

**THE IMPACT OF PAYMENT SYSTEM ON SMALL AND MEDIUM SCALE
ENTERPRSE IN NIGERIA**

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MAY, 2024.

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BY

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**BEING A PROJECT SUBMITTED TO THE DEPARTMENT OF BANKING AND
FINANCE, FACULTY OF MANAGEMENT SCIENCES, UNIVERSITY OF
BENIN, BENIN CITY IN PARTIAL FUFILLMENT OF THE REQUIREMENTS
FOR THE AWARD OF BACHELOR OF SCIENCE (B.Sc.) DEGREE IN
BANKING AND FINANCE**

MAY, 2024.

DECLARATION

I, **OLOGBON OSHIONAMEH GABRIEL**, hereby declare that: This project is based on a study undertaken by me in the Department of Banking and Finance, Faculty of Management Sciences, University of Benin, Benin City, under the supervision of **DR. B.O ISIBOR**.

This work has not been previously submitted for the award of any diploma elsewhere. Ideas and views are products of my personal research and where the view of others have been expressed, they have been duly acknowledged.

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CERTIFICATION

This is to certify that this project titled “**THE IMPACT OF PAYMENT SYSTEM ON SMALL AND MEDIM SCALE ENTEPRISE IN NIGERIA**” was carried out by **OLOGBON OSHIONAMEH GABRIEL** with matriculation number **MGS1907988**. It has been read and recommended for acceptance in partial fulfillment of the requirement for the award of Bachelor of Science (B.Sc.) Degree in Banking and Finance.

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DEDICATION

This work is dedicated to the almighty God who made me all I am and granted me the required strength, wisdom and knowledge needed in carrying out this work. I also specially dedicate this work to my amazing parents, MR. & MRS. OLOGBON and my siblings for always believing in me and pushing me to be my best in my academic pursuit.

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I sincerely want to acknowledge and appreciate the Almighty God for his steadfast love, care and directions. For always showing up strong for me in my moments of weakness and for clarity in the times of confusion. Indeed, I give him all the glory for the successful completion of this project.

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ABSTRACT

This research work deals with the Impacts of Payment System on Small and Medium Enterprises in Nigeria over the period of 1990-2020. The introductory aspect of the project talks about the background of the study and the analysis of the payment system on small and medium enterprises. Also the statements of the problem of a successful payment system are well explained. This study also attempted to provide an answer to the question raised under the problem the problem statement. It also talked about the objective of the study which is to test empirically the payment system as an important variable and more so of its impact on small and medium enterprises. The literature review talks about the opinion of various authors, that's what their view is about payment system. Their view are based on the terminologies of payment system, the conceptual and theoretical framework in payment system were analyzed and the review of empirical studies. The essence of the Chapter Three is to provide information on the research method, which is the model specification, sources of data and estimation techniques as well as the justification for the choice of the estimation techniques, used in the analysis and presentation of the information and data collected. Chapter Four centers on data presentation, analysis, and interpretation of results. The objective of the analysis is to provide a detailed description on the empirical investigation of the relationship between Total Volume of Mobile Money transactions (VLMOB), Total Volume of ATM transactions (VLATM), Total Volume of POS transactions (VLPOS), Total Volume of WEB transactions (VLWEB), Commercial Banks Loans to Small Scale Enterprises (CBSME). The concluding aspect of this project is that best management cannot turn around ailing small and medium enterprises without a payment system: likewise small and medium scale enterprises cannot operate with unreliable payment system.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Financial institutions have devised innovative payment methodologies to facilitate monetary exchange, fostering commerce and economic advancement while offering flexibility and reduced transaction expenses with enhanced security. Decades past, consumers primarily utilized cash or checks for acquisitions, with cash prevalent for smaller transactions and checks for larger purchases. As commerce and economies grew, so did the frequency and complexity of transactions, necessitating improved monetary exchange mechanisms. Utilizing cash for each transaction became impractical and unmanageable. In scenarios involving substantial sums, concerns arose over cash security and transportation. Banks stepped in, providing solutions in the form of diverse payment systems. While cash persists as the dominant payment method in certain regions, its prevalence has declined with the advent of general-purpose payment cards, empowering consumers and enterprises to conduct transactions more conveniently (Mararo, 2018).

Presently, consumers can execute payments digitally via credit, debit, and prepaid cards, and more recently, through various devices ranging from point-of-sale (POS) systems to mobile phones. The influence of electronic payment adoption on consumption and economic growth varies significantly across nations, reflecting disparities in economic development, market penetration, and financial infrastructure (David & Nivetha, 2018). Electronic payment systems are reshaping the industry by simplifying payments, lowering costs, and enhancing security.

Today, a multitude of payment systems exist, encompassing checks, wire transfers, cards, and online transfers. This study focuses specifically on electronic payment systems.

The rise of electronic payment systems has been particularly beneficial for Small and Medium Enterprises (SMEs), which may not have been adequately served by traditional banking systems. Electronic payment systems have facilitated cost-effective money transfers, eliminating the need for in-person transactions at bank premises. Consequently, there has been a growing need to examine the impact of electronic payment systems on SME performance. SMEs can leverage electronic payment systems to expand their business, enhance customer satisfaction, and cater to stakeholders (Mararo, 2018).

Electronic payment systems expedite business transactions and minimize costs across parties. Banked individuals can access their accounts via mobile phones, cards, and POS systems. Electronic payment platforms, including cards, POS systems, and mobile money services, are expanding into rural areas, providing greater access and functionality. The underlying infrastructure seamlessly connects individuals making payments and those receiving them (Bangens & Soderberg, 2011).

In Nigeria, SMEs constitute an estimated 87% of all operating firms. According to Ihua (2009), SMEs contribute approximately 97% of all enterprises in Nigeria. SMEs reportedly employ over 60% of the workforce (Chamberlain, 2003), contribute up to 50% of industrial output (Ihua, 2009), and account for approximately 70% of industrial employment (Aina, 2007). These statistics underscore the significance of SMEs in Nigeria, warranting focused examination in this study.

1.2 Statement of the Research Problem

Examination of multiple existing investigations concerning the influence of electronic payment systems on the performance of small and medium-sized enterprises (SMEs) suggests that most of these studies were conducted in developed nations (Chogi, 2006; Huang, 2008; Porteous, 2006; Bangens & Soderberg, 2008; David & Nivetha, 2018 among others) and thus might not accurately represent the impact on how it benefits business environments and in particular the micro businesses in a developing country like Nigeria. Therefore, extensive research on the impact of electronic payment systems on SMEs who are among those who employ electronic payments systems particularly mobile banking, cards, internet banking and POS, in Nigeria is warranted. “So far there has been no clear insight into the role that electronic payments play in the development of micro-business. This implies that technology providers, government agencies and development partners may not address the required interventions and there is therefore a need to examine the contribution of electronic payments systems on micro businesses and the impact on their growth/performance. Also, the owners of the Small and Medium Scale enterprises in Nigeria need to fully understand the entrepreneurial impact of these new technologies on their business so as to cope with the increasing developments in the electronic payment services and the challenges in the micro business operating environment. The choice and use of technology in micro business is dependent on how well it is likely to contribute to the growth of businesses”. Despite the exponential growth in the use of electronic payment systems, only few studies have focused on its impact on the performance of SMEs. This means that the effect of using electronic payment in the

growth of SME's businesses has not been effectively assessed. Consequently, there was need to study how this financial innovation has affected the performance of SMEs. Therefore, this study sought to determine the effect of electronic payment systems on the performance of SMEs in Nigeria.

1.3 Research Questions

This investigation aims to answer the inquiries in the questions below:

- (i) How do mobile banking services influence the performance of small and medium scale enterprises in Nigeria?
- (ii) To what extent does an automated teller machine service affect the performance of small and medium scale enterprises in Nigeria?
- (iii) Is a web payment service significant in affecting the performance of small and medium scale enterprises in Nigeria?
- (iv) To what extent have commercial bank loans to small scale enterprises significant affect the performance of small and medium scale enterprises in Nigeria.

