FUW-IJMSS
ISSN: 2635-3539 (Print)
2384-6224 (online)
Open Access

DIGITAL TRANSFORMATION AND CUSTOMER SATISFACTION: AN EMPIRICAL ANALYSIS OF SHOPRITE STORES IN ABUJA, NIGERIA

[1]UMAR GUNU SULEIMAN, PhD
Department of Business Administration, University of Abuja, Nigeria.
umar.suleima@uniabuja.edu.ng

[2]TAJUDEEN FATAI FEMI
Department of Business Administration, University of Abuja, Nigeria.
Femifatai222@gmail.com

Abstract

Digital transformation has become a strategic imperative for businesses seeking to enhance performance and customer satisfaction in an increasingly competitive environment. This study investigates the effects of digital transformation on customer satisfaction among Shoprite customers in the Federal Capital Territory (FCT), Abuja, Nigeria. Specifically, it examines the influence of three digital transformation constructs, digital infrastructure, mobile applications, and customer relationship technology, on customer satisfaction, measured through convenience, trust and security, and repeat purchase intentions. A quantitative survey research design was adopted, with data collected from 384 customers across Shoprite stores in Abuja using structured questionnaires. The study employed Structural Equation Modelling–Partial Least Squares (SEM-PLS) for data analysis, assessing measurement model validity through Cronbach's Alpha, Composite Reliability, Average Variance Extracted (AVE), and Heterotrait-Monotrait (HTMT) ratios. Hypothesis testing was conducted via SEM-PLS structure modelling bootstrapping. Findings from the measurement model confirmed satisfactory reliability and discriminant validity for all constructs. The structural model revealed that digital transformation tools collectively explain 32.5% of the variance in customer satisfaction ($R^2 = 0.325$). Customer relationship technology emerged as the strongest predictor ($\beta = 0.332$, $p = 0.000$), followed by mobile applications ($\beta = 0.277$, $p = 0.000$), while digital infrastructure demonstrated a positive but statistically insignificant effect ($\beta = 0.083$, $p = 0.193$). The study concludes that customer-facing digital tools, particularly customer relationship technology and mobile applications, are more effective drivers of customer satisfaction than backend infrastructure. Digital infrastructure, while operationally essential, functions as an indirect enabler rather than a direct determinant of satisfaction. The study recommends that retail organisations prioritise investment in CRM systems and mobile application development to improve responsiveness, personalisation, and overall customer experience.

Keywords: Digital transformation, customer satisfaction, mobile applications, digital infrastructure, customer relationship technology

1. INTRODUCTION

Change is a constant phenomenon worldwide and has manifested in every sector, with business being no exception. The business environment is characterised by a high level of dynamism and uncertainty, forcing businesses to constantly innovate to remain competitive and sustainable (Vial, 2019). Digital transformation has emerged as a central strategy in this regard, involving the integration of technologies such as artificial intelligence (AI), data analytics, the Internet of Things, blockchain, and cloud computing into various aspects of business operations, including processes, services, and products (Wang and Lee, 2017; Wessel et al., 2021). According to the World Economic Forum (2023), digital transformation is projected to contribute over $100 trillion in value to the global economy by 2026, assisting businesses in optimising operations, innovating products and services, and improving customer experiences.

Key elements of digital transformation include digital infrastructure, mobile applications, and customer relationship technology. Digital infrastructure, such as high-speed networks and POS machines, helps businesses serve customers in real-time, and is considered not just a technological necessity but a strategic asset that strengthens customer relationships and enhances overall performance (Nag et al., 2022; Biao and Rojniruttikul, 2023). Mobile applications serve as a significant platform through which customers interact with businesses seamlessly, enhancing convenience in shopping and selecting products and services (Yamin and A Al Amri, 2016). Customer relationship technology encompasses the various channels adopted by organisations to interact with customers, fostering engagement, improving service quality, and enabling proactive, personalised approaches that align with modern customer expectations (Kumar et al., 2022; Cavaliere et al., 2021).

Customer satisfaction, the extent to which businesses meet or exceed customer expectations, is a key determinant of business success and competitive advantage (Dike and Stanley, 2021). It is influenced by factors such as product quality, price, convenience, and shopping experience (Gbolagade and Adeyemi, 2024). Tran and Le (2024) further explain that customers are likely to be satisfied when the perceived value derived from products and services exceeds their expectations. Notably, a survey by Kankia and Aliyu (2024) found that companies embracing digital transformation are 43% more likely to achieve above-average customer satisfaction by lev]eraging digital tools to deliver value seamlessly and conveniently.

Businesses in Nigeria, particularly in the retail sector, have undergone significant transformation in the past decade driven by advancements in digital technologies and shifting consumer behaviours (Kim et al., 2025). Shoprite, a major retail player in Nigeria, has demonstrated notable agility by integrating digital technologies into its operations, including online channels, delivery partnerships, and in-store digital systems. These include scanning machines that automatically calculate grocery prices, POS machines enabling card and smartphone payments, and smart carts that use AI and computer vision to detect and tally items in real-time. Additionally, the company maintains third-party delivery partnerships with platforms like Glovo, and has invested in CRM systems and marketing communication channels for real-time customer interaction.

Despite these initiatives, significant challenges remain. Customers still experience long queues and high waiting times due to downtime of digital payment systems and poor self-service experiences (Aniekan, 2025). Limited awareness of Shoprite's mobile application platforms persists, with many customers having minimal engagement with these digital tools, suggesting they may not be effectively utilised to enhance customer engagement. Feedback on customer service responsiveness and access to product information remains mixed, with complaints about slow response times and little personalization despite the availability of CRM technologies. Furthermore, Shoprite has yet to fully migrate its stores to independent online platforms, unlike competitors such as FoodCo, Market Square, Jara, and Jumia, who operate on a full digital scale, allowing customers to access, explore, order, and pay for products conveniently without third-party involvement.

Empirically, various studies have examined the relationship between digital transformation and business outcomes. Ononiwu et al. (2024) concluded that existing technologies and organisational structure significantly influence digital transformation's ability to enhance organisational agility. Kim et al. (2025) noted that digital services and improved perceived quality contribute to customer satisfaction and loyalty. Suryani and Mulia (2025) found that digital transformation contributes to customer satisfaction in the banking sector, while Isihak et al. (2024) demonstrated that e-commerce dimensions of digital transformation significantly influence customer satisfaction in online businesses. However, limited studies have focused specifically on the relationship between digital transformation initiatives and customer satisfaction in the retail sector, with most research conducted in banking, insurance, and manufacturing contexts, creating a notable gap in the literature.

Therefore, the uncertainty surrounding the effectiveness of Shoprite's digital transformation initiatives, particularly digital infrastructure, mobile applications, and customer relationship technologies remains a problem. Mbonu (2025) demonstrated that, although digital infrastructure, mobile applications, and customer relationship technologies have been introduced, their impact on customer satisfaction remains unclear and insufficiently explored and customers still experience long queues and high waiting times due to downtime of digital payment systems and poor self-service experiences. If these conditions persist, the organisation risks increased customer frustration, reduced brand loyalty, diminished repeat purchase

intentions, and ultimately, a loss of market share, as customers may shift to competitors offering more seamless digital experiences.

Consequently, this study seeks to fill this gap by empirically examining the effects of digital transformation on customer satisfaction in Shoprite stores in Abuja, Nigeria. Specifically, it investigates how digital infrastructure, mobile applications, and customer relationship technology affect customer satisfaction. Based on these objectives, the inquiry tested the following hypotheses: $H0_1$: Digital infrastructures have no significant effect on customer satisfaction in ShopRite FCT; $H0_2$: Mobile applications have no significant effects on customer satisfaction in ShopRite FCT; and $H0_3$: Customer relationship technology does not have a significant effect on customer satisfaction in ShopRite FCT.

This study focuses on the effects of digital transformation tools on customer satisfaction among Shoprite customers in FCT Abuja. Abuja's urban profile, high concentration of government institutions, corporate offices, and expatriate communities creates a customer base that demands higher service standards and reliable digital experiences. The city's relatively higher purchasing power and greater digital technology adoption make it an ideal context for examining how retail digital transformation affects customer satisfaction. Additionally, Shoprite operates five stores across Abuja, providing access to a diverse and broader customer base.

