AN ASSESSMENT OF THE INFRASTRUCTURAL READINESS FOR TRANSITIONING TO A CASHLESS SOCIETY IN NIGERIA: NAVIGATING TECHNOLOGICAL LIMITATIONS IN THE ENFORCEMENT OF A CASHLESS POLICY

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MSc Project Submission Sheet

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AN ASSESSMENT OF THE INFRASTRUCTURAL READINESS FOR TRANSITIONING TO A CASHLESS SOCIETY IN NIGERIA: NAVIGATING TECHNOLOGICAL LIMITATIONS IN THE ENFORCEMENT OF A CASHLESS POLICY

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Abstract

The widespread adoption of technology globally has yielded numerous benefits, including increased innovation, reduced cash spending, lower transaction costs, enhanced security, privacy, financial inclusion, and enhanced convenience. However, some economies, like Nigeria, have not fully embraced this system, leading to missed opportunities. This study assesses Nigeria's economic infrastructural readiness for a cashless society, by adopting the Unified Theory of Acceptance and Use of Technology (UTAUT) model survey questions and various analytical techniques such as descriptive analysis, Chi-square test, Cronbach's Alpha, and Exploratory Factor Analysis (EFA) for responses received. The research evaluates cashless channels and infrastructure, their accessibility, usability, effectiveness, and technological challenges. Findings reveal rapid development of cashless payment systems, particularly in urban areas with higher employment rates, and positive perceptions of cashless transactions. However, the study's limited sample size and focus on perceptions warrant further research. Policymakers, businesses, and consumers can leverage these insights to promote cashless adoption and enhance readiness for a successful transition.

1. Introduction

1.1. Background of The Study

Technology's widespread adoption and continuous advancements have transformed global economies in various sectors, including agriculture, healthcare, and finance. Embracing a cashless economy has revolutionized daily transactions. Despite some negative consequences, technology plays a pivotal role in modernizing financial systems and enhancing convenience (Kirobo, et. al., 2022). Recent years have witnessed several finance-related technological innovations, shifting away from traditional methods. These innovations automate financial services, increasing customer satisfaction. A notable aspect is the rise of financial technology (Fintech), crucial in modernizing and digitizing financial systems (Ediagbonya and Tioluwani, 2022).

The global shift towards digitalization has led economies to adopt fintech solutions, reducing reliance on physical cash for faster transactions online and offline. European countries like Sweden, Norway, the United Kingdom, and Finland showcase the positive impact of integrating digitalization, curbing the parallel economy, preserving cash value, and reducing costs. The economies' progression can be observed through four stages: cash dominance, a mix of electronic and physical payments, majority electronic transactions, and widespread acceptance of alternative payment channels, moving towards dematerialization while not entirely eliminating cash (Raya and Vargas, 2022).

The acceptance and use of technology in financial transactions within an economy are driven by four factors: rising transaction expenses, competition in banking and retail, demand for

expanded services and convenience, and the inherent efficiency of technological solutions in processing transactions (Ude, 2020). The widespread use of mobile phones for mobile payments has simplified transaction integrations between parties. However, the successful implementation of any cashless system relies on the overall perception and sentiment towards technology, considering both positive and negative aspects (Priananda, et. al., 2020).

The advancement of digital payment infrastructure has been instrumental in driving the growth of non-cash transactions. The COVID-19 pandemic further accelerated this trend, compelling individuals and businesses to adopt digital technology and non-cash payment methods. Research by the Capgemini Research Institute for Financial Services predicts a substantial increase in instant payments and e-money transactions, with their share expected to rise from 17% in 2021 to 28% by 2026. This underscores the growing importance of digital payments in shaping the future of financial transactions. (Vaidya, et. al., 2023).
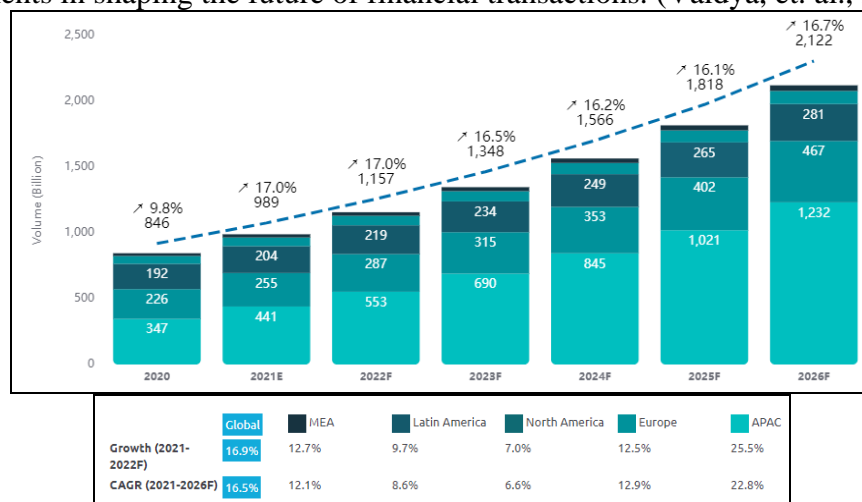