1.4 Objectives of the Study

The broad objective of this study is to ascertain the impact of payment system on Small and Medium Enterprise in Nigeria. The specific objectives are to:

- (i) Examine the effect of mobile banking services on the performance of small and medium scale enterprises in Nigeria;

- (ii) Determine the effect of automated teller machine service on the performance of small and medium scale enterprises in Nigeria;
- (iii) Ascertain the effect of web payment services on the performance of small and medium scale enterprises in Nigeria.
- (iv) Determine the effect of Commercial Banks Loans on the performance of small and medium scale enterprises in Nigeria.

1.5 Research Hypotheses

The following hypotheses were tested for this study:

- H0₁: Mobile banking services has no significant effect on the performance of small and medium scale enterprises in Nigeria.
- H0₂: Automated teller machine services have no significant effect on the performance of small and medium scale enterprises in Nigeria.
- H0₃: Internet banking services has no significant effect on the performance of small and medium scale enterprises in Nigeria.
- H0₄: Web payment services have no significant effect on the performance of small and medium scale enterprises in Nigeria.
- H0₅: Commercial Banks Loans to Small Scale Enterprises has no significant effect on the performance of small and medium scale enterprises in Nigeria.

1.6 Scope of the Study

The research investigation was conducted within the boundaries of Nigeria, with a focus on the nation's small and medium-sized enterprises. The research examines the impact of electronic payment methods on the performance of the SME sector, employing electronic payment channels (Mobile Banking (MB), Automated Teller Machine (ATM), Internet/Online Banking (OB), and POS) as independent variables. The study period spanned from 1990 to 2020, with the selection of this period driven by data accessibility.

1.7 Significance of the Study

This investigation aims to synthesize current knowledge regarding the challenges confronting Nigeria's electronic payment system and SME performance. Additionally, the study seeks to investigate the effects of electronic payment systems on SMEs, thereby enriching empirical evidence from Nigeria. Furthermore, owing to the empirical nature of the study, its findings will assist policymakers and regulatory institutions in developing economic models and conducting policy simulations pertaining to the variables examined.

The outcomes of this study will be valuable to investment analysts, investors, and corporations in evaluating the efficacy of youth entrepreneurship. Given the paucity of empirical research in this field in emerging economies such as Nigeria, it will also contribute to public debate. Lastly, it will contribute to the existing body of knowledge on the subject while also providing a foundation for future researchers seeking to advance this inquiry.

1.8 Limitations of the Study

The research utilizes secondary data gathered via external sources. Consequently, the trustworthiness and exactitude of the data impact the study's validity. Selecting a reputable data source (CBN Statistical Bulletin) mitigates this potential drawback.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this section, we will examine pertinent literature regarding the ramifications of payment systems on Small and Medium-sized Enterprises (SMEs) within the Nigerian context. To this end, we will explore the conceptual, theoretical, and empirical literature pertinent to the topic. Additionally, we will highlight any areas of deficiency in prior research.

2.2 Conceptual Literature

2.2.1 Small and Medium Scale Enterprises (SMEs)

There exists no widely accepted definition for small-scale businesses, as the categorization into large-scale or small-scale is subjective and qualitative. As per Ekpenyong and Nyong (1992), there is no singularly accepted definition globally for SMEs. This is attributed to the subjective nature of categorizing businesses as small or large. Moreover, SME definitions vary across countries and continents. In nations like the USA, Britain, and Canada, small-scale enterprises are defined based on annual turnover and employee count. In Britain, a small-scale business is one with an annual turnover of 2 million pounds or less and fewer than 200 employees.

Conversely, the Asia Pacific Economic Cooperation (APEC) defines micro, small, and medium enterprises (MSMEs) as businesses with less than 100 employees. A medium-sized enterprise employs 20-99 individuals, a small firm employs 5-19, and a micro firm employs less than 5, including self-employed managers.

In Japan, small-scale industries are classified based on industry type, paid-up capital, and employee count. Thus, small and medium-scale enterprises are defined as follows: manufacturing firms with 100 million yen paid-up capital and 300 employees; wholesale trade firms with 30 million yen paid-up capital and 100 employees; and retail and service trade firms with 10 million yen paid-up capital and 50 employees.

As per the European Commission (EC), small enterprises are those employing less than 50 persons and having annual sales or total assets not exceeding \$13 million. Meanwhile, micro enterprises employ fewer than 10 persons and have annual sales or total assets not exceeding \$3 million.

In Nigeria, the Central Bank of Nigeria's (CBN) Communiqué No. 69 from the special monetary policy committee meeting held on April 15, 2010, also acknowledges the existence of multiple SME definitions. According to the CBN, any enterprise with an asset base (excluding land) between N5 million and N500 million and a workforce of 11-300 belongs to the SME sub-sector. This implies that the CBN Communiqué defines SMEs based on employed capital and employee count. Furthermore, small and medium-scale enterprises are defined as businesses with total costs (excluding land) not exceeding two hundred million naira (Owolabi & Nasiru, 2017). By this definition, any business

with total costs below N200,000,000 qualifies as an SME; however, once its total costs surpass this threshold, its classification changes.

Additionally, SMEDAN (2007) provided a standard definition for the concept, as presented in Table 2.1. The National Policy Document stipulates that in cases of conflict between employment and asset-based criteria (e.g., an enterprise with assets worth seven million naira (N7m) and employing 7 persons), employment-based classification will prevail, and the enterprise will be categorized as micro (Evbuomwan, Ikpi, Okoruwa, and Akinyosoje, 2013). This choice, they argue, stems from the relative stability of employment-based classification, as inflationary pressures can compromise asset-based definitions.

Table 2.1: Classification of SMEs in Nigeria

Size Category	Employment (In Persons)	Assets (₦Million) (Excluding Cost of Land and Building)
Micro Enterprises	Less than 10	Less than 5
Small Enterprises	10 – 49	5 less than 50
Medium Enterprises	50 – 199	50 less than 500

Source: Small and Medium Enterprises Development Agency of Nigeria (SMEDAN, 2007), Abuja.

2.2.2 Electronic Payment System

Digital payment methods facilitate transactions (online) without utilizing physical currency or written checks (Daniel, 1999). The World Payment Report (WPR) (2013) defines electronic payments as digital exchanges conducted over the internet for e-commerce activities. According to Webster's New World Dictionary, electronic payments involve making payments digitally rather than in person. Electronic payment systems typically fall into four categories: credit cards and debit cards; electronic cash; micropayment systems; and session-level protocols for secure communications. A secure electronic financial transaction requires fulfillment of specific criteria: ensuring the confidentiality of communications; verifying the identities of both the client and server; and guaranteeing that data is transferred by the authorized signatory. This research examines various electronic payment systems, including: mobile phone banking, automated/computerized teller banking, internet banking (or online banking), and point of sale (POS) systems

2.2.3 Mobile banking

In 2016, Worku, Tilahun, and Tafa defined mobile-phone banking as a service provided by banks that empowers individuals, companies of various sizes, and other business ventures to execute financial transactions through mobile phones. Additionally, it enables customers to access account information, initiate bill payments, transfer funds within and between banks, and make payments for goods and services. Mobile banking, often referred to as M-banking, involves conducting financial operations such as balance inquiries, account management, payments, loan applications, and other banking activities using mobile devices like phones or PDAs. Early mobile banking services were provided through SMS, a service known as SMS banking. Mobile banking is widely adopted in regions with limited or no infrastructure, particularly in remote rural areas.

2.2.4 Automated teller machine

Automated Teller Machine (ATM), as described by Abubakar and Tosmin (2012), entails the use of computerized telecommunications devices that facilitate access to financial operations for clients of a financial institution in a public setting, obviating the need for human intervention or a bank teller. Similarly, Ali and Emenike (2016) characterize it as a computerized telecommunication device that empowers customers of a financial institution to engage in financial transactions within a public space, dispensing with the necessity for a cashier, human clerk, or bank teller. Fenuga (2010) defines it as an apparatus that allows cash withdrawals without entering the physical banking premises.

Moreover, it offers recharge card purchases for various mobile networks and facilitates bank transfers across multiple institutions, operating 24 hours a day and 7 days a week, additionally providing account balance inquiries

2.2.5 Internet banking

Internet banking, accessible via an online platform, allows individuals to conduct monetary activities, including settling financial obligations and investing, seamlessly. Notably, this service extends to small and medium-sized enterprises, providing them with the convenience of accessing their accounts and comprehensive information regarding bank offerings through the institution's website. This eliminates the need for cumbersome procedures such as physical mail, fax, original signatures, and phone verifications (Simon and Thomas, 2016). Essentially, online banking entails performing financial transactions on the internet using electronic devices like computers, bypassing the need for physical visits to bank branches. It stands as a cost-effective means of accessing banking products (Pikkarainen, Pikkarainen, Karjaluoto and Pahnla, 2004).

