigeria.

## 2.3.4 E-Transaction Efficiency

E-transaction efficiency reduces friction in the purchasing process by improving convenience, speed, reliability, and perceived security. Kehinde and Naomi (2024) identify digital payment adoption as relevant to customer experience, while Upadhyay et al. (2022) show the importance of security and self-efficacy in mobile-payment adoption. Singh et al. (2020), Tapanainen (2020), and Nyanga and Eresia-Eke (2025) further establish the relevance of technology acceptance to FinTech adoption and outcomes.

Efficient transactions can therefore reduce uncertainty and facilitate continued patronage. Hence, H4: E-transaction efficiency significantly influences customer loyalty among SMEs in South-East Nigeria.

# 3. Methodology

## 3.1 Research Design and Context

The study employed a quantitative, cross-sectional descriptive survey design. The design was appropriate because the study sought to obtain standardised perceptions from SME customers and examine the statistical relationship between multiple dimensions of e-business adoption and customer loyalty at a single point in time. The study was conducted among customers of registered SMEs in South-East Nigeria who used digital channels for interaction with and receipt of services from businesses.

## 3.2 Population, Sample and Data Collection

The target population comprised customers of registered SMEs who actively interacted with businesses through digital channels. A total of 400 questionnaires were distributed. Three hundred and fifty-four properly completed questionnaires were retrieved and used for analysis, producing an effective response rate of 88.5%. The usable responses constituted the empirical basis of the analysis.

| Questionnaire status | Frequency | Percentage |
|---|---|---|
| Copies distributed | 400 | 100.0 |
| Copies retrieved and used | 354 | 88.5 |
| Copies not retrieved/not used | 46 | 11.5 |
| Total | 400 | 100.0 |

Source: Field Survey, 2026.

## 3.3 Instrument and Measurement

Data were collected with a structured questionnaire comprising demographic questions and five-point Likert-type measures ranging from Strongly Agree (5) to Strongly Disagree (1). The instrument measured online presence and digital accessibility (OPDA), electronic service quality (ESQ), digital communication (DC), e-transaction efficiency (ETE), and customer loyalty (CL). The measurement items were adapted from prior literature and contextualised for SME customers. Content validity was assessed by experts in management and digital business. The study also reports the use of Cronbach's alpha for reliability assessment before the main survey.

## 3.4 Data Analysis

Data were coded and analysed using SPSS Version 27. Frequencies and percentages were used to summarise respondent characteristics and item responses. Multiple regression analysis was used to examine the simultaneous contribution of the four independent variables to customer loyalty. The model was specified as $CL = \beta0 + \beta1OPDA + \beta2ESQ + \beta3DC + \beta4ETE + \varepsilon$. Model adequacy was assessed using $R^2$ and ANOVA, while individual hypotheses were evaluated using unstandardised coefficients, standardised beta coefficients, t-values and p-values. Statistical decisions were made at the 0.05 level of significance.

## 4. Results

# 4.1 Descriptive Assessment of Major Variables

The descriptive results indicate generally positive perceptions of the digital practices of the SMEs represented in the sample. Across the six online presence and digital accessibility items, an average of 47% of respondents strongly agreed, and 33% agreed. For electronic service quality, 44% strongly agreed, and 35% agreed. Digital communication recorded 47% strong agreement and 33% agreement, while e-transaction efficiency recorded 44% strong agreement and 35% agreement. Customer loyalty similarly recorded 47% strong agreement and 33% agreement. The pattern suggests that most respondents perceived the SMEs as digitally accessible, reasonably reliable in electronic service delivery, communicative, efficient in transactions, and capable of maintaining customer relationships.

| Construct | Strongly Agree (%) | Agree (%) | Undecided (%) | Disagree (%) | Strongly Disagree (%) |
|---|---|---|---|---|---|
| Online presence & digital accessibility | 47 | 33 | 10 | 6 | 4 |
| Electronic service quality | 44 | 35 | 11 | 6 | 4 |
| Digital communication | 47 | 33 | 10 | 6 | 4 |
| E-transaction efficiency | 44 | 35 | 10 | 6 | 4 |
| Customer loyalty | 47 | 33 | 10 | 6 | 4 |

Source: Field Survey, 2026.

# 4.2 Regression Model

| Model | R | $R^2$ | Adjusted $R^2$ | Std. Error |
|---|---|---|---|---|
| 1 | .658 | .433 | .427 | .79233 |

Source: SPSS Version 27 Output, 2026.

The regression model produced a multiple correlation coefficient of R = .658. The coefficient of determination, $R^2$ = .433, indicates that the four e-business dimensions jointly accounted for 43.3% of the observed variation in customer loyalty. The adjusted $R^2$ of .427 indicates that the explanatory level remained substantial after adjustment for the number of predictors. The remaining 56.7% of variation was attributable to factors outside the model.