The study holds substantial significance for multiple stakeholders. For retail businesses like Shoprite, the findings provide practical insights for improving operational efficiency, redesigning strategies, and delivering value that meets customer expectations, thereby enhancing profitability and competitive advantage. For management and strategic planners, the study helps identify which digital transformation tools yield the highest returns and where improvements are needed to better capture customer needs and ensure loyalty. Policy-makers and regulators can leverage the findings to craft policies that encourage innovation while safeguarding consumer interests around trust, security, and convenience. Academically, the study advances understanding of the relationship between digital transformation and customer satisfaction, connecting digital transformation theories with customer satisfaction models. It serves as a valuable reference for future researchers and contributes to expanding the litreature on technology and customer experience within the Nigerian retail context.

2. LITERATURE REVIEW

CONCEPTUAL FRAMEWORK

Digital transformation is an emerging strategy organisations adopt to enhance operational efficiency. Various authors have defined the concept differently based on context. Fitzgerald et al. (2014) defined it as enhancing business operations by integrating digital technologies, while Reis (2018) described it as engaging emerging technologies to achieve significant business transformation. Mergel et al. (2019) offers a broader definition, describing it as the process by which organisations deliver goods and services using new technologies to maintain competitive advantage. Vial (2019) explains it as a process where digital technology facilitates changes in value-creation activities, while Schallmo et al. (2020) and Verhoef et al. (2021) view it as integrating technology to obtain, analyse, and process data for decision-making and performance improvement. This study defines digital transformation as the conscious efforts designed and implemented by organisations to enhance performance by adopting and integrating new digital technologies into business operations, processes, and models.

Several drivers facilitate digital transformation adoption. First, technological advancements drive businesses to upgrade and adapt. Wang and Lee (2017) noted that emerging technologies like AI, IoT, and big data analytics changed the business landscape, forcing organisations to re-strategize. Zhang and Lichtenstein (2019) argued that businesses leveraging AI and data analytics achieve greater operational efficiency and competitive advantage. Egbuhuzor et al. (2021) further explained that cloud computing facilitates digital transformation by providing scalable infrastructure at lower costs, enabling businesses to focus on innovation. Second, customer expectations significantly drive digital transformation. Kane et al. (2015) noted that customers increasingly demand personalised and seamless interactions, compelling businesses to integrate digital tools. Verhoef et al. (2021) argued that firms adopt customer-centric models using CRM systems and data analytics to improve customer experience. Sheth (2020) further explained that pressure to deliver omni-channel experiences stimulates digital transformation adoption, while Borisova et al. (2020) emphasised the need to integrate digital and physical channels to meet customer expectations effectively. Third, competitive pressure compels businesses to transform. Eckert et al. (2022) noted that new entrants with advanced technologies force traditional businesses to evolve or risk

obsolescence. McDonald et al. (2018) argued that retail, banking, and media companies were forced to transform digitally in response to disruptive technologies introduced by new competitors. Menga and Wang (2023) further noted that firms must develop innovative strategies leveraging technology to remain sustainable amid intense competitive pressure. Fourth, regulatory and environmental factors act as catalysts. Nigeria's Data Protection Act (NDPA, 2023) forces firms to adopt data governance strategies, while CBN regulations drive financial firms toward electronic identity verification (Ikeobi, 2024). Omrani et al. (2022) noted that regulatory pressure facilitates digital transformation adoption, and Jeble et al. (2020) highlighted that pandemic challenges accelerated investment in new technologies. Finally, internal leadership and organisational culture drive digital transformation. Kane et al. (2015) identified top management commitment as essential, while Tangwaragorn et al. (2024) noted that digitally oriented leaders establish cultures that holistically integrate digital transformation. Côrte-Real et al. (2017) emphasised that firms with innovative cultures are more likely to succeed in digital transformation, provided employees possess the necessary digital skills and expertise (Mihu et al., 2023).

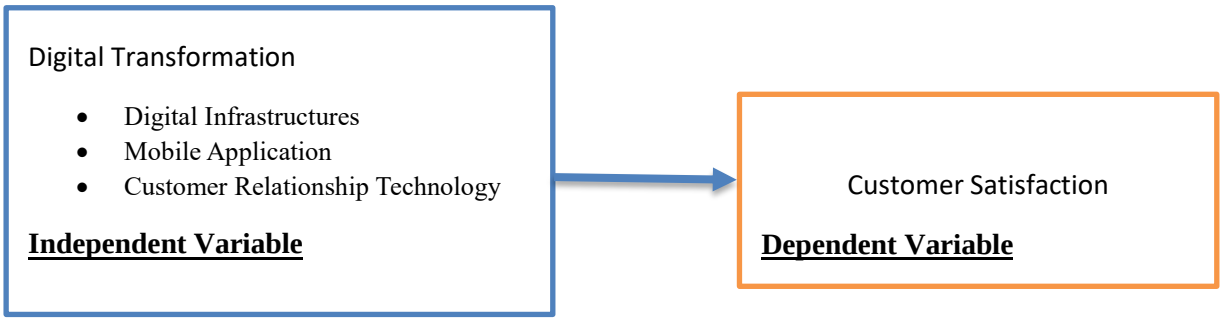
Ononiwu et al. (2024) specifically identifies its elements as digital infrastructures, mobile applications, customer relationship technology, and process automation. Digital infrastructure is a core component of digital transformation. Ariffian and Zainal (2024) described it as the foundation upon which digital strategies lie, encompassing hardware, software, platforms, internet, and human systems. Wang and Lee (2017) define it as the technological frameworks and resources supporting effective digital service delivery. A strong digital infrastructure facilitates smooth operations, improves communication, and enables integration of technologies like AI and data analytics (Nag et al., 2022). Manik et al. (2022) noted that organisations with robust infrastructure gain scalability and operational effectiveness, while Muhdaliha et al. (2025) emphasised that it provides the processing power needed to digitise products, adopt analytics, and experiment with new business models. However, Chen and Wang (2018) warned that infrastructure gaps hinder digital transformation adoption, and Iwedi (2024) highlighted that many digital projects fail by underestimating upgrade requirements.

Mobile applications are another significant element. Mergel et al. (2019) described them as software platforms supporting customer engagement via mobile devices, while Khrais and Alghamdi (2021) explained they represent the digital equivalent of physical business environments, enabling customers to purchase without physical contact. Setiadi et al. (2023) noted that mobile applications enable access to services anytime and anywhere, increasing customer engagement. However, Adebiyi and Omotosho (2022) cautioned that mobile applications are costly to manage due to multi-OS support requirements, and Molinillo et al. (2022) highlighted the need to balance personalization with privacy compliance.

Customer Relationship Technology (CRT) encompasses digital platforms and systems enabling businesses to manage customer interactions and deliver personalised experiences (Von Leipzig et al., 2017). Khan et al. (2022) explained that CRT includes chatbots, social media platforms, and CRM systems that enable real-time customer engagement. Al-Bashayreh et al. (2022) emphasised CRT's role in supporting omni-channel customer journeys and data-driven personalization. Cavaliere et al. (2021) noted that integrating CRT improves digital transformation effectiveness, enhancing retention and lifetime value. Egbuhuzor et al. (2021) concluded that digital infrastructure, mobile applications, and CRT are interdependent, with each component enabling and reinforcing the others.

Customer satisfaction reflects the degree to which customer expectations are met or exceeded (Dike and Stanley, 2021). Kotler and Keller (2016) identified it as a critical success factor fostering long-term relationships and positive word-of-mouth. Tran and Le (2024) further noted it serves as a key performance indicator predicting future business performance. Convenience is a multidimensional determinant of satisfaction encompassing accessibility, ease of decision-making, and time efficiency (Tien et al., 2021). Kumar et al. (2020) found that time savings during purchase significantly boost satisfaction and repeat patronage. Trust and security are equally essential, as customers must feel confident their data and transactions are protected (Agustian et al., 2023). Jeble et al. (2022) identified trust as the foundation of long-term customer relationships, while Kraus et al. (2021) warned that trust breaches lead to dissatisfaction and reputational damage. Repeat purchase intention reflects customers' likelihood of returning based on prior positive experiences (Elkhwesky and Elbaz, 2022). Lim et al. (2020) identified it as a critical measure of satisfaction, with higher intentions indicating greater satisfaction with the organisation's offerings.