2.2.6 Point of Sales (POS)

A customer-merchant interaction during the acquisition of goods or services, where a dedicated system known as a point of sale (POS) is often utilized to facilitate the completion of the transaction

.2.3 Theoretical Review

Unified Theory of Acceptance and Use of technology (UTAUT) Theory

This theory aligns with user acceptance of information technology, striving towards a unified perspective. It elucidates user motivations to utilize information systems and subsequent usage patterns. Notably, four key constructs: performance expectations, effort expectations, social influences, and favorable conditions are recognized. The theory posits that age, gender, experience, ease of utilization, and voluntary usage potentially moderate the influence of these constructs on usage intentions and behavior. It also addresses challenges encountered in technology adoption (Venkatesh, Morris, Davis, & Davis, 2003). This theory gained preference over the Theory of Reasoned Action and Technology Acceptance Model (TAM). Davis (1989) proposed that when a user encounters a novel technology, a multitude of factors impact their decision on its usage. Manuaeli, Latu, and Koh (2007) described innovation as perceived utility and perceived ease of use, which are widely employed in the adoption approach that builds upon TAM.

Forman and Goldfarb (2006) have established TAM as a robust model frequently utilized in studying the acceptance of information communication technology (ICT). TAM is perceived as an information system theory that aids in understanding the adoption and use of the internet (Gibbs et al., 2007). The theory elucidates how adopters come to accept or reject the use of ICT in their businesses. However, Manuelli et al. (2007) critiqued TAM as less comprehensive in comparison to the diffusion approach, which incorporates more innovation characteristics, including time as a fundamental element of the theory (Gibbs, Sequeira & White, 2007; Rogers, 1995). TAM was also criticized for not considering influence and personal control factors impacting behavior, including the omission of external influences such as competitors (Manuelli et al., 2007). The Theory of Reasoned Action (TRA) model, which is more general than TAM, encompasses four primary concepts: behavioral attitude, subjective norms, intention to use, and actual use.

Theory of Planned Behavior (TPB) model

Theory of Planned Behavior (TPB) model extended TRA to encompass situations where individuals lack control over their behavior (Manuelli et al., 2007). Venkatesh et al. (2003) found that UTAUT accounted for 75% of intention variance and 50% of actual use in a longitudinal study. This study's theory suggests that background elements, entrepreneurial characteristics, and investment costs affect e-payment adoption in SME hotels.

Beckinsale and Ram (2006) identified four main areas in ICT literature for South Africa: ICT utilization, SMEs and ICT, ICT as a strategic tool, and ICT acceptance.

Mutua and Wasike (2009) further suggested that 'when and how' considerations influence ICT use.

2.4 Empirical Review

Chogi (2006) conducted research to analyze the effects of mobile phone technology on small and medium-sized enterprises (SMEs) in Nairobi. A self-administered survey gathered data. The study found that most SMEs believed mobile phones positively impacted their revenue. It also showed that the majority perceived mobile banking as a means to lower operational costs.

Huang (2008) similarly studied the impact of mobile phones on SME performance in Auckland, New Zealand. He utilized a questionnaire to obtain data. His findings revealed that most Auckland SMEs employed mobile technology in their business operations. Furthermore, he determined that mobile devices enabled SMEs to increase their annual revenue through expanded business networking opportunities.

Bangens and Soderberg (2008) investigated the role of mobile banking in providing basic banking services to a vast population in Sub-Saharan Africa. Data was gathered from both primary and secondary sources. They found that mobile banking facilitated monetary transactions and remittances. Additionally, their study indicated that mobile banking enhanced SME operations and competitiveness.

Wambari (2009) conducted a case study in Kenya to examine the impact of mobile banking in developing nations. A semi-structured questionnaire collected data from 20 SMEs. The study found that mobile banking had a positive effect on SME financial dealings. Moreover, it showed that adopting mobile banking allowed SMEs to increase their sales, leading to improved financial outcomes.

Nahian, Shahriar, and Islam (2009) investigated factors influencing SME adoption of e-banking in Bangladesh. The study incorporated the Technology Organization-Environment (TOE) framework, Technology Acceptance Model (TAM), Institutional Theory, and Institutional Intervention Theory. These theories resulted in a comprehensive conceptual framework for SME e-banking that considered both the goal-oriented behavior of firms and the external forces of technology adoption. They identified seven variables affecting e-banking adoption by SMEs: organizational capabilities, perceived credibility, perceived regulatory support, ICT industry readiness, lack of financial institution readiness, and institutional influence.

Donner and Escobari (2010) assessed mobile phone usage by SMEs in developing countries. They collected data from fourteen research studies that had examined mobile use by SMEs. Their findings showed that mobile phones increased SME productivity, sales, and financial performance.

Mbogo (2010) investigated the success factors of mobile payments for micro-businesses in Nairobi, Kenya. The study utilized the Theory of Technology Acceptance Model (TAM) extended to include additional factors. Analysis revealed that factors such as convenience, accessibility, cost, support, and security were associated with the behavioral

intention to use and actual usage of mobile payment services, leading to micro-business success and growth.

Higgins et al. (2012) conducted a study to determine mobile money usage patterns among Kenyan SMEs. A questionnaire gathered data from 865 SME owners. The study found that 99.5% of SMEs used mobile money. Additionally, it showed that mobile money usage improved SME performance.

Nyaga (2013) examined the impact of mobile banking on small and medium enterprise performance in an urban town in Kenya. The study found that mobile money significantly contributed to the SME sector. Most traders relied on it for daily transactions rather than the formal banking sector. Respondents had a clear understanding of mobile money services and their functions. However, concerns were raised about the convenience and cost of the service due to functional issues. Delays were a major concern, but few respondents had experienced them. The study identified that many SME sector players did not utilize the service for savings, loan access, or bank accounts, creating a significant potential for mobile money growth.

Nthenya, (2014) analyzed the impact of smartphone-based money transfers on the financial success of SMEs in Nairobi County, Kenya. The study employed descriptive survey methodology. Data was gathered using both self-administered questionnaires and interview guides. The collected data was processed using the Statistical Package for Social Sciences. Analysis employed descriptive and inferential statistics, with results presented in tables and figures. The study's findings indicated a positive correlation between SME financial health and business growth, enhanced service delivery, ease of

information access, and dependable convenience. The development of mobile money transfer services fosters market development and increases the effectiveness of business service delivery. Access to information via mobile money transfer depends on the setting, and these services are generally reliable and convenient.

Chuwa (2015) explored the factors shaping the adoption of online banking by SMEs in Nyamagana District, Mwanza-Tanzania. The methodology included 425 interviews yielding primary data. Analysis of these interviews, using graphs and figures, determined the extent to which the studied factors influenced customer adoption of online banking. Descriptive statistics, including bar graphs and tables, assessed the relationship between customer demographics and internet banking adoption. These tools highlighted differences in perceptions between users and non-users. The findings revealed that demographic factors like age, income, education, and occupation influence internet banking adoption. Psychological factors, including perceived benefits, compatibility, complexity, risk, and cost, were also found to be influential. However, social influences such as opinions from friends and family were not significant in the Tanzanian context.

David and Nivetha (2018) examined the status and growth of online payment systems for small-scale retailers. They comprehensively surveyed all aspects of electronic payment systems and identified disincentives hindering consumer and business migration to electronic payments.

Kwabena, Qiang, Wenyan, Qalati, and Erusalkina (2019) evaluated the impact of the digital payment system on SME performance. Their research utilized a technology-organizational-environmental framework for investigation. Data was gathered through a

closed-ended, self-administered questionnaire circulated from September 2019 to November 2019, with executives and owners of SMEs as respondents. The partial least squares structural equation modeling approach facilitated data analysis. The study's results revealed significant effects of technology, organizational, environmental factors, and digital payment system use on SME performance. These findings empower SME owners to leverage digital payment systems to enhance trade and stakeholder relationships.