Figure 1. *World Bank increasing non-cash transaction volumes and forecast*
(Vaidya, et. al., 2023)

In light of the aforementioned context, this study aims to evaluate the infrastructural preparedness of the Nigerian economy for transitioning towards a cashless society, as advocated by the Central Bank of Nigeria (CBN). Unlike previous research, it focuses specifically on assessing the components and requirements necessary for a successful and sustainable cashless system. The study seeks to gauge the utilization, limitations, and effectiveness of digital payment systems within Nigeria's financial landscape, providing insights into their efficiency and functionality in reducing cash transactions and fostering economic growth. (Ogbeide, 2019).

1.2. Research Question and Objective

This research question to be addressed is as follows:
'To what extent can the current infrastructure in Nigeria support a successful transition of the country's economy from a cash-based to cashless system?'
The objectives encompass the key area of focus for the study which aims at assessing the infrastructural readiness for transitioning to a cashless society in Nigeria while considering the technological limitations in the enforcement of a cashless policy.
A summary of these objectives includes:
  i.   Evaluation of the current state of cashless channels and infrastructure in Nigeria.
  ii. Assessment of the accessibility, usability, and effectiveness of cashless channels in meeting the needs of businesses and consumers.

iii.   Examination of the capability of the existing infrastructure to handle the high volume of transactions required for a cashless economy.

iv.   Identification and resolution of the technological limitations and challenges in the enforcement of a cashless policy in Nigeria.

v.   Provide recommendations for enhancing readiness and navigating technological limitations in transitioning to a cashless society.

The study's organization is as follows: Section 2 reviews relevant literature, Section 3 describes the research methodology, Section 4 presents design specifications, and Section 5 explains data transformation and analysis. In Section 6, results are analyzed and discussed, Section 7 discusses limitations, proposes future research, and concludes.

2.   Related Works

2.1.   Background: The Nigerian Cashless Policy

The cashless policy in Nigeria, under the Central Bank of Nigeria (CBN), serves as a regulatory framework designed to facilitate a shift from physical to non-physical payment methods across various transactional domains (Ibukun & Cynthia, 2020). Despite its initiation in 2012, CBN's 2014 annual report highlighted the continued reliance on physical cash for transactions in Nigeria, prompting the need for an assessment of the policy's impact (CBN, 2023). Starting in Lagos in 2012, the policy expanded to several states and became nationwide on July 1, 2013 (Musa et al., 2022). With a focus on promoting inclusivity, economic growth, and transparency, the policy aims to limit excessive cash withdrawals, promote electronic transactions, and combat fraud (Gbadamosi, 2019). The World Bank acknowledged its transformative potential for Nigeria (Ehiedu et al., 2020).

In December 2022, the CBN adjusted withdrawal limits to N500,000 for individuals and N5,000,000 for companies, revealing infrastructure challenges. Internet and mobile banking platforms, POS systems, Swift, USSD, and other channels face strain to accommodate increased demands (CBN, 2023). This underscores the pressing need to strengthen Nigeria's technological infrastructure to achieve the goals of the cashless policy effectively.

2.2.   Overview of The Infrastructure Challenges for The Implementation of a Cashless Economy in Nigeria

The significance and advantages of financial technology cannot be overstated, as it has been widely recognized that no economy can achieve socio-economic growth without its integration. Extensive research has demonstrated numerous benefits associated with financial technology, including enhanced convenience, reduced transaction costs, stimulation of GDP growth, decreased corruption, and more. These benefits underscore the pivotal role played by financial technology in driving economic development and fostering positive socio-economic outcomes (Ibukun and Cynthia, 2020).

The business environment and financial transaction landscape in Nigeria have witnessed significant advancements and improvements with the integration of technology. This transformation has led to enhanced efficiency and convenience. However, along with these benefits, the adoption of technology in the implementation of the cashless policy has also exposed vulnerabilities to fraudulent activities. As a result, there is a continuous need to strengthen and upgrade the control measures in place to mitigate the financial and reputational risks associated with fraudulent incidents within the cashless ecosystem (Adu and Williams, 2023).