# 4.3 Analysis of Variance

| Source | Sum of Squares | Df | Mean Square | F | p |
|---|---|---|---|---|---|
| Regression | 167.359 | 4 | 41.840 | 66.647 | < .001 |
| Residual | 219.096 | 349 | .628 | | |
| Total | 386.455 | 353 | | | |

Source: SPSS Version 27 Output, 2026.

The ANOVA result indicates that the overall regression model was statistically significant, $F(4, 349) = 66.647$, $p < .001$. The null hypothesis that the four e-business dimensions jointly provide no statistically significant explanation of customer loyalty is therefore not supported by the empirical results.

# 4.4 Regression Coefficients and Hypothesis Testing

| Predictor | B | Std. Error | β | t | p | Decision |
|---|---|---|---|---|---|---|
| Constant | − .078 | .268 | — | − .292 | .771 | — |
| Online presence & digital accessibility | .406 | .055 | .411 | 7.397 | < .001 | Supported |
| Electronic service quality | .291 | .046 | .302 | 6.345 | < .001 | Supported |
| Digital communication | .139 | .047 | .141 | 2.959 | .003 | Supported |
| E-transaction efficiency | .192 | .050 | .194 | 3.876 | < .001 | Supported |

Source: SPSS Version 27 Output, 2026.

All four predictors have positive and statistically significant coefficients. Online presence and digital accessibility has the largest standardised coefficient (β = .411), followed by electronic service quality (β = .302), e-transaction efficiency (β = .194) and digital communication (β = .141). Thus, all four hypotheses are supported by the reported regression results.

# 5. Discussion

The findings provide evidence that customer loyalty among the SMEs represented in the study is associated with an integrated set of digital capabilities. The overall model explains 43.3% of the variance in customer loyalty, suggesting that e-business practices constitute an important part of the customer

relationship environment, although the model does not account for all factors that may shape loyalty. This result is consistent with the broader literature showing that digital transformation produces value when technological capabilities are integrated with business processes and customer needs. Van Veldhoven and Vanthienen (2022) emphasise the interaction between technology, business and society, while Sharabati et al. (2024) and Fuad et al. (2024) link digital marketing capabilities with organisational outcomes. The present evidence extends this discussion by focusing specifically on customer loyalty among SMEs in Nigeria.

Online presence and digital accessibility produced the largest standardised coefficient ($\beta = .411$, $p < .001$). This indicates that, within the variables examined, customers' perceptions of an SME's visibility and ease of digital access were most strongly associated with customer loyalty. The finding is consistent with Arshad et al. (2025), who connect e-commerce adoption with SME business outcomes, and with Giang et al. (2025), who show that technological readiness is associated with marketing performance. It also accords with the technology-acceptance literature represented by Nurqamarani et al. (2021), Mohd Basir et al. (2023) and Ramdass and Karthikeyan (2021), where usefulness and accessibility are relevant to digital adoption. The present result, however, shifts the emphasis from adoption itself to loyalty, suggesting that digital accessibility may matter because it reduces customer effort and facilitates continuing interaction.

Electronic service quality also had a significant positive effect on customer loyalty ($\beta = .302$, $p < .001$). This result suggests that simply maintaining a digital platform is insufficient; customers also evaluate the reliability, responsiveness, usability, security, and support associated with digital services. Mehralian and Khazaee (2022) highlight the role of customer relationship management in translating digital marketing into business outcomes, while Mohammad (2022) associates successful digital marketing with customer loyalty. Fuad et al. (2024) similarly identify digital marketing as relevant to SME outcomes. The present finding therefore supports a customer-experience interpretation of digital transformation: investments in digital infrastructure become more consequential when customers encounter consistent and dependable service through those channels.

Digital communication significantly influenced customer loyalty ($\beta = .141$, $p = .003$), although its coefficient was smaller than those of online accessibility, electronic service quality, and e-transaction efficiency. The finding nevertheless indicates that communication remains a meaningful part of digital relationship management. Adejuwon (2022) connects social-media marketing with customer retention, while Nwaka et al. (2025) demonstrate the relevance of digital relationship marketing to customer loyalty among Nigerian SMEs. Yachou et al. (2022) also show that digital marketing strategy affects customer and organisational outcomes. The implication is not that promotional communication alone creates loyalty, but that useful information, responsiveness, feedback and relationship-oriented interaction can reinforce customers' continuing connection with SMEs.