Mbah and Obiezekwem (2019) investigated the relationship between electronic banking and SME performance in Anambra state in Nigeria. A questionnaire assessed SME performance and its association with electronic banking components including ATMs, point-of-sale services, SMS transaction alerts, and mobile banking. Three hundred and seventy (73.1% response rate) valid questionnaires were analyzed using SPSS and Excel. Regression analysis confirmed a positive relationship between various electronic banking components and SME performance in Anambra State, Nigeria. The study attributed continued SME use of electronic banking services to their cost-effectiveness, convenience, security, accessibility, and diversity.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

The aim of this chapter is to elucidate the methodological approach utilized in this investigation. The structure of this chapter is as follows: Section 3.2 outlines the investigative design; Section 3.3 delineates the subject pool and subsample employed in the study, Section 3.4 expounds upon the sources of data; Section 3.5 sets forth the theoretical underpinnings; Section 3.6 furnishes an overview of the empirical model; Section 3.7 addresses the operationalization of variables; and Section 3.8 elucidates the estimation technique utilized.

3.2 Research Design

This study adheres to an ex-post facto research design, where variables are neither manipulated nor assigned randomly. It seeks to determine the impact of the independent variable on the dependent variables.

3.3 The Population and Sample

Given that our analysis is based on time series data, the study's population encompasses all small and medium-sized enterprises (SMEs) operating within Nigeria's borders.

3.4 Sources of Data

Secondary data will be employed in the study, gathered from the statistical bulletin of the Central Bank of Nigeria (CBN). The period under examination spans from 1990 to 2020, selected due to accessible data availability.

3.5 Theoretical Framework

The basis of this study is derived from the theoretical framework of the Unified Theory of Acceptance and Use of Technology (UTAUT).

3.6 Model Specification

In alignment with Nyaga's (2013) modifications, the model under consideration can be represented functionally as:

$SMEOP = f(VLMOB, VLATM, VLPOS, VLWEB, CBSME) \dots\dots\dots (1)$

Transforming equation (1) into an econometric form, the model takes the following specification:

$SMEOP = \beta_0 + \beta_1 VLMOB + \beta_2 VLATM + \beta_3 VLPOS + \beta_4 VLWEB + \beta_5 CBSME + \epsilon_{it} \dots (2)$

Where

SMEOP = SME Output

VLMOB = Total Volume of Mobile Money transactions

VLATM = Total Volume of ATM transactions

VLPOS = Total Volume of POS transactions

VLWEB = Total Volume of WEB transactions

CBSME = Commercial Banks Loans To Small Scale Enterprises (₦ Million)

ε = error term

β_0, β_1 to β_5 are parameters to be estimated.

A priori expectations of the study are of the form: $\beta_0, \beta_1, \beta_2, \beta_3 > 0$; while β_4 and $\beta_5 < 0$.

These preliminary indicators suggest that the explanatory variables in the models are anticipated to exert both positive and negative effects on the dependent variable.

3.7 Operationalization of Variables

The variables used in the study are operationalized as presented in table 3.1

Table 3.1: Procedures used to measure the variables in the construct

S/N	Variables	Type of variable	Measurement
1.	Small and Medium Scale Enterprises Output(SMEOP)	Dependent variable	SMEs output proxy by Wholesale and Retail trade output as a component of GDP
2.	Total volume of mobile banking (TVMB)	Independent variable	Total volume of mobile banking transactions in Nigeria
3.	Total volume of ATM transactions (TVATM)	Independent variable	Total volume of ATM transactions in Nigeria
4.	Total volume of POS transactions (TVPOS)	Independent variable	Total volume of POS transactions (TVPOS)
5.	Total volume of web payment transactions (VLWEB)	Independent variable	Total volume of web payment transactions
6.	Commercial Banks Loans To Small Scale Enterprises (CBSME)	Independent variable	This are loans given to Small and Medium Enterprises from deposit money banks.

Source: Researcher's Compilation, (2021).

3.8 Method of Data Analysis

This investigation entails data analysis employing both statistical and econometric approaches. Statistical tools utilized comprise descriptive statistics and correlation analysis. The econometric analysis expands upon the statistical analysis, aiming to perform empirical analysis and derive estimated coefficients suitable for hypothesis testing. The econometric analysis will utilize the multivariate OLS regression method to assess the influence of electronic payment systems on Nigerian SMEs. The statistical and regression analyses will be conducted using the EView 10.0 econometric software.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

4.1 Introduction

This research assesses the ramifications of payment structures on Nigerian Small and Medium Enterprises. Prior to analyzing the gathered data, the examination ascertains the normalcy of the series being analyzed, subsequent to which it utilizes ordinary least squares to evaluate the study's stated hypotheses. To scrutinize the correlation between dependent and independent variables, the correlation result is used; in addition, the unit root test is applied to ascertain the stationarity characteristic of the series.

The model used in the study is stated thus:

$$\text{SMEOP} = f(\text{VLMOB}, \text{VLATM}, \text{VLPOS}, \text{VLWEB}, \text{CBSME})$$

Where

SMEOP =

VLMOB = Total Volume of Mobile Money transactions

VLATM = Total Volume of ATM transactions

VLPOS = Total Volume of POS transactions

VLWEB = Total Volume of WEB transactions

CBSME = Commercial Banks Loans To Small Scale Enterprises (₦ Million)

The focus of the empirical analysis is to test the following hypotheses stated below:

H0₁: Mobile banking services has no significant effect on the performance of small and medium scale enterprises in Nigeria.

H0₂: Automated teller machine services have no significant effect on the performance of small and medium scale enterprises in Nigeria.

H0₃: POS service has no significant effect on the performance of small and medium scale enterprises in Nigeria.

H0₄: Internet banking services has no significant effect on the performance of small and medium scale enterprises in Nigeria.

H0₅: Commercial Banks Loans To Small Scale Enterprises has no significant effect on the performance of small and medium scale enterprises in Nigeria.

4.2 Presentation of Results on the Impact of Payment System on Small and Medium Enterprise in Nigeria

Herein, we exhibit the diverse inspections undertaken within the inquiry. The computations are executed utilizing econometric view application release ten. The computations comprise the descriptive statistical data, correlation, unit root examination, and regression outcomes. These computations are conducted employing the statistics detailed within table 4.1.

Table 4.1: Data on the Impact of Payment System on Small and Medium Enterprise in Nigeria

	SMEs OUTPUT	Total Volume of MOB transactions	Total Volume of ATM transactions	Total Volume of POS transactions	Total Volume of WEB transactions	Commercial Banks Loans To Small Scale Enterprises (₦ Million)
YEAR	SMEOP	VLMOB	VLATM	VLPOS	VLWEB	CBSME
2009	8,085.44	1,809,251	109,161,646	918,256	2,703,516	16,366.49
2010	8,992.65	1,156,533	60,133,610	1,072,426	1,601,086	12,550.30
2011	9,640.90	3,649,374	347,569,999	2,100,673	1,932,355	15,611.70
2012	9,853.68	2,297,688	375,487,756	2,555,045	2,276,464	13,863.46
2013	10,507.90	15,812,435	295,292,940	9,402,255	2,900,473	15,353.04
2014	11,125.80	29,156,406	400,102,507	20,817,423	5,587,081	16,069.27
2015	11,697.59	43,933,362	433,587,623	33,720,933	7,981,361	12,949.48
2016	11,669.06	47,053,252	590,238,934	63,715,203	14,088,247	10,747.89
2017	11,546.45	47,804,561	800,549,099	146,267,156	28,991,097	10,747.89
2018	11,473.79	87,086,260	875,519,307	295,890,167	50,815,901	40,393.12
2019	11,430.55	338,720,999	839,819,922	438,614,182	103,497,007	88,651.42

Source: Central Bank of Nigeria, National Bureau of Statistics (NBS), Nigeria Inter-Bank Settlement System Plc. (NIBSS), 2021.

4.2.1 Descriptive Statistics on the Data for Impact of Payment System on Small and Medium Enterprise in Nigeria

The mean values indicate that SMEOP possesses the lowest mean, whereas VLATM boasts the highest. This implies that ATM infrastructures have a substantial presence in facilitating monetary access for users of financial services within the economy. Another crucial financial infrastructure is the POS, which plays a role in financial inclusion by

enabling access to financial services. The average volume of POS transactions stands at 57,645,954, a figure notably higher than mobile money and web payment channels.