The increasing enthusiasm for transitioning to a cashless economy, driven by the desire to modernize payment systems and decrease reliance on physical cash, highlights the crucial need for robust and sufficient infrastructure to facilitate electronic payment systems. This encompasses various elements such as point-of-sale devices, digital identity systems, reliable and high-speed internet connectivity, regulatory frameworks, financial literacy programs, as well as physical and digital infrastructure, networks, and services. Based on a thorough analysis of the infrastructural challenges encountered in Nigeria subsequent to the introduction of the cashless policy, the study has identified the following noteworthy issues:

i. **Electronic Fraud** - The challenge arises from exploiting vulnerabilities in the digital transition facilitated by the nationwide cashless policy in 2014. Fraudsters with extensive knowledge of infrastructures use deceptive techniques like unauthorized access to defraud investors, savers, and financial institutions. Perpetrators fall into categories, including insider fraudsters leveraging their positions, outsider fraudsters using online expertise, and collaborative fraudsters combining insider and outsider tactics (Tade and Adeniyi, 2020).

ii. **Financial Literacy –** This entails the application of four dimensions, namely knowledge, skills, attitude, and behavior, to influence the process of making informed decisions and effectively managing finances (Rachmatika, et al., 2023). In Nigeria, payment channels are widely used in major cities like Lagos, Abuja, and Port Harcourt, while a significant portion of the population remains unbanked, relying on cash transactions. Older individuals lack trust in technology and infrastructure due to security and theft concerns. Some encounter usability issues with existing channels like ATMs. (Ejiobih, et al., 2019).

iii. **Insecurity** – This is the state of been open to threat and also where there is a lack of protection of personal data, information, funds, and more (Ozoji, et. al., 2021). Apart from fraud and scams, incidents of harassment, physical altercations, and personal data and fund theft occur at cash points like ATMs and kiosks. Financial institutions attempt to raise awareness and educate people on these issues, but trust in existing infrastructures remains low (Maitanmi, et al., 2021).

iv. **Inadequate Payment Channels** - Although the cashless policy expanded payment channels like ATMs and POS systems, they remain inadequate for Nigeria's growing population of over 200 million. Challenges persist, including frequent failed transactions and deductions without successful payments, revealing limitations in the payment infrastructure (Musa, et. al., 2022).

v. **Power Outage** - In Nigeria, the lack of a reliable power supply poses a critical challenge for both organizations and individuals. Many have turned to solar power or generators fueled by petrol or diesel to cope with this issue. Nevertheless, the inefficient power infrastructure significantly impacts transaction efficiency and increases costs (Mamudu and Gayovwi, 2019).

vi. **Poor Network and Telecom Connectivity** - Network connectivity is a major challenge faced by banks and customers in Nigeria, regardless of the network provider. This problem results in transaction difficulties at various establishments, such as shopping malls. Urgent attention and remedial measures are needed to ensure seamless and uninterrupted financial transactions in the country (Adigwe, 2022).

2.3.   Relevant Studies on Infrastructure and Cashless Economy in Nigeria

This literature review focuses on the Nigerian context and aims to identify the necessary infrastructure for a smooth transition to a cashless economy. Through a comprehensive analysis of existing literature, the study intends to uncover gaps and challenges in Nigeria's infrastructure that could hinder a successful cashless economy. It provides valuable insights into specific infrastructure requirements and potential barriers, enhancing understanding of Nigeria's readiness for a cashless society.

A research study on Fintech innovation in e-money products in Nigeria's financial sector revealed that available products are not adequately recognized despite technological advancements. The study used regression analysis with data from the CBN Statistical Bulletin and annual reports. Although certain Fintech technologies, like POS terminals and mobile banking, reduced queues in traditional bank branches, vulnerable groups like food market sellers and street taxi drivers hesitated to adopt digital infrastructures due to limited understanding, lack of trust, and frequent network outages. To address this, the study recommends public education, accessible e-payment channels, and improved network infrastructure for reliable transactions (Omodero, 2021).

Amid Nigeria's economic challenges during the recession, an efficient exchange and payment system became crucial for stability and development. This research assessed the cashless policy's effectiveness in addressing these issues. A survey of 204 bank workers from four Nigerian banks gathered perceptions. The cashless policy served as the independent variable, while dependent variables included cash-based transactions, payment system modernization, and cash circulation outside the formal economy. Data analysis in SPSS 10 revealed the policy's significant positive impact on the exchange and payment system. It led to reduced informal sector cash and cash-based transactions. The study recommends considering a second phase to expand the policy's scope for a broader range of transactions (Ugwoke, et al., 2019).