The conceptual framework in figure 1 illustrates the relationship between digital transformation (independent variable) and customer satisfaction (dependent variable). Digital transformation constructs include digital infrastructure, mobile applications, and customer relationship technology, while customer satisfaction constructs include convenience, trust and security, and repeat purchase intentions. Arrows indicate the directional effects between variables.



Sources: *Vial (2019); Ononiwu et al. (2024); Oni and Adeyeye (2020).*

Figure 1: Conceptual framework

THEORETICAL FRAMEWORK

This study is underpinned by dynamic capability theory, introduced by Teece et al. (1997) as an extension of the resource-based view theory (Chowdhury and Quaddus, 2017). The theory focuses on an organisation's ability to continuously adapt, renew, and reconfigure its resources in response to environmental changes (Liu et al., 2022). It assumes that businesses operate in dynamic, unpredictable environments where they must constantly identify market opportunities and transform their resources to align with market trends (Miguel et al., 2022). Once built, these capabilities become a stronghold for sustained competitive advantage (Chowdhury and Quaddus, 2017).

The theory is particularly suitable for this study as it provides a valuable framework for understanding how firms leverage digital technologies to gain competitive advantage. It emphasises examining the market to identify customer needs and reconfiguring organisational resources, specifically digital technologies, to satisfy those needs. The model also aligns with this research by examining digital transformation through the lens of continuous adaptation, where firms must constantly upgrade their digital infrastructure, mobile applications, and customer relationship technologies to meet evolving customer expectations. Breznik and Lahovnik (2016) further noted that the model explains how organisations identify environmental opportunities, adapt their structures, and gain competitive advantage, making it especially relevant in contexts disrupted by digital technologies.

Researchers have applied dynamic capabilities theory across various fields. Miguel et al. (2022) used it to analyse how firms adopt digital platforms, mobile applications, and data analytics to improve customer experience and business performance. Muhdaliha et al. (2025) demonstrated how organisations acquire and utilise external knowledge to develop products and services that satisfy customer needs. Similarly, Liu et al. (2022) applied the theory to examine how digital tools, including CRM technology, POS automation, and mobile applications, contribute to competitive advantage and improved service delivery.

Despite its wide application, the theory has attracted criticism. Barney et al. (2021) argued that differentiating dynamic capabilities from routine administrative activities is conceptually challenging, affecting empirical measurement. Bertram (2016) further noted that the model overemphasises managerial ability while neglecting personal limitations such as cognitive capacity and information gaps. Additionally, developing dynamic capabilities is time-consuming and costly, limiting its applicability for resource-constrained smaller

firms. Notwithstanding these limitations, dynamic capability theory remains one of the most widely used frameworks in strategic management for investigating organisational adaptation, digital transformation, and competitive advantage in dynamic environments (Liu et al., 2022).

EMPIRICAL REVIEW

Yamin and A Al Amri (2016) investigated the effect of mobile applications on customer satisfaction in the Saudi Electricity Company, analysing the design, usefulness, and effectiveness of the mobile application. Using a correlation model on data collected from SEC customers, results showed a positive correlation between mobile applications and customer satisfaction ($r = 0.564$). The study concluded that mobile applications yield significant benefits to customers, though findings are limited to the electricity sector in Saudi Arabia. Mbiydzenyuy and Esono (2017) examined digital transformation strategies and supply chain performance in Cameroon's retail sector. Using a case study approach with interviews and observation from four leading companies, regression analysis revealed that technologies like advanced inventory management and data analytics positively impact supply chain management and firm performance. The study is limited by its small purposive sample of four companies, restricting generalizability. Njanja et al. (2018) investigated digital transformation's impact on customer experience and loyalty in Cameroon's retail sector. Survey data from 300 randomly selected customers analysed through regression showed that digital transformation significantly impacts customer experience and loyalty ($r = 0.67$, $r^2 = 0.45$). Brunetti et al. (2020) explored challenges businesses face integrating digital transformation strategies. Using exploratory research with interviews from 60 respondents analysed through content analysis, findings revealed that multifaceted strategies including developing digital culture, investing in infrastructure, and employee training help navigate challenges. The study is limited by its narrow focus on challenges, neglecting digital transformation's broader impact on business performance. Chege et al. (2020) examined technology innovation's impact on firm performance among 240 SMEs in Kenya. Using structural equation modeling, results showed a positive and significant impact of technological innovation on performance ($r = 0.67$). The study concluded that proper integration of innovative technology enhances long-term SME performance, though findings are geographically limited to Kenya and may differ in larger organisations.

Gil-Gomez et al. (2020) investigated the relationship between CRM components of digital transformation and sustainable business model innovation. Through qualitative review of past studies, results showed CRM positively impacts organisational sustainability. However, the study lacks empirical justification for the relationships identified between CRM components and business sustainability. Kraus et al. (2021) studied digital transformation's impact on business competitiveness through a phenomenological review of litreature published between 2010 and 2021. Content analysis concluded that digital transformation is essential for market competitiveness, though a mismatch often exists between organisational resources and new technology integration. The study is limited by its secondary methodology, restricting practical generalizability. Cavaliere et al. (2021) examined CRM technology's impact on customer satisfaction and retention across 100 bank clients. Regression analysis revealed significant impacts on customer happiness and patronage continuity ($r = 0.347$, $P < 0.05$), concluding that CRM implementation improves seamless customer interaction and satisfaction. The study is limited by its small sample size relative to the infinite banking customer population. Egbuhuzor et al. (2021) explored cloud-based AI-integrated CRM systems in Nigeria's financial sector. Using qualitative content analysis of secondary data, results showed that AI-integrated cloud CRM provides personalised customer benefits, enhances satisfaction, and improves bank competitiveness. The study lacks empirical support, as secondary data may be insufficient to explicitly explain the relationships identified.

Onikoyi et al. (2022) investigated e-commerce application elements on customer satisfaction in selected Lagos retail enterprises. Regression analysis of 384 respondents showed electronic advertisements, customer support services, and e-order delivery positively and significantly impact customer satisfaction (0.619, 0.378, and 0.379 respectively, $P<0.05$). The study effectively explored one dimension of digital transformation but neglected other dimensions for a more holistic view. Manik et al. (2022) investigated digital infrastructure and trust effects on customer satisfaction in the Central Bank of Asia. Multiple regression analysis of 99 bank customers revealed that digital facilities and trust significantly affect customer satisfaction (0.201 and 0.571 respectively), though findings are limited to this specific banking context. Sinemus et al. (2022) studied shopping application features on customer satisfaction and loyalty in the retail sector. Regression analysis showed all examined app features, including pre-

purchase, transaction, and cross-channel features, positively impact customer satisfaction. The study is limited by its urban focus, restricting generalizability across regions with differing digital adoption levels.

Molinillo et al. (2022) examined retail app experience dimensions on customer loyalty using PLS-SEM analysis of 545 app users. Results showed affective dimensions most influenced loyalty (0.320), while sensory experience surpassed cognitive experience (0.147 and 0.054). Though insightful on psychological dimensions, the study neglects how mobile applications actively enhance product and service accessibility. Setiadi et al. (2023) investigated mobile application user experience and customer satisfaction using the Delone and McLean framework. PLS-SEM analysis of 396 respondents showed significant relationships between mobile application experience and customer satisfaction, though service quality and perceived utilitarianism had limited impacts. The study's focus on mobile applications alone limits holistic insight into digital transformation's broader effects. Ononiwu et al. (2024) investigated digital transformation's role in enhancing organisational agility among 300 senior employees in Lagos manufacturing companies. Regression analysis showed big data analytics and cloud computing significantly impact organisational agility (r^2=0.46 and 0.39, P<0.05). Findings are industry-specific and may not generalize to the retail sector. Isihak et al. (2024) examined e-commerce influence on customer satisfaction in Nigerian airline businesses. Regression analysis of 346 customers showed technology readiness and digital applications significantly affect customer satisfaction (0.324 and 0.288 respectively), though the study neglected the broader elements linking e-commerce to customers.