Table 4.2: Descriptive Statistics (COMMON SAMPLES) on the Data for Impact of Payment System on Small and Medium Enterprise in Nigeria

	SMEOP	VLMOB	VLATM	VLPOS	VLWEB	CBSME
Mean	10459.33	27975912	4.29E+08	57645954	11887758	16465.26
Median	10816.85	22484421	3.88E+08	15109839	4243777.	14608.25
Maximum	11697.59	87086260	8.76E+08	2.96E+08	50815901	40393.12
Minimum	8085.442	1156533.	60133610	918256.0	1601086.	10747.89
Std. Dev.	1268.304	28500024	2.65E+08	95129118	16090540	8657.099
Skewness	-0.631995	0.784230	0.372730	1.815021	1.665259	2.383334
Kurtosis	2.104707	2.685854	2.239540	5.020514	4.470007	7.261657
Jarque-Bera	0.999675	1.066148	0.472505	7.191531	5.522195	17.03451
Probability	0.606629	0.586798	0.789581	0.027440	0.063222	0.000200
Sum	104593.3	2.80E+08	4.29E+09	5.76E+08	1.19E+08	164652.6
Sum Sq. Dev.	14477346	7.31E+15	6.30E+17	8.14E+16	2.33E+15	6.75E+08
Observations	10	10	10	10	10	10

Source: Authors Estimation using EView 10, 2021.

The distribution of the standard deviation shows high disparity from the mean point. This distribution is similar for all the series used in the study. While three variables SMEOP, VLMOB, and VLATM passed the kurtosis test, the other variables failed the test. These variables are VLPOS, VLWEB and CBSME. The result of the Jarque-Bera statistic with its probability revealed that SMEOP, VLMOB, VLWEB and VLATM are normally distributed while VLPOS and CBSME are not normally distributed as shown by the Jarque-Bera statistic test at 5% level of statistical significance. This thus necessitates the use of a unit root test to examine the stationarity of the series.

4.2.2 Unit Root Results on the Data for Impact of Payment System on Small and Medium Enterprise in Nigeria

The findings from the Augmented Dickey-Fuller unit root analysis indicate that a pair of the variables exhibit stationary properties. SMEOP is identified as stationary at its original level, whereas VLATM exhibits stationarity when differenced once. The remaining variables demonstrate non-stationarity at their original levels. However, given that four of the variables satisfy a normal distribution based on the Jarque-Bera statistic and its associated probabilities, we are able to proceed with using the series for a regression analysis that will form the basis for our inferences..

Table 4.3: Augmented Dickey-Fuller Unit Root Test on the Data for Impact of Payment System on Small and Medium Enterprise in Nigeria

Variable (Series)	LEVEL	Prob.	Remark
SMEOP	-3.477348	0.0368	I(0)
VLMOB	1.218731	0.9944	Not Stationary
D(VLMOB)	-1.526721	0.4704	
D(VLMOB,2)	-1.816894	0.3407	
VLATM	1.731395	0.9680	
D(VLATM)	-2.061189	0.0444	I(1)
VLPOS	24.72215	0.9999	Not Stationary
D(VLPOS)	7.456473	1.0000	
D(VLPOS,2)	1.736749	0.9641	
VLWEB	10.77542	1.0000	Not Stationary
D(VLWEB)	3.861172	0.9987	
D(VLWEB,2)	-0.171508	0.5897	
CBSME	0.497191	0.8015	Not Stationary

D(CBSME)	-0.769898	0.3513	
D(CBSME,2)	-0.765957	0.7633	

* MacKinnon (1996) one-sided p-values. Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 7

Source: Author’s Estimation from EView 10, 2021.

4.2.3 Correlation Analysis for Impact of Payment System on Small and Medium Enterprise in Nigeria

The correlation table (4.4) exhibits a positive association between the dependent variable and all the independent variables in the study. Notably, only VLMOB and VLATM emerge as statistically significant. TVPOS, VLWEB, and CBSME lack significant correlation with SMEOP ($p < 0.05$). VLATM demonstrates the most substantial association with SMEOP, followed by VLMOB. The relationships among the independent variables are complex, with certain variables exhibiting significance while others do not. VLPOS and VLWEB share a stronger correlation with SMEOP than CBSME.

Table 4.4: Correlation Result for Impact of Payment System on Small and Medium Enterprise in Nigeria

Covariance Analysis: Ordinary
Date: 07/25/21 Time: 09:22
Sample: 2009 2018
Included observations: 10

Correlation	SMEOP	VLMOB	VLATM	VLPOS	VLWEB	CBSME
Probability						
SMEOP	1.00000 0 -----					
VLMOB	0.80372 7 0.0051	1.00000 0 -----				

VLATM	0.80501	0.88587	1.00000			
	0	9	0			
	0.0050	0.0006	-----			
VLPOS	0.53903	0.89689	0.85720	1.00000		
	7	4	0	0		
	0.1079	0.0004	0.0015	-----		
VLWEB	0.55606	0.90300	0.87471	0.99795	1.00000	
	5	3	1	9	0	
	0.0951	0.0003	0.0009	0.0000	-----	
CBSME	0.14897	0.60528	0.45922	0.77301	0.73544	1.00000
	4	2	3	3	3	0
	0.6813	0.0637	0.1818	0.0087	0.0153	-----

Source: Author's Estimation from EView 10, 2021.

4.2.4 Regression Analysis on Impact of Payment System on Small and Medium Enterprise in Nigeria

The table 4.5 regression result denotes that 98.51% of the dependent variable's systematic variations are accounted for by the independent variables, demonstrating that the model specified in the study effectively reflects its core content and accurately explains the behavioral relationship between these variables. The adjusted coefficient of determination, a measure of model fitness, is 96.65%.

Regarding the overall statistical significance of the model, the F-statistic of 53.06 with a probability value of 0.000951, which is lower than 0.05, indicates that the model is statistically significant in explaining the hypotheses examined in the study. The Durbin-Watson statistic of 1.9331 indicates the absence of serial correlation in the study, allowing for reliance on inferences drawn from the data/variables used.

VLMOB, VLATM, VLPOS, VLWEB, and CBSME significantly influence the independent variable SMEOP at 1% and 5% levels of statistical significance.

VLMOB, VLATM, and VLPOS have a substantial positive effect on SMEOP, whereas VLWEB and CBSME have a significant negative impact.

The positive and significant effect of the three variables on SME could be attributed to their expanding access to the market. Mobile money facilitates immediate transaction value transfers between interested parties, while POS enables access to both payments and cash withdrawals, enhancing business transactions further. These numerous payment options have also provided business opportunities for SMEs, with many reaping rewards as business avenues.

The remaining two variables, VLWEB and CBSME, have a negative effect on SMEOP, implying that transactions conducted through web channels reduce business opportunities for SMEs and hence their performance. This is because major web channel operators are primarily from the formal sector and not the SME sector.

Table 4.5: Regression Result for Impact of Payment System on Small and Medium Enterprise in Nigeria

Dependent Variable: SMEOP
 Method: Least Squares
 Date: 07/04/21 Time: 22:00
 Sample: 2009 2018
 Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10884.99	774.2662	14.05846	0.0001
VLMOB	5.12E-05	7.15E-06	7.163245	0.0020
VLATM	3.91E-06	8.06E-07	4.851012	0.0083
VLPOS	9.61E-05	2.97E-05	3.236517	0.0318
VLWEB	-0.000620	0.000165	-3.767859	0.0196
CBSME	-0.103241	0.031892	-3.237249	0.0318
R-squared	0.985147	Mean dependent var		10459.33

Adjusted R-squared	0.966581	S.D. dependent var	1268.304
S.E. of regression	231.8566	Akaike info criterion	14.01382
Sum squared resid	215030.0	Schwarz criterion	14.19538
Log likelihood	-64.06912	Hannan-Quinn criter.	13.81466
F-statistic	53.06168	Durbin-Watson stat	1.933198
Prob(F-statistic)	0.000951		

Source: Author's Estimation from EView 10, 2021.