E-transaction efficiency was also statistically significant ($\beta = .194$, $p < .001$). The finding indicates that customers value digital transactions that are convenient, dependable, timely, and secure. Kehinde and

Naomi (2024) relate digital payment adoption to customer experience, while Upadhyay et al. (2022) show the importance of security and self-efficacy in mobile-payment adoption. Singh et al. (2020) and Tapanainen (2020) similarly demonstrate the importance of technology-acceptance considerations in FinTech contexts. Nyanga and Eresia-Eke (2025) and Subanidja et al. (2022) further connect financial-technology capabilities with SME or organisational outcomes. The present study adds a customer-loyalty perspective, indicating that transaction efficiency is not merely an operational convenience but a customer-facing capability associated with continued patronage.

Taken together, the findings support an integrated rather than technology-specific understanding of e-business adoption. The significance of all four dimensions suggests that customer loyalty is associated with a combination of accessibility, service quality, communication, and transaction efficiency. This complements the literature in which different digital practices have frequently been studied separately. The evidence also reinforces the relevance of combining TAM and TOE perspectives: customer-facing usefulness and ease of interaction are important, but their realisation depends on organisational capacity to integrate technologies into business processes. The study therefore suggests that SMEs should avoid treating websites, social media, digital payment systems and customer communication as disconnected investments. Instead, these capabilities should operate as mutually reinforcing elements of a customer-centred digital business model.

# 6. Theoretical Implications

The study contributes to technology-adoption research in three ways. First, it extends the outcome focus from technology adoption and organisational performance to customer loyalty. Second, it demonstrates the analytical value of treating e-business adoption as a multidimensional customer-facing capability rather than as a single technological variable. Third, it provides evidence from South-East Nigeria, thereby adding an African SME context to a literature in which much empirical evidence originates from other emerging and developed economies. The combined use of TAM and TOE provides a complementary explanation: TAM helps account for the usefulness and ease associated with digital customer interactions, while TOE highlights the technological and organisational conditions required for those capabilities to be embedded in business practice.

# 7. Managerial Implications

The results have direct implications for SME owners and managers. First, SMEs should maintain accurate, current and easily accessible online channels because online presence and digital accessibility produced the largest standardised coefficient. Second, digital service platforms should be designed around reliability, responsiveness, usability and security rather than mere availability. Third, digital communication should be treated as relationship management, with emphasis on timely responses, personalised engagement, complaint handling and feedback. Fourth, electronic payment and transaction systems should minimise delays, failures and uncertainty. The central managerial implication is that SMEs should coordinate these capabilities rather than invest in isolated digital tools. Customer loyalty is

more likely to be supported when digital visibility, service delivery, communication and transactions provide a coherent customer experience.

## 8. Conclusion

This study examined the effect of four dimensions of e-business adoption on customer loyalty among SMEs in South-East Nigeria. Based on 354 valid customer responses, the regression model was statistically significant and explained 43.3% of the variance in customer loyalty. Online presence and digital accessibility, electronic service quality, digital communication, and e-transaction efficiency each had a positive and statistically significant coefficient. The findings indicate that customer loyalty is associated with a combination of digital capabilities rather than a single technological investment.

The study concludes that digital transformation should be approached as a customer-centred business process. For SMEs, the value of digital technologies is realised when customers can find the business easily, receive reliable electronic services, communicate effectively and complete transactions efficiently. The evidence therefore supports an integrated e-business orientation in which technology adoption is connected directly to customer experience and relationship management.

## 9. Limitations and Future Research

The cross-sectional design limits the ability to establish temporal changes in customer loyalty. The study also relies on customer perceptions collected through a structured questionnaire, which may not capture all behavioural dimensions of loyalty. In addition, the geographical focus on South-East Nigeria limits the direct generalisation of the findings to other Nigerian regions with different market and infrastructure conditions. Future studies could adopt longitudinal designs, compare regions and SME sectors, incorporate objective behavioural indicators such as repeat-purchase records, and examine additional explanatory variables such as trust, perceived value, customer satisfaction, cybersecurity and digital literacy. Qualitative studies could also explore how customers interpret specific digital experiences that lead to continued patronage.

## Declarations

# Author Contribution

O.O.L( Oduh obiegeri loretta) developed the research structure, framework and workflow, N.C.C( Ndukwe-Tochi Chinwe Chosen) Contributted to the literature review, led the writing of the original manuscript draft;review, editing, formatting, K.O.N( Kelvin Obinna Nwankpa) contributed to the research methodology, and critical revision of the manuscript. A.P.C(Agu Paul Chinedu) contributed to data analysis, validation of Results and refunement of the theoretical and empirical discussions. A.R.C (Agbaraevoh Roseline Chinasa) contributed to formatting and refinement of the final version. All authors reviewed and approved the final manuscript for submission.

# Data Availability

All data supporting the findings of this study will be made available upon request

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