Despite establishing significant links between digital transformation and customer satisfaction, most reviewed studies were conducted in sectors including banking, insurance, shipping, and manufacturing, with limited focus on the retail sector. Geographically, studies concentrated in locations including India, Kenya, Indonesia, and southwestern Nigeria, creating a notable gap for Abuja. Furthermore, most studies examined isolated dimensions of digital transformation. This study addresses these gaps by empirically investigating the combined effects of digital infrastructure, mobile applications, and customer relationship technology on customer satisfaction among Shoprite customers in FCT Abuja.

3. METHODOLOGY

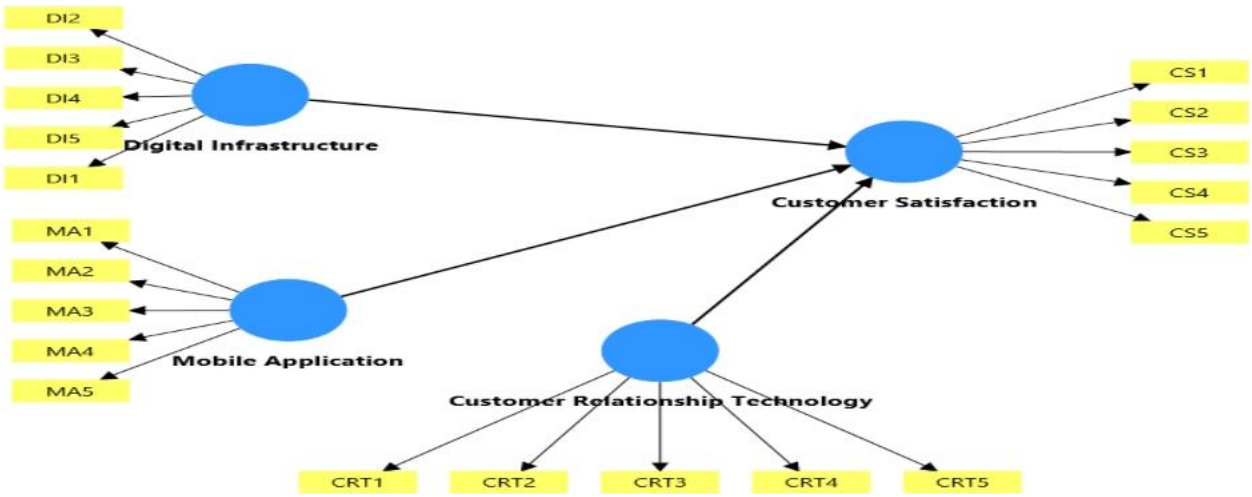
This study adopts a survey research design to investigate the effects of digital transformation on customer satisfaction. Survey research design is a subset of the quantitative research method that systematically collects numerical data from a large and diverse population through structured instruments. This design is appropriate as it allows respondents to express their experiences and attitudes in measurable terms, enabling statistical analysis to determine the strength and direction of relationships between variables. It also facilitates generalization of findings to the broader customer population while maintaining reliability and validity. The study population comprises all customers of five active Shoprite stores in Abuja as 2025, including individuals from diverse backgrounds, age groups, and levels of digital literacy who interact with Shoprite through mobile applications, online platforms, and other digital infrastructures. Due to the heterogeneity and large size of this customer base, the population is considered infinite. A simple random sampling technique was used to select study participants. The sample size was determined using Cochran's (1967) infinity formula, suitable for large, diverse, and imprecisely known populations. The formula is expressed as:

$$\mathbf{n = Z^2 \times p \times q / e^2}$$

Where Z = 1.96 (95% confidence level), p = 0.5, q = 0.5, and e = 0.05 (5% margin of error), yielding a sample size of **384 customers**.

Primary data were collected directly from Shoprite customers using a structured questionnaire, ensuring information is specific, current, and directly related to the research objectives. The questionnaire is divided into three sections. The first captures demographic information including age, gender, education level, and familiarity with digital services. The second section captures information on Shoprite's digital transformation initiatives, focusing on digital infrastructure, mobile applications, and customer relationship management systems. The third section measures customer satisfaction dimensions including convenience, reliability, trust, and overall shopping experience. All items were measured using a Likert scale, providing standardised and statistically analysable data aligned with the quantitative research design. Data were analysed using inferential statistical tool. Structural Equation Modelling – Partial Least Squares (SEM-PLS) was employed to analyse the effects of digital transformation variables on customer satisfaction. This model is appropriate because both constructs are multidimensional and measured using multiple Likert-scale items, requiring a method capable of handling latent variables and assessing measurement validity.

SEM-PLS provides a robust, flexible, and accurate analytical framework for examining the interactions between digital transformation components, specifically digital infrastructure, mobile applications, and customer relationship technologies, and customer satisfaction in the retail sector. It also allows the measurement and structural models to be analysed simultaneously, thereby minimising error variance. The Smart PLS was used for data analysis, including hypothesis testing. Latent Constructs and observed indicators relationships are clearly represented. The model identified the latent constructs (also known as factors or variables) that represent the underlying theoretical concepts in the research. It also determined the observed indicators (also known as manifest variables or items) that reflect each latent construct. The measurement model was assessed to ensure the measurements used are reliable and valid for the model. The structural model is then used to validate the hypotheses. The hypothesised model of the study is presented below (Figure 2). The hypothesised structural model shows how exogenous variables affect the endogenous variable, which provides an analytical foundation for estimation while establishing the inter-variable relationships essential for regression analysis.



Source: Authors' Formulation from SmartPLS

Figure 2: Proposed Structural model

The proposed structural model illustrates the path connections between indicators and proxy variables, as well as the directional relationships between the exogenous (independent) and endogenous (dependent) variables. The independent variable, digital transformation, is measured through three proxies: digital infrastructure, mobile applications, and customer relationship technology. These collectively capture the organisation's commitment to convenience, personalization, accessibility, and communication. The dependent variable, customer satisfaction, is measured through convenience and speed, trust and security, responsiveness, accessibility, and repeat purchase intentions, reflecting the key factors that shape customer behaviour and continued patronage. The indicators labelled DI1 to DI5 measure digital infrastructure, MA1 to MA5 measure mobile application, CRT1 to CRT5 measure customer relationship technology, and CS1 to CS5 measure customer satisfaction. These indicators represent the questionnaire items, coded in Likert scale format for quantitative measurement. Furthermore, the structural model depicts the paths and directions through which the proxies of digital transformation relate to customer satisfaction, providing a framework for achieving the research objectives.

4. FINDINGS

The data collected was analysed via measurement and structural model of SEM-PLS. The measurement model assessment evaluated the fit of the latent construct for the analysis.

MEASUREMENT MODEL

The measurement model was assessed to evaluate convergent validity, internal consistency reliability, and discriminant validity of the constructs. The assessment was conducted using Cronbach's alpha,

composite reliability, Average Variance Extracted (AVE), and the Heterotrait–Monotrait ratio (HTMT).

Table 1: Reliability Assessment

	Cronbach's alpha	Composite reliability (rho_c)	Average Variance Extracted (AVE)	Composite reliability (rho_a)
Customer Relationship Technology	0.743	0.764	0.589	0.784
Customer Satisfaction	0.725	0.688	0.510	0.754
Digital Infrastructure	0.670	0.649	0.514	0.704
Mobile Application	0.734	0.732	0.567	0.731

Source*: Authors' Computation from SmartPLS*

Table 1 presents the reliability and validity results for all constructs. Cronbach's Alpha values include digital infrastructure (0.670), mobile applications (0.734), customer relationship technology (0.743), and customer satisfaction (0.725). While customer relationship technology, mobile applications, and customer satisfaction exceed the recommended 0.70 threshold, digital infrastructure's moderate score remains acceptable given its p-value is less than 0.05. Composite reliability (rho_c) values for customer relationship technology (0.764), mobile applications (0.732), and customer satisfaction (0.688) indicate moderate internal consistency, while digital infrastructure (0.649) reflects weaker consistency among its indicators. Composite reliability (rho_a) values for customer relationship technology (0.784), customer satisfaction (0.754), digital infrastructure (0.704), and mobile applications (0.731) all indicate acceptable internal consistency. Average Variance Extracted (AVE) was used to assess convergent validity. The AVE values for customer relationship technology (0.589), customer satisfaction (0.510), digital infrastructure (0.514), and mobile applications (0.567) all exceed the 0.5 benchmark, confirming satisfactory convergent validity and demonstrating that the indicators adequately represent their intended constructs. Overall, these results confirm that all constructs exhibit adequate internal consistency, reliability, and validity for use in this study.