The mathematical representation of the regression result showing the magnitude of effects and direction of effect on the dependent variable is shown as below:

$$\text{smeop} = 10884.9880884 + 5.1242841006e-05*\text{vlmob} + 3.9110198628e-06*\text{vlatm} + 9.60506587665e-05*\text{vlpos} - 0.000620232597652*\text{vlweb} - 0.103241004011*\text{cbsme}$$

A stability test carried out in the study which is presented in figure 4.1 shows that the model used in the study is well specified. The trend falls between the trough and resistance point and follows a continuous increasing growth path. Below is the cumulative sum of squares figure:

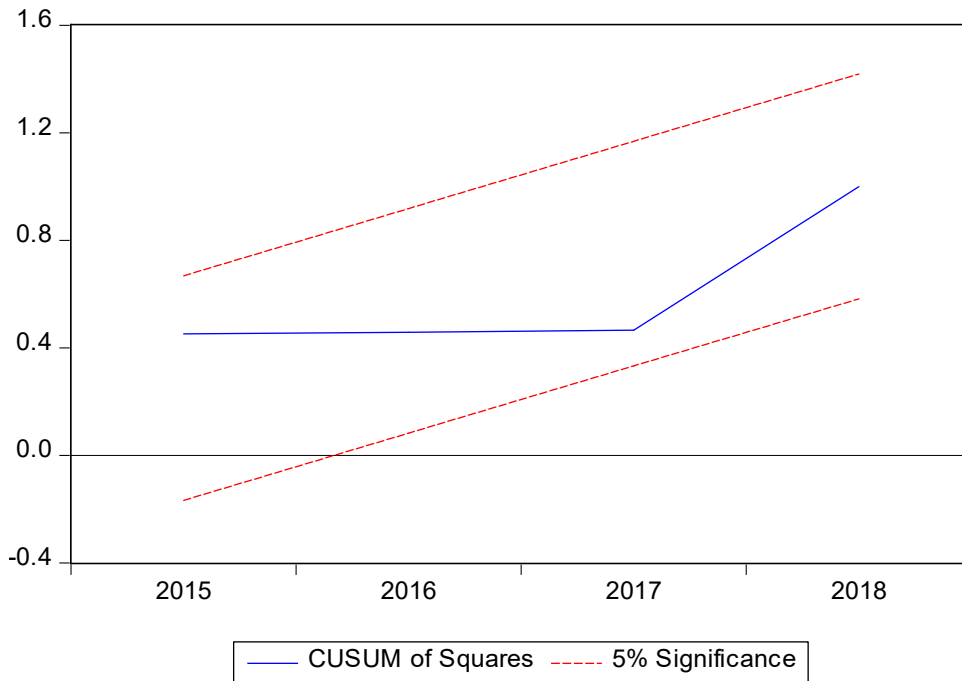


Figure 4.1: Recursive Estimates OLS ONLY CUSUM

Source: Source: Author's Estimation from EView 10, 2021.

The forecast of the study shows that with increasing growth in electronic payment systems, the performance of the small and medium enterprises will be on a continual increase. This is because the SMEs thus provide both financial access to business enterprises and business opportunity for SMEs. This is presented in figure 4.2

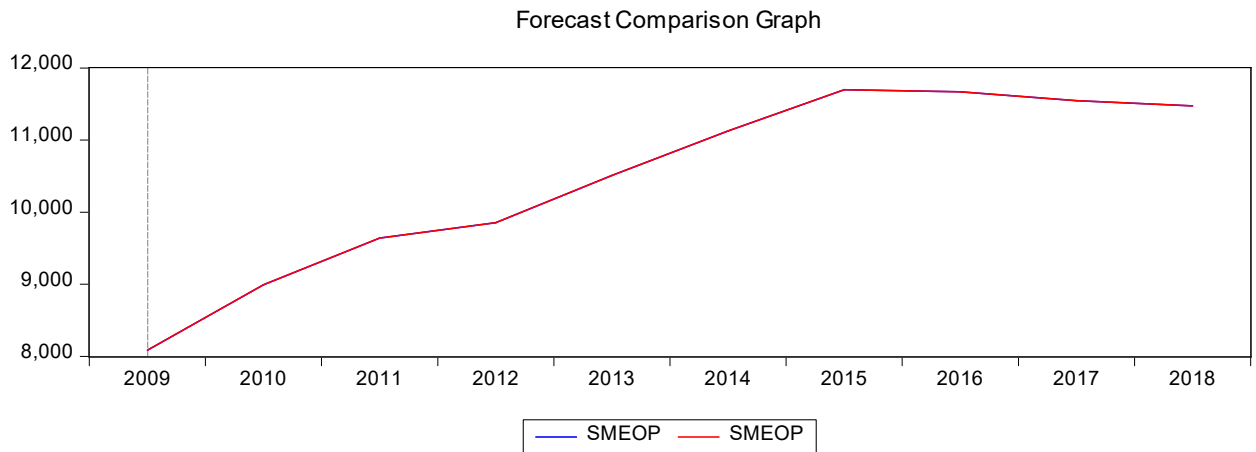


Figure 4.2: Forecast for the study

Source: Source: Author's Estimation from EView 10, 2021.

4.3 Test of Hypotheses

In testing the hypotheses for the study, we utilized the probability values and the t-statistics of the regression result.

Hypothesis One

It was previously suggested that the impact of mobile banking services on the performance of Nigerian small and medium-sized enterprises is insignificant. Our empirical analysis, however, leads us to reject this proposition. Instead, we embrace the alternative hypothesis, affirming that mobile banking services have a notable effect on the performance of these enterprises (VLMOB Prob. = 0.0020 > 0.05).

Hypothesis Two

It was previously suggested that Automated teller machine services have no substantial impact on the success of Nigerian small and medium-sized businesses. Our empirical analysis shows that we reject the null hypothesis and accept the alternative hypothesis,

which states that automated teller machine services significantly impact the performance of Nigerian small and medium-sized businesses (VLATM Prob. = 0.0083<0.05).

Hypothesis Three

The preliminary assumption that POS usage lacks a substantial influence on the functionality of Nigerian small and medium-sized businesses was refuted. Our statistical analysis leads us to reject the null hypothesis and accept the alternative, which states that POS usage exerts a notable impact on the performance of small and medium-sized businesses (VLPOS Prob. = 0.03180 < 0.05).

Hypothesis Four

Previously, it was suggested that internet banking services do not materially impact the performance of small and medium-sized businesses in Nigeria. However, our empirical analysis refutes this notion and validates the opposing hypothesis: internet banking services significantly influence the performance of small and medium-sized enterprises in Nigeria (VLWEB Prob. = 0.0196<0.05).

Hypothesis Five

An earlier claim suggested that Commercial Banks Loans to Small Scale Enterprises lack a substantial impact on the performance of small and medium scale enterprises in Nigeria. However, our empirical analysis refutes this null hypothesis, affirming the alternative hypothesis that commercial bank loans to small-scale enterprises indeed have a

significant influence on the performance of small and medium scale enterprises in Nigeria (CBSME Prob. = 0.0318 <0.05).

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The outcomes gleaned from the analysis of the impact of the payment system on the functionality of small and medium-sized businesses are presented in this segment, inferring conclusions from the findings and formulating suggestions for policy guidance and investment choices.

5.2 Summary of Findings of the Study

The followings are the findings from the empirical analysis of the study

1. That mobile banking service has significant and positive effect on the performance of small and medium scale enterprises in Nigeria.
2. That automated teller machine services significantly and positively affect the performance of small and medium scale enterprises in Nigeria.
3. That POS service significantly and positively affect the performance of small and medium scale enterprises in Nigeria.
4. That web payment services significantly but negatively affect the performance of small and medium scale enterprises in Nigeria.
5. That commercial banks loan to small scale enterprises significantly but negatively affect the performance of small and medium scale enterprises in Nigeria.

5.3 Conclusion

Based on the study's revelations, we posit that the small and medium segment of the economy has been profoundly impacted by the burgeoning expansion and innovation within the payment system sectors of the financial system. The payment system fosters access to payment-facilitated transactions within the broader economy, providing the foundation for its smooth functioning. SMEs have reportedly experienced reduced costs associated with executing payments during business transactions due to the payment infrastructure provided by the payment system. This has also mitigated losses incurred through theft and acceptance of counterfeit currency during business dealings. SMEs have been able to channel resources and time traditionally allocated to payment execution towards more productive endeavors and business activities, facilitated by the enhanced ease of conducting business through the payment system.