A subsequent study focused on the challenges and prospects of electronic infrastructure, particularly point-of-sale (POS) systems and the cashless policy in Nigeria. Primary data from 450 respondents through questionnaires was collected and analyzed using various statistical techniques. The results revealed that POS usage had a highly significant and positive impact on the cashless policy's implementation. Syntax errors associated with POS also showed significance but had a diminishing effect on the policy. However, the intermediating effect did not significantly impact policy implementation. The study suggests that POS systems play a crucial and favorable role in the cashless policy and recommends enhancing policy effectiveness by raising awareness, reducing charges, promptly rectifying syntax errors, addressing political and economic factors, and enforcing higher cash withdrawal limits (Anyanwu and Anumaka, 2020).

A survey in Kaduna State, Nigeria, used questionnaires to assess the cashless policy's implementation by the Central Bank of Nigeria. The findings from bank customers and personnel, analyzed through a simple regression model, showed power outages hindering infrastructure utilization. Deficiencies like inadequate supervision, network issues, software malfunctions, and cybersecurity problems were highlighted, leading to a lack of trust in available resources. Concerns about social engineering, hackers, identity theft, and ATM transaction issues without cash receipt were raised. (Musa, et al., 2022).

In Kwara State, Nigeria, a research study assessed the effectiveness and reliability of electronic banking services in meeting customer needs. Correlation and linear regression analyses explored the relationship between e-banking attributes, like security, speed,

responsiveness, user-friendliness, reliability, and customer satisfaction. Cronbach's alpha confirmed high variable reliability, while Kaiser-Meyer-Olkin and Bartlett's tests validated the sample size. The Technology Acceptance Model (TAM) analyzed attitudes towards technology and its usage. Questionnaire-based primary data revealed challenges related to limited infrastructure accessibility due to a lack of trained personnel, infrequent mobile application updates, slow complaint response, limited ATMs, poor network services, customer information confidentiality concerns, and inconsistent infrastructure charges (Raji, et al., 2021).

A study in Akure, Ondo State aimed to assess electronic banking's influence on customer satisfaction, contrasting with earlier research in Kwara State. It specifically analyzed electronic products from six major Nigerian banks using logistic regression. Questionnaire responses from customers, considering deposit volume, operational activities, and transaction frequency, were analyzed. Electronic banking attributes' reliability was assessed with Cronbach's alpha. Findings showed positive impacts on customer loyalty, convenience, service delivery, and ease of transactions. Challenges included high transaction costs, design constraints limiting facilities, and security concerns like theft and hacking of mobile applications and ATM PINs. (Otapo and Obagunwa, 2021).

A study in Imo State, Nigeria, examined the impact of the cashless policy and the use of payment systems like cheques, funds transfers, and ATMs. The findings showed increasing acceptance of electronic payments and interbank transfers, indicating a shift away from cash settlements. Data from the CBN Statistical Bulletin and NDIC annual reports were analyzed descriptively and inferentially using the t-test. The study emphasized the growing use of ATMs as financial intermediaries but highlighted challenges like inadequate infrastructure and promoting an e-payment culture among the illiterate population. Regulatory authorities should implement strategies to encourage electronic payment adoption and educate the public about financial innovations and options like cheque systems, funds transfers, and bank accounts (John, et. al., 2020).

Another study in Imo State investigated electronic banking's impact on customer satisfaction in selected commercial banks, namely United Bank for Africa Plc, Access Bank Ltd, and Keystone Bank. Questionnaires collected primary data, and Pearson Product Moment Correlation analysis was conducted. Findings revealed a positive correlation between ATMs, mobile banking, and customer satisfaction, while a negative relationship was observed between point-of-sale (POS) systems and satisfaction due to increased charges. Recommendations include upgrading ATMs for better service, providing POS systems at reduced costs for small businesses, prioritizing internet security and mobile banking, and embracing advancements in information communication technology to enhance overall customer satisfaction and meet evolving needs (Ijeoma, et. al., 2020).

In Lagos State, Nigeria, a cross-sectional survey investigated the availability and adoption of Point of Sale (POS) systems in small and medium-scale enterprises across various sectors. The survey included 2,059 respondents, employing Cronbach's alpha, descriptive analysis, and Pearson Product Moment correlation. Findings showed widespread POS usage among businesses, offering benefits like reduced cash handling risk and printing costs. Participants highlighted the importance of improving power supply, bandwidth, and network connectivity to foster trust and confidence in the electronic payment system (Akerejola et al., 2019).