Table 2: Discriminant Validity: Heterotrait-monotrait ratio (HTMT)

	Customer Satisfaction	Customer Relationship Technology	Digital Infrastructure	Mobile Application
Customer Satisfaction				
Customer Relationship Technology	0.711			
Digital Infrastructure	0.789	0.593		
Mobile Application	0.504	0.732	0.604	

Source*: Authors' Computation from SmartPLS*

Table 2 presents the Heterotrait-Monotrait Ratio (HTMT) results for discriminant validity assessment within the PLS-SEM model, with a validity threshold of 0.853. Discriminant validity confirms that the latent constructs, customer satisfaction, digital infrastructure, mobile applications, and customer relationship technology, are empirically distinct and measure different concepts. All HTMT scores fall below the 0.853 threshold, confirming strong discriminant validity across all construct pairs. Specifically, customer satisfaction and customer relationship technology scored 0.711, digital infrastructure and customer relationship technology scored 0.593, and digital infrastructure and customer satisfaction scored 0.789. Mobile applications and customer relationship technology recorded 0.732, mobile applications and customer satisfaction recorded 0.504, and mobile applications and digital infrastructure recorded 0.604. Since all values fall below

the recommended threshold, the results confirm that each construct is empirically distinct, measuring different underlying concepts, and that discriminant validity is satisfactorily established for all constructs in this study.

Table 3: Outer model collinearity statistics: Variance Inflation Factors (VIF)

	Original sample (O)	Sample mean (M)	2.5%	97.5%
CRT1	1.101	1.115	1.051	1.200
CRT2	1.027	1.039	1.009	1.089
CRT3	1.088	1.101	1.041	1.179
CRT4	1.044	1.057	1.018	1.111
CRT5	1.042	1.055	1.017	1.111
CS1	1.080	1.094	1.039	1.171
CS2	1.095	1.109	1.048	1.191
CS3	1.111	1.126	1.060	1.208
CS4	1.100	1.114	1.050	1.201
CS5	1.054	1.067	1.022	1.129
DI1	1.034	1.047	1.013	1.098
DI2	1.043	1.056	1.016	1.114
DI3	1.024	1.036	1.008	1.079
DI4	1.036	1.049	1.013	1.104
DI5	1.015	1.026	1.004	1.065
MA1	1.044	1.057	1.016	1.116
MA2	1.095	1.109	1.047	1.193
MA3	1.027	1.039	1.009	1.088
MA4	1.087	1.101	1.042	1.182
MA5	1.016	1.028	1.005	1.067

Source*: Authors' Computation from SmartPLS*

Table 4.5 presents the Variance Inflation Factors (VIF) for indicators in the outer measurement model, used to assess multicollinearity among constructs. According to Hair et al. (2017), the recommended threshold is 3.3, with scores below this value indicating no critical collinearity issues. All VIF values fall well below this threshold. Original sample (O) values range from 1.015 to 1.111, while sample mean (M) values range from 1.026 to 1.115. Bootstrap confidence intervals also remain within acceptable limits, with lower band (2.5%) values ranging from 1.005 to 1.051 and upper band (97.5%) values ranging from 1.067 to 1.208. Since all VIF values are well below the 3.3 threshold, multicollinearity does not threaten the validity of the model estimates. The low VIF scores further confirm that the indicators are distinct and non-redundant, supporting a reliable and valid measurement model.

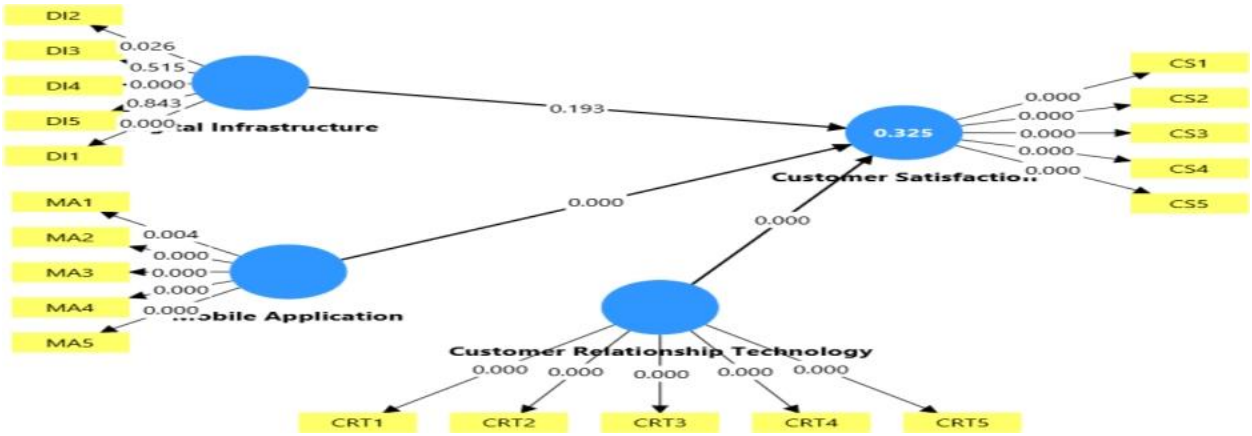
Table 4: Outer Loading Measurement

	Customer Relationship Technology	Customer Satisfaction	Digital Infrastructure	Mobile Application
CRT1	0.716			
CRT2	0.782			
CRT3	0.738			
CRT4	0.795			
CRT5	0.824			
CS1		0.772		
CS2		0.849		
CS3		0.707		

CS4	0.881		
CS5	0.747		
DI1		0.826	
DI2		0.848	
DI3		0.402	
DI4		0.741	
DI5		0.310	
MA1			0.815
MA2			0.747
MA3			0.818
MA4			0.829
MA5			0.799

***Source**: Field Survey, 2025*

Table 4 presents the outer loadings for all indicators in the measurement model. Loadings ≥ 0.708 are considered ideal, those between 0.40 and 0.70 are acceptable if statistically significant, and loadings below 0.40 are considered weak. For customer relationship technology, all indicators (CRT1 = 0.716, CRT2 = 0.782, CRT3 = 0.738, CRT4 = 0.795, CRT5 = 0.824) exceed the 0.70 threshold, confirming strong and significant loadings that adequately capture the construct. For customer satisfaction, all indicators (CS1 = 0.772, CS2 = 0.849, CS3 = 0.707, CS4 = 0.881, CS5 = 0.747) surpass the threshold, indicating a reliable and strong measurement model. For digital infrastructure, DI1 (0.826), DI2 (0.848), and DI4 (0.741) demonstrate strong loadings, while DI3 (0.402) shows a weak but marginally acceptable loading, and DI5 (0.031) falls well below the threshold, indicating weak contribution to the construct. For mobile applications, all indicators (MA1 = 0.815, MA2 = 0.747, MA3 = 0.818, MA4 = 0.829, MA5 = 0.799) exceed the threshold, confirming strong and significant loadings across all items. Overall, most indicators reliably measure their respective constructs, with the exception of DI3 and DI5, which showed weak loadings for digital infrastructure.



Source: Authors' Formulation from SmartPLS

Figure 3: Structural Model Diagram with Outer loading Significance

The figure above presents the structural diagram of the indicators and their relationships to the constructs. It shows the significance level for each indicator within each construct. All indicators of digital infrastructure, except DI3 and DI5, are significant, demonstrating a moderate contribution to construction. All indicators for mobile application (MA1 to MA5), customer relationship technology (CRT1 to CRT5), and customer satisfaction (CS1 to CS5) have p-values less than 0.05, indicating significant contributions to the measurement model.