Undoubtedly, the lifeblood of any commercial undertaking is the payment system or channel employed for such activities. The payment system serves as the vital artery for trade within an economy, and in the Nigerian context, SMEs constitute a significant component of economic activities, generating employment opportunities for the populace. The advancements within the payment system have had a positive impact on the overall standard of living through various interconnected factors.

Conversely, the adverse effects of bank loans on small and medium-scale enterprises imply that these entities have been negatively impacted by borrowing from banks. The interest rates charged by commercial banks are often prohibitive for SMEs, making it challenging to simultaneously cover interest payments, principal repayments, and maintain profitability. This situation has deterred many SMEs from seeking commercial bank loans, diminishing their attractiveness as borrowers.

5.4 Recommendations

Based on the findings of the study, we recommend that:

1. Financial institutions and telecommunications providers facilitating mobile transactions ought to expand their reach to remote and underprivileged areas within urban communities..
2. Given that automated teller machines elevate the capabilities of small and medium-scale businesses, there ought to be concerted efforts to guarantee that such financial infrastructure achieves widespread prevalence within the economic landscape.
3. The security of life and property in the economy should be improved to allow for growth of the financial sector both in the urban and rural areas.
4. More enlightenment and education programmes should be carried out by the Central Bank of Nigeria to endear the use of electronic payment system to the populace by dimaying the risks associated with the usage.

5. That infrastructure supporting access to web channel should be provided across the economy and access cost be reduced to be able to capture more users and reduce the burden on SMEs.
6. That SMEs should be made part of the web channel framework to generate more business for the SMEs sector and increase return for the sector thereby enhancing their performance.
7. That commercial banks should have favourable interest rate and lending conditions for lending to the SMEs sector.

5.5 Suggestion for Further Studies

Subsequent investigations might prioritize exploring the influence of particular payment conduits on the operation of the broader economy or a specific economic division, beyond the parameters of small and medium-sized enterprises. Future research endeavors could delve into the domains of accessibility, economic inclusion or novel financial instruments within the context of payment mechanisms for the future, considering for instance the potential of crypto currencies as a domestic payment system.

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APPENDIX A: ESTIMATIONS

UNIT ROOT TEST

SMEOP AT LEVEL

Null Hypothesis: SMEOP has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.477348	0.0368
Test critical values:		
1% level	-4.420595	
5% level	-3.259808	
10% level	-2.771129	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(SMEOP)

Method: Least Squares

Date: 07/04/21 Time: 22:26

Sample (adjusted): 2010 2018

Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SMEOP(-1)	-0.235818	0.067816	-3.477348	0.0103
C	2816.401	706.4991	3.986418	0.0053
R-squared	0.633353	Mean dependent var		376.4832
Adjusted R-squared	0.580975	S.D. dependent var		382.5490
S.E. of regression	247.6321	Akaike info criterion		14.05490
Sum squared resid	429251.6	Schwarz criterion		14.09872
Log likelihood	-61.24703	Hannan-Quinn criter.		13.96032
F-statistic	12.09195	Durbin-Watson stat		1.338841
Prob(F-statistic)	0.010303			

VLMOB AT LEVEL

Null Hypothesis: VLMOB has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.218731	0.9944

Test critical values:	1% level	-4.420595
	5% level	-3.259808
	10% level	-2.771129

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(VLMOB)

Method: Least Squares

Date: 07/04/21 Time: 22:57

Sample (adjusted): 2010 2018

Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VLMOB(-1)	0.260884	0.214062	1.218731	0.2624
C	3890199.	6201128.	0.627337	0.5503
R-squared	0.175045	Mean dependent var		9475223.
Adjusted R-squared	0.057194	S.D. dependent var		12907687
S.E. of regression	12533133	Akaike info criterion		35.71878
Sum squared resid	1.10E+15	Schwarz criterion		35.76261
Log likelihood	-158.7345	Hannan-Quinn criter.		35.62420
F-statistic	1.485306	Durbin-Watson stat		1.819787
Prob(F-statistic)	0.262420			

VLMOB AT FIRST DIFFERENCE

Null Hypothesis: D(VLMOB) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.526721	0.4704
Test critical values:		
	1% level	-4.582648
	5% level	-3.320969
	10% level	-2.801384

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 8

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(VLMOB,2)

Method: Least Squares

Date: 07/04/21 Time: 22:58
Sample (adjusted): 2011 2018
Included observations: 8 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(VLMOB(-1))	-1.185451	0.776469	-1.526721	0.1777
C	11807450	6712266.	1.759085	0.1291
R-squared	0.279788	Mean dependent var		4991802.
Adjusted R-squared	0.159752	S.D. dependent var		15466609
S.E. of regression	14177471	Akaike info criterion		35.98452
Sum squared resid	1.21E+15	Schwarz criterion		36.00438
Log likelihood	-141.9381	Hannan-Quinn criter.		35.85057
F-statistic	2.330877	Durbin-Watson stat		1.509803
Prob(F-statistic)	0.177684			

VLMOB AT SECOND DIFFERENCE

Null Hypothesis: D(VLMOB,2) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.816894	0.3407
Test critical values:		
1% level	-5.119808	
5% level	-3.519595	
10% level	-2.898418	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 6

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(VLMOB,3)

Method: Least Squares

Date: 07/04/21 Time: 22:58

Sample (adjusted): 2013 2018

Included observations: 6 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(VLMOB(-1),2)	-2.672016	1.470650	-1.816894	0.1668
D(VLMOB(-1),3)	1.150546	0.964849	1.192463	0.3188
C	7344298.	7620734.	0.963726	0.4063
R-squared	0.530160	Mean dependent var		7062486.
Adjusted R-squared	0.216934	S.D. dependent var		21023171
S.E. of regression	18603621	Akaike info criterion		36.62246

Sum squared resid	1.04E+15	Schwarz criterion	36.51834
Log likelihood	-106.8674	Hannan-Quinn criter.	36.20566
F-statistic	1.692578	Durbin-Watson stat	2.161927
Prob(F-statistic)	0.322051		

VL ATM AT LEVEL

Null Hypothesis: VLATM has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.731395	0.9680
Test critical values:		
1% level	-2.847250	
5% level	-1.988198	
10% level	-1.600140	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(VLATM)

Method: Least Squares

Date: 07/04/21 Time: 22:51

Sample (adjusted): 2010 2018

Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VLATM(-1)	0.169193	0.097720	1.731395	0.1216
R-squared	-0.145742	Mean dependent var		85150851
Adjusted R-squared	-0.145742	S.D. dependent var		1.19E+08
S.E. of regression	1.27E+08	Akaike info criterion		40.26929
Sum squared resid	1.30E+17	Schwarz criterion		40.29120
Log likelihood	-180.2118	Hannan-Quinn criter.		40.22200
Durbin-Watson stat	2.443363			

VLATM AT FIRST DIFFERENCE

Null Hypothesis: D(VLATM) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
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Augmented Dickey-Fuller test statistic		-2.061189	0.0444
Test critical values:	1% level	-2.886101	
	5% level	-1.995865	
	10% level	-1.599088	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 8

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(VLATM,2)

Method: Least Squares

Date: 07/04/21 Time: 22:52

Sample (adjusted): 2011 2018

Included observations: 8 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(VLATM(-1))	-0.764569	0.370936	-2.061189	0.0782
R-squared	0.373199	Mean dependent var		15499780
Adjusted R-squared	0.373199	S.D. dependent var		1.95E+08
S.E. of regression	1.54E+08	Akaike info criterion		40.66360
Sum squared resid	1.67E+17	Schwarz criterion		40.67353
Log likelihood	-161.6544	Hannan-Quinn criter.		40.59662
Durbin-Watson stat	1.298685			

VLPOS AT LEVEL

Null Hypothesis: VLPOS has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	24.72215	0.9999
Test critical values:		
	1% level	-2.847250
	5% level	-1.988198
	10% level	-1.600140

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(VLPOS)

Method: Least Squares

Date: 07/23/21 Time: 12:33

Sample (adjusted): 2010 2018
 Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VLPOS(-1)	1.052582	0.042576	24.72215	0.0000
R-squared	0.981069	Mean dependent var		32774657
Adjusted R-squared	0.981069	S.D. dependent var		50964328
S.E. of regression	7012270.	Akaike info criterion		34.46866
Sum squared resid	3.93E+14	Schwarz criterion		34.49057
Log likelihood	-154.1090	Hannan-Quinn criter.		34.42137
Durbin-Watson stat	2.546290			