STRUCTURAL MODEL

The structural model examines the relationships among the constructs; it tests the model fit and explanatory power of the independent variable on the dependent variable. This is measured using latent-variable correlations and the coefficient of determination (R^2).

Table 5: Latent variable correlation statistics

	Customer Satisfaction	Customer Relationship Technology	Digital Infrastructure	Mobile Application
Customer Satisfaction	1			
Customer Relationship Technology	0.504	1		
Digital Infrastructure	0.364	0.542	1	
Mobile Application	0.460	0.459	0.367	1

***Source**: Authors' Computation from SmartPLS*

Table 5 presents the latent-variable correlation results among the study constructs. All correlations are positive and statistically significant. Customer satisfaction and customer relationship technology recorded a moderate correlation (r = 0.504), while digital infrastructure and customer relationship technology showed the strongest correlation (r = 0.542), suggesting that robust digital systems strongly align with customer relationship management technologies. Digital infrastructure and customer satisfaction recorded a weak positive correlation (r = 0.364). Mobile applications and customer relationship technology showed a moderate correlation (r = 0.459), as did mobile applications and customer satisfaction (r = 0.460). Mobile applications and digital infrastructure recorded the weakest correlation (r = 0.367). Overall, the constructs are meaningfully interrelated, reflecting a cohesive technological ecosystem where digital infrastructure, mobile tools, and relationship management collectively contribute to customer satisfaction. Bootstrap results, with sample means close to original values and low standard deviations, further confirm the reliability and stability of these estimates.

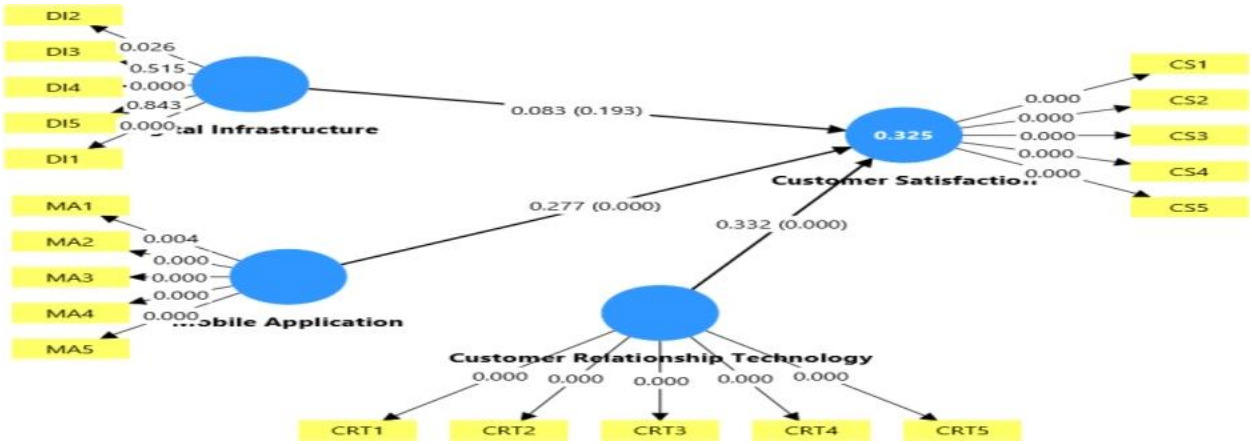
Table 6: Model Fit: Explained Variance (R^2)

	Explained Variance (R^2)	Adjusted R	Effect Size (f^2)
Customer Relationship Technology			0.102
Digital Infrastructure			0.007
Mobile Application			0.088
Customer Satisfaction	0.325	0.319	

***Source**: Authors' Computation from SmartPLS*

Table 6 presents the coefficient of determination (R^2) for the model. The R^2 value of 0.325 indicates that digital transformation tools, digital infrastructure, mobile applications, and customer relationship technology, explain 32.5% of the variation in customer satisfaction, reflecting moderate predictive power. The adjusted R^2 of 0.319, marginally lower than the R^2, confirms that the model does not suffer from overfitting and that all predictors contribute meaningfully. The effect size (f^2) results further clarify each predictor's contribution. Digital infrastructure recorded a negligible effect size (f^2 = 0.007, p = 0.645), indicating little to no practical impact on customer satisfaction when considered alongside other predictors. Mobile applications recorded a small effect size (f^2 = 0.088, p = 0.023), confirming a positive but modest contribution to customer satisfaction. Customer relationship technology recorded the strongest effect size (f^2 = 0.102, p = 0.026), falling within the medium range according to Cohen's (1988) guidelines, indicating it is the most influential predictor of customer satisfaction among the three constructs. Overall, these results suggest that while all three digital

transformation tools contribute to customer satisfaction, customer relationship technology exerts the greatest influence, followed by mobile applications, with digital infrastructure having a negligible effect.



***Source**: Authors' Computation from SmartPLS*

Figure 4: Structural Model Diagram

Table 7: Standardised Path Coefficients (Test of Hypotheses)

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Decisions
Customer Relationship Technology -> Customer Satisfaction	0.332	0.334	0.066	5.012	0.000	Reject
Digital Infrastructure -> Customer Satisfaction	0.083	0.096	0.063	1.301	0.193	Accept
Mobile Application -> Customer Satisfaction	0.277	0.284	0.053	5.236	0.000	Reject

***Source**: Authors' Computation from SmartPLS*

Table 4.9 presents the path coefficients examining the direct effects of each digital transformation construct on customer satisfaction. Digital infrastructure recorded a standardised coefficient of β = 0.083, with a t-value of 1.301 (< 1.96) and a p-value of 0.193 (> 0.05), indicating a positive but statistically insignificant relationship with customer satisfaction. Consequently, the null hypothesis that digital infrastructure has no significant effect on customer satisfaction is accepted. Mobile applications recorded a standardised coefficient of β = 0.277, with a t-value of 5.236 and a p-value of 0.000, confirming a positive and statistically significant effect on customer satisfaction. This indicates that mobile applications increase customer satisfaction by 0.277 units when other variables are controlled. Therefore, the null hypothesis is rejected, and the alternate hypothesis is accepted. Customer relationship technology recorded the strongest path coefficient of β = 0.332, with a t-value of 5.012 (> 1.96) and a p-value of 0.000 (< 0.05), indicating a positive and statistically significant effect on customer satisfaction. Accordingly, the null hypothesis is rejected, and the alternate hypothesis is accepted. Overall, mobile applications and customer relationship technology significantly influence customer satisfaction, while digital infrastructure does not show a statistically significant effect.

The findings revealed that digital infrastructure had a positive but statistically insignificant effect on customer satisfaction (β = 0.083, p = 0.193). While the relationship was positive, it was too weak to meet the threshold for statistical significance. This suggests that although digital infrastructure forms an essential backbone for retail operations, it does not directly translate into improved customer satisfaction from the customers' perspective. Digital infrastructure largely operates in the background and remains invisible to customers. Technologies such as point-of-sale systems, network servers, scanners, and backend payment systems primarily support internal efficiency rather than

directly shaping customer experiences. Consequently, customers tend to perceive these systems as basic operational requirements rather than value-adding features, limiting their influence on satisfaction. This aligns with Oni & Adeyeye (2020) and Manik et al. (2022), who found that digital infrastructure does not significantly affect customer satisfaction. However, it contradicts Njanja et al. (2018) and Muhdaliha et al. (2025), who reported significant positive relationships between digital infrastructure and customer satisfaction.

The study found that mobile applications had a positive and statistically significant effect on customer satisfaction ($\beta = 0.277$, $p = 0.000$). This indicates that customers derive tangible value from mobile applications, enhancing their overall shopping experience. Features such as online product browsing, digital payments, order placement, promotions, and customer notifications contribute to convenience, flexibility, and time savings. Unlike digital infrastructure, mobile applications offer direct interaction between customers and the retail store, enabling engagement beyond physical store visits. This aligns with the Resource-Based View (RBV) theory, which holds that organisations leverage technology to gain competitive advantage. The findings resonate with Eckert et al. (2022), who found that integrating digital applications enhances customer satisfaction through convenience and flexibility. They also align with Aniekan et al. (2025), who found that digital payment systems positively affect customer satisfaction by enabling seamless interactions, and Sinemus et al. (2022), who found that shopping applications increase customer satisfaction by improving interaction flexibility between customers and retail companies.

Customer relationship technology emerged as the strongest and most significant predictor of customer satisfaction ($\beta = 0.332$, $p = 0.000$). Technologies used to manage customer interactions, including feedback systems, customer support platforms, personalised communication, and complaint-handling mechanisms, play a central role in shaping satisfaction. These technologies enable organisations to understand customer needs, respond promptly to complaints, personalise services, and build long-term relationships, enhancing customers' sense of being valued and heard. Customer relationship technology encompasses various interaction channels, including self-service guides, social media, email, telephone support, and AI assistants embedded in mobile applications, all of which improve organisational responsiveness and the overall customer experience. This finding aligns with Kumar et al. (2022), who found that electronic customer relationship management significantly improves customer satisfaction by enhancing customer interactions, and Cavaliere et al. (2021), who established that customer relationship management positively influences both satisfaction and loyalty. It also resonates with Molinillo et al. (2022), who found that customer retail experience directly affects loyalty.

Collectively, the findings demonstrate that customer-facing digital tools, particularly customer relationship technology and mobile applications, are more directly influential in driving customer satisfaction than backend infrastructure. While digital infrastructure remains operationally essential, its impact on customer satisfaction is indirect. Retailers seeking to enhance customer satisfaction through digital transformation should therefore prioritise investments in customer relationship technologies and mobile applications, as these foster direct engagement, personalization, and responsiveness that meaningfully shape customer experiences.

5. CONCLUSION

Findings revealed that mobile applications and customer relationship technology positively influence customer satisfaction in ShopRite, Abuja, while digital infrastructure does not demonstrate a statistically significant direct effect. Digital infrastructure exhibited a positive but statistically insignificant effect on customer satisfaction. Rather than serving as a direct driver of satisfaction, digital infrastructure functions as a foundational enabler, with its benefits likely realized indirectly through improved service delivery and operational efficiency. Its background nature means customers rarely perceive it as a value-adding feature. Mobile applications contribute positively to customer satisfaction by enhancing convenience, flexibility, accessibility, and responsiveness. As one of the most influential tools of digital technology, mobile applications link customers directly to the store, enabling them to browse product catalogueues, check stock availability, review prices, place orders, and make payments without physically visiting the store. These features align with customer values, foster loyalty and trust, and increase continued purchase intentions, reinforcing the growing importance of customer-facing digital tools in modern retail. Customer relationship technology is another critical element of digital transformation that shapes customer satisfaction. It encompasses customer relationship management systems, automated communication systems, loyalty management systems, and AI-driven service tools, enabling organisations to understand customer needs and

deliver personalised, high-quality products and services. By connecting customers directly to companies, this technology enhances communication, responsiveness, and the overall customer experience, making it the strongest predictor of customer satisfaction in this study.

Overall, the study concludes that digital transformation initiatives are vital for enhancing customer satisfaction in ShopRite stores in the Abuja metropolis. Retailers should prioritise investments in mobile applications and customer relationship technologies to maximise customer satisfaction and maintain competitive advantage. Based on this, the study recommends the following:

1. Retail stores should not only invest in digital infrastructure but also integrate it more effectively into daily operations. They should invest in regular upgrades, innovations, and employee training programmes to ensure the gadget is used to its full potential and achieves its objectives.
2. Retail stores like ShopRite should also continuously invest in mobile app development to enhance customer engagement. Regular updates, enhanced user-friendly features, and strong cybersecurity protocols should be prioritised to build employee and customer trust.
3. ShopRite and other retail stores should prioritise investments in advanced customer relationship management (CRM) systems. These systems should be designed to capture customer feedback in real time, manage complaints efficiently, and personalise customer interactions.

REFERENCES

Adebiyi, A. M., & Omotosho, B. S. (2022). Mobile banking applications in Nigeria: An analysis of user sentiments. *Journal of Banking*.

Agustian, K., Mubarok, E. S., Zen, A., Wiwin, & Malik, A. L. (2023). The impact of digital transformation on business models and competitive advantage. *Technology and Society Perspectives (TACIT)*, 1(2), 79-93

Al-Bashayreh, M., Almajali, D., Al-Okaily, M., Masa'deh, R. E., & Samed Al-Adwan, A. (2022). Evaluating electronic customer relationship management system success: the mediating role of customer satisfaction. *Sustainability*, *14*(19), 12310.

Aniekan, E. A., Aniefiok, O. A., & Affiah, E. A. (2025). Assessing the influence of digital payments systems on customer satisfaction in petroleum retail outlets in Akwa Ibom State, Nigeria. *International Journal of Management Practice and Innovation*, *13*(2), 130-143.

Ariffian, R., & Zainal, M. (2024). Influence of modern retail, digital marketing, and technological infrastructure toward traditional retail in Indonesia. In *5th International Conference on Global Innovation and Trends in Economy 2024 (INCOGITE 2024)* (pp. 754-765). Atlantis Press.

Barney, J. B., Ketchen Jr, D. J., & Wright, M. (2021). Resource-based theory and the value creation framework. *Journal of management*, *47*(7), 1936-1955.

Bertram, M. (2016). Theoretical foundation: The resource-based view (RBV) of the firm. In *The strategic role of software customisation: Managing customisation-enabled software product development* (pp. 67-102). Wiesbaden: Springer Fachmedien Wiesbaden

Bhatnagr, P., & Rajesh, A. (2024). Artificial intelligence features and expectation confirmation theory in digital banking apps: Gen Y and Z perspective. *Management Decision*.

Breznik, L., & Lahovnik, M. (2016). Dynamic capabilities and competitive advantage: Findings from case studies. *Management: journal of contemporary management issues*, *21*(Special issue), 167-185.

Biao, L., & Rojniruttikul, N. (2023, April). Impact of digital technologies, modern infrastructure, self-service learning experience, and customer satisfaction at Haidilao restaurant in China. In *Proceedings of the 2023 5th International Conference on Management Science and Industrial Engineering* (pp. 136-143).

Borisova, A., Borisova, E., Kirichenko, E., & Dmitrieva, L. (2020). Digital technologies in retail: is there an impact on businesses?. In *SHS Web of Conferences* (Vol. 80, p. 01021). EDP Sciences.

Cavaliere, L. P. L., Khan, R., Sundram, S., Jainani, K., Bagale, G., Chakravarthi, M. K., ... & Rajest, S. S. (2021). The Impact of customer relationship management on customer satisfaction and retention: The mediation of service quality. *Turkish Journal of Physiotherapy and Rehabilitation*, *32*(3), 22107-22121.

Chen, L., & Wang, Y. (2018). Embracing digital transformation: challenges and opportunities for traditional enterprises. *International Journal of Information Management*, 38(5), 156-171

Chowdhury, M. M. H., & Quaddus, M. (2017). Supply chain resilience: Conceptualization and scale development using dynamic capability theory. *International journal of production economics*, *188*, 185-204.

Corte, V. D., D'Andrea, C., & Del Gaudio, G. (2017). The state of art of Resource-Based Theory in marketing research. *The Marketing Review*, *17*(3), 283-306.

Dike, R. A., & Stanley, C. C. (2021). Effect of Customer relationship management on customers' loyalty in shipping companies in Lagos State, Nigeria. *American International Journal of Business Management*, *4*(5), 52-64.

Eckert, C., Neunsinger, C., & Osterrieder, K. (2022). Managing customer satisfaction: digital applications for insurance companies. *The Geneva Papers on Risk and Insurance-Issues and Practice*, *47*(3), 569-602.

Elkhwesky, Z., & Elbaz, A. (2022). The role of digital transformation in improving customer satisfaction: An empirical study on Egyptian hotels. *Electronic Journal of Information Systems in Developing Countries*, 88(1), e12234. https://doi.org/10.1002/isd2.12234

Egbuhuzor, N. S., Ajayi, A. J., Akhigbe, E. E., Agbede, O. O., Ewim, C. P. M., & Ajiga, D. I. (2021). Cloud-based CRM systems: Revolutionizing customer engagement in the financial sector with artificial intelligence. *International Journal of Science and Research Archive*, *3*(1), 215-234.