VLPOS AT FIRST DIFFERENCE

Null Hypothesis: D(VLPOS) has a unit root
 Exogenous: None
 Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	7.456473	1.0000
Test critical values:		
1% level	-2.886101	
5% level	-1.995865	
10% level	-1.599088	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations
 and may not be accurate for a sample size of 8

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(VLPOS,2)
 Method: Least Squares
 Date: 07/23/21 Time: 12:36
 Sample (adjusted): 2011 2018
 Included observations: 8 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(VLPOS(-1))	0.916255	0.122881	7.456473	0.0001
R-squared	0.823461	Mean dependent var		18683605
Adjusted R-squared	0.823461	S.D. dependent var		26255223
S.E. of regression	11031538	Akaike info criterion		35.38688
Sum squared resid	8.52E+14	Schwarz criterion		35.39681
Log likelihood	-140.5475	Hannan-Quinn criter.		35.31991
Durbin-Watson stat	2.230302			

VLPOS AT SECOND DIFFERENCE

Null Hypothesis: D(VLPOS,2) has a unit root
 Exogenous: None
 Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.736749	0.9641
Test critical values:		
1% level	-2.937216	
5% level	-2.006292	
10% level	-1.598068	

*MacKinnon (1996) one-sided p-values.
 Warning: Probabilities and critical values calculated for 20 observations
 and may not be accurate for a sample size of 7

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(VLPOS,3)
 Method: Least Squares
 Date: 07/23/21 Time: 12:36
 Sample (adjusted): 2012 2018
 Included observations: 7 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(VLPOS(-1),2)	0.436350	0.251245	1.736749	0.1331
R-squared	-0.027892	Mean dependent var		9456712.
Adjusted R-squared	-0.027892	S.D. dependent var		13840859
S.E. of regression	14032554	Akaike info criterion		35.88322
Sum squared resid	1.18E+15	Schwarz criterion		35.87549
Log likelihood	-124.5913	Hannan-Quinn criter.		35.78772
Durbin-Watson stat	1.794915			

VLWEB AT LEVEL

Null Hypothesis: VLWEB has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on Modified HQ, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	10.77542	1.0000
Test critical values:		
1% level	-4.420595	
5% level	-3.259808	
10% level	-2.771129	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(VLWEB)

Method: Least Squares

Date: 07/04/21 Time: 22:42

Sample (adjusted): 2010 2018

Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VLWEB(-1)	0.848399	0.078735	10.77542	0.0000
C	-1070119.	894285.1	-1.196619	0.2704
R-squared	0.943140	Mean dependent var		5345821.
Adjusted R-squared	0.935017	S.D. dependent var		7852501.
S.E. of regression	2001737.	Akaike info criterion		32.05006
Sum squared resid	2.80E+13	Schwarz criterion		32.09389
Log likelihood	-142.2253	Hannan-Quinn criter.		31.95548
F-statistic	116.1097	Durbin-Watson stat		2.256054
Prob(F-statistic)	0.000013			

VLWEB AT FIRST DIFFERENCE

Null Hypothesis: D(VLWEB) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on Modified HQ, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	3.861172	0.9987
Test critical values:		
1% level	-2.886101	
5% level	-1.995865	
10% level	-1.599088	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 8

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(VLWEB,2)

Method: Least Squares

Date: 07/04/21 Time: 22:44

Sample (adjusted): 2011 2018

Included observations: 8 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(VLWEB(-1))	0.601022	0.155658	3.861172	0.0062
R-squared	0.417515	Mean dependent var		2865904.
Adjusted R-squared	0.417515	S.D. dependent var		3377074.
S.E. of regression	2577406.	Akaike info criterion		32.47893
Sum squared resid	4.65E+13	Schwarz criterion		32.48886
Log likelihood	-128.9157	Hannan-Quinn criter.		32.41196
Durbin-Watson stat	2.100815			

VLWEB AT SECOND DIFFERENCE

Null Hypothesis: D(VLWEB,2) has a unit root

Exogenous: None

Lag Length: 0 (Automatic - based on Modified HQ, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.171508	0.5897
Test critical values:		
1% level	-2.937216	
5% level	-2.006292	
10% level	-1.598068	

*MacKinnon (1996) one-sided p-values.

Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 7

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(VLWEB,3)

Method: Least Squares

Date: 07/04/21 Time: 22:46

Sample (adjusted): 2012 2018

Included observations: 7 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(VLWEB(-1),2)	-0.052997	0.309008	-0.171508	0.8695
R-squared	-0.077622	Mean dependent var		784036.4
Adjusted R-squared	-0.077622	S.D. dependent var		2941168.
S.E. of regression	3053184.	Akaike info criterion		32.83283
Sum squared resid	5.59E+13	Schwarz criterion		32.82510
Log likelihood	-113.9149	Hannan-Quinn criter.		32.73733
Durbin-Watson stat	1.905157			

CBSME AT LEVEL

Null Hypothesis: CBSME has a unit root
 Exogenous: None
 Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	0.497191	0.8015
Test critical values:		
1% level	-2.847250	
5% level	-1.988198	
10% level	-1.600140	

*MacKinnon (1996) one-sided p-values.
 Warning: Probabilities and critical values calculated for 20 observations
 and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(CBSME)
 Method: Least Squares
 Date: 07/04/21 Time: 22:35
 Sample (adjusted): 2010 2018
 Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CBSME(-1)	0.125602	0.252623	0.497191	0.6324
R-squared	-0.042459	Mean dependent var		2669.626
Adjusted R-squared	-0.042459	S.D. dependent var		10362.20
S.E. of regression	10579.90	Akaike info criterion		21.47574
Sum squared resid	8.95E+08	Schwarz criterion		21.49765
Log likelihood	-95.64082	Hannan-Quinn criter.		21.42845
Durbin-Watson stat	1.112361			

CBSME AT FIRST DIFFERENCE

Null Hypothesis: D(CBSME) has a unit root
 Exogenous: None
 Lag Length: 0 (Automatic - based on SIC, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.769898	0.3513
Test critical values:		
1% level	-2.886101	
5% level	-1.995865	
10% level	-1.599088	

*MacKinnon (1996) one-sided p-values.
 Warning: Probabilities and critical values calculated for 20 observations
 and may not be accurate for a sample size of 8

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(CBSME,2)
 Method: Least Squares
 Date: 07/04/21 Time: 22:39
 Sample (adjusted): 2011 2018
 Included observations: 8 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CBSME(-1))	-1.314605	1.707506	-0.769898	0.4665
R-squared	-0.075396	Mean dependent var		4182.677
Adjusted R-squared	-0.075396	S.D. dependent var		10959.68
S.E. of regression	11365.33	Akaike info criterion		21.63099
Sum squared resid	9.04E+08	Schwarz criterion		21.64092
Log likelihood	-85.52397	Hannan-Quinn criter.		21.56402
Durbin-Watson stat	1.054361			

CBSME AT SECOND DIFFERENCE

Null Hypothesis: D(CBSME,2) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on Modified HQ, maxlag=1)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.765957	0.7633
Test critical values:		
1% level	-4.803492	
5% level	-3.403313	
10% level	-2.841819	

*MacKinnon (1996) one-sided p-values.
 Warning: Probabilities and critical values calculated for 20 observations
 and may not be accurate for a sample size of 7

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(CBSME,3)
 Method: Least Squares
 Date: 07/04/21 Time: 22:41
 Sample (adjusted): 2012 2018
 Included observations: 7 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CBSME(-1),2)	-0.989137	1.291375	-0.765957	0.4783
C	3791.768	4927.583	0.769499	0.4764
R-squared	0.105016	Mean dependent var		3252.521
Adjusted R-squared	-0.073981	S.D. dependent var		12451.06

S.E. of regression	12903.41	Akaike info criterion	22.00333
Sum squared resid	8.32E+08	Schwarz criterion	21.98787
Log likelihood	-75.01165	Hannan-Quinn criter.	21.81232
F-statistic	0.586689	Durbin-Watson stat	1.044529
Prob(F-statistic)	0.478283		