Gbolagade, A. S., & Adeyemi, O. A. (2024). Effect of Customer Relationship Management on Customer Satisfaction in the Nigeria Food Industry: A Case Study of Sweet Sensation Confectioneries. *Journal of Research and Review in Accounting, Business & Finance Management*, 1(1), 4-13

Gil-Gomez, H., Guerola-Navarro, V., Oltra-Badenes, R., & Lozano-Quilis, J. A. (2020). Customer relationship management: digital transformation and sustainable business model innovation. *Economic research-Ekonomska istraživanja*, *33*(1), 2733-2750.

Ismail, M. N., Jameel, S. H., Al-Zeyadi, B. K. A., Saeed, A. M., Salman, S. M., Dakov, S., & Ali, H. (2024). Investigating Three Digital Transformation Theories TAM, TTF, and UTAUT. In *2024 36th Conference of Open Innovations Association (FRUCT)* (pp. 538-548). IEEE.

Ikeobi, N. R. P. (2024). Impact of Identity Management in the Banking Industry on the Nigerian Economy. *Responsible Consumption, Production and Accounting in Emerging Economies*, 100.

Iwedi, M. (2024). Digital finance infrastructure and growth of commercial banking firms in Nigeria. *Discover Analytics*, *2*(1), 16.

Jeble, S., Gupta, S., & Awasarala, V. (2020). *Digital transformation for business sustainability: A critical review*. *Journal of Business Research*, 118, 315-322.

Kankia, j. L., & Aliyu, s. D. (2024). E-commerce and consumer satisfaction: evidence from katsina state, NIGERIA. *Journal of African Sustainable Development*.

Khan, R. U., Salamzadeh, Y., Iqbal, Q., & Yang, S. (2022). The impact of customer relationship management and company reputation on customer loyalty: The mediating role of customer satisfaction. *Journal of Relationship Marketing*, *21*(1), 1-26.

Khrais, L. T., & Alghamdi, A. M. (2021). The role of mobile application acceptance in shaping e-customer service. *Future Internet*, *13*(3), 77.

Kim, J., Kim, Y., & Han, S. (2025). *Constructing the digital quality standard: Enhancing service quality, trust, and customer satisfaction in Korean banking.* Sustainability, 17**(**8), 3500.

Kraus, S., Jones, P., Kailer, P., Weinmann, A., Chaparro-Banegas, N. & Roig-Tierno, N. (2021), Digital Transformation: An overview of the current state of the art of research. *SAGE Open*, 1– 15

Kumar, P., Mokha, A. K., & Pattnaik, S. C. (2022). Electronic customer relationship management (E-CRM), customer experience and customer satisfaction: evidence from the banking industry. *Benchmarking: An International Journal*, *29*(2), 551-572.

Lim, L. G., Tuli, K. R., & Grewal, R. (2020). Customer satisfaction and its impact on the future costs of selling. *Journal of Marketing*, *84*(4), 23-44.

Liu, L., An, S., & Liu, X. (2022). Enterprise digital transformation and customer concentration: An examination based on dynamic capability theory. *Frontiers in Psychology*, *13*, 987268.

Manik, D. E. M., Pesta Gultom, Yulvitriyani Br Sebayang, & Felix. (2022). The effect of facilities and trust on customer satisfaction in the use of digital facilities at PT. Bank Central Asia Tbk Kcu Asia Branch . *Enrichment : Journal of Management*, *12*(2), 2465-2468. https://doi.org/10.35335/enrichment.v12i2.562

Mbonu, O. C. (2025). Digital innovation and supply chain management: a study of Shoprite Enugu. International Journal of Entrepreneurship and Business Innovation, 8(1), 87-101. DOI: 10.52589/IJEBI-ROPLTUS3.

Menga, F. & Wang, W. (2023). The impact of digitalisation on enterprise value creation: An empirical analysis of Chinese manufacturing enterprises. *Journal of Innovation & Knowledge* 8 (2023) 100385

Mergel, I., Edelmann, N. & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, 36(4), p. 101385. https://doi.org/10.1016/j.giq.2019.06.002.

Miguel, P. M. D., De-Pablos-Heredero, C., Montes, J. L., & García, A. (2022). Impact of dynamic capabilities on customer satisfaction through digital transformation in the automotive sector. *Sustainability*, *14*(8), 4772.

Molinillo, S., Aguilar-Illescas, R., Anaya-Sanchez, R., & Carvajal-Trujillo, E. (2022). The customer retail app experience: Implications for customer loyalty. *Journal of Retailing and Consumer Services*, *65*, 102842.

Mihu, C., Pitic, A. G., & Bayraktar, D. (2023). Drivers of digital transformation and their impact on organisational management. *Studies in Business and Economics*, *18*(1), 149-170.

Muhdaliha, E., Lestari, S. D., Maulana, P., & Rohman, A. (2025). Analyzing the Effect of Infrastructure and Facility Quality on Customer Satisfaction. *Jurnal Ilmiah Manajemen Kesatuan*, *13*(4), 2557-2568.

Nag, A. K., Arora, N., & Joshi, R. (2022). Impact of Infrastructure, Marketing, and Pricing Strategies On Customer Satisfaction Of Telecom Users A Sectoral Study. *The Management Accountant Journal*, *57*(11), 34-40.

Omrani, N., Rejeb, N., Maalaoui, A., Dabić, M., & Kraus, S. (2022). Drivers of digital transformation in SMEs. *IEEE transactions on engineering management*, *71*, 5030-5043.

Ononiwu, M. I., Onwuzulike, O. C., & Shitu, K. (2024). The role of digital business transformation in enhancing organisational agility. *World Journal of Advanced Research and Reviews*, 23(03), 285-308. Available at: https://doi.org/10.30574/wjarr.2024.23.3.2670

Onikoyi, I. A., Babatunde, B. O., & ODEH, C. D. (2022). Impact of E-Commerce Applications on Non-Financial Peformance of Selected Online Retail Enterprises in Lagos State, Nigeria. *The Journal of Accounting and Management*, *12*(3).

Setiadi, B., Kraugusteeliana, K., Risdwiyanto, A., Bakri, A. A., & Arief, I. (2023). The Application of Delone and Mclean Framework to Analyse the Relationship Between Customer Satisfaction and User Experience of Mobile Application. *Jurnal Sistim Informasi Dan Teknologi*, 84-89.

Sinemus, K., Zielke, S., & Dobbelstein, T. (2022). Shopping app features: their impact on customer satisfaction and loyalty. *The International Review of Retail, Distribution and Consumer Research*, *32*(4), 423-449.

Tangwaragorn, P., Charoenruk, N., Viriyasitavat, W., Tangmanee, C., Kanawattanachai, P., Hoonsopon, D., ... & Rhuwadhana, P. (2024). Analyzing key drivers of digital transformation: A review and framework. *Journal of Industrial Information Integration*, *42*, 100680.

Tien, N. H., Anh, N., Dung, H., On, P., Anh, V., Dat, N., & Tam, B. (2021). Factors impacting customer satisfaction at Vietcombank in Vietnam. *Hmlyan Jr Eco Bus Mgn*, *2*(4), 44-51.

Tran, H. T., & Le, M. T. (2024). The impact of digital transformation on customer satisfaction in digital banking: Evidence from Vietnam. *Frontiers in Business, Economics and Management,* 9(4), 101–113. https://doi.org/10.54097/fbem.v9i4.6587

Verhoef, P. C., Kannan, P. K., & Inman, J. J. (2021). *From multi-channel retailing to omni-channel retailing: The role of digital transformation in enhancing customer experience. Journal of Retailing*, 97(4), 521-537.

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *Journal of Strategic Information Systems*, 28(2), 118-139.

Wang, L., & Lee, C. (2017). Digital Transformation in Manufacturing: Challenges and Opportunities. *International Journal of Production Economics*, 150, 30-43.

Yamin, M., & A Al Amri, S. (2016). Mobile applications and customers satisfaction in saudi electricity company. *International Multilingual Academic Journal*, *2*(1).