The study investigates the impact of the cashless and e-payment policy on bank clients' well-being in Nigeria. Questionnaires were distributed to bankers and customers in Ogun and Lagos states, and ANOVA tested three hypotheses. Findings show increased customer satisfaction due to the cashless banking initiative, but cash fraud reduction remains a

challenge. The adoption of the cashless economy has improved funds management and saving culture. Recommendations include expanding POS terminals and ATMs, raising awareness, investing in technology and infrastructure, addressing cybercrime, reducing charges, and fostering cooperation among stakeholders to create a secure electronic banking environment (Adeyemo, et. al., 2020)

The evaluation of Nigeria's south-south region revealed limited uptake of the cashless policy due to inadequate financial literacy among adults. Recommendations include awareness programs to educate residents on electronic payment systems, providing efficient administrative tools for cashless transactions, and enhancing security measures to foster trust. Implementing these recommendations is expected to boost the adoption of the cashless policy in the region (Eniang-Esien and Ekpe, 2019).

A study evaluated e-banking adoption in Nigeria's five geopolitical zones, revealing low usage rates due to poor digital infrastructure, security concerns, and specific socioeconomic characteristics of respondents. Age, education, and income influenced the likelihood of adopting internet/mobile banking, while age and informal employment affected the adoption of SMS and POS banking. A Generalized Structural Equation Model analyzed users' socioeconomic characteristics for e-banking adoption. Recommendations include banks enhancing secure e-banking channels, addressing customer complaints promptly, and tailoring services to meet customers' specific needs based on their physical and economic profiles (Aduba, 2021).

2.4. Relevant Studies on Infrastructure and Cashless Economy in Other Countries

Amid technological progress, economies worldwide are embracing cashless systems. This review assesses global experiences and challenges in transitioning to cashless societies. It offers insights from existing literature, guiding strategies, policies, and infrastructure needs. Informed by global case studies, this study aids Nigeria's cashless transition, aiming to enhance understanding and effective adoption.

A comprehensive analysis explored the impact of banking technology like ATMs, POS systems, and mobile devices (MOBs) on cash usage across 21 Sub-Saharan African countries. Using panel data, the study aimed to establish a robust cashless economy model. Findings revealed that MOBs significantly advance cashless economies, while ATMs show limited influence. The study identified education and bank branch numbers as factors affecting adoption. Notably, education and MOBs exhibit a positive synergy, emphasizing financial literacy's importance. To foster cashless economies, policymakers should prioritize infrastructure development and education. This study offers valuable insights and practical guidance for Sub-Saharan African policymakers aiming to promote cashless systems (Urhie et al., 2021).

This Malaysian study investigates the relationship between cashless society readiness and cashless application adoption. Utilizing a survey with 258 respondents, it develops a model based on the Unified Theory of Acceptance and Use of Technology 2 and Technology Readiness Index 2.0. Findings indicate that ease of use, optimism, innovativeness, usefulness, and lack of awareness significantly impact readiness, yet readiness does not guarantee adoption. Risk and Intrinsic motivation mediate digital payment service adoption. The study highlights awareness promotion and suggests addressing perceived risks. Collaborative efforts can encourage adoption, especially among older generations resistant to new tech (Balakrishnan and Shuib, 2021).

This Indonesian study evaluates cashless payments' impact on the economy pre and during COVID-19, with a focus on GDP growth. It analyzes debit cards, credit cards, and e-money

transactions from January 2018 to December 2022, using the Autoregressive Distributed Lag (ARDL) method. Debit and credit cards insignificantly affect growth, while e-money shows a positive and significant impact. Cashless payments positively influence economic growth, particularly during the pandemic. Recommendations include policy adjustments for an efficient payment system and technology and infrastructure enhancement to promote cashless payment adoption (Givelyn, et. al., 2022).

3.   Research Methodology

3.1.   Introduction

This chapter delineates the methodological approach for data collection and analysis, including statistical methods and result evaluation. It elucidates research objectives, encompassing approach, design, population, sampling, and ethics. By ensuring clarity and detail, this chapter maintains study rigor, integrity, and credible outcomes.

3.2.   Data Collection, Preparation and Analysis

3.2.1 Sample Size and Technique

Target Population

The research employed a sample size of 151 individuals between the age of 18 to 65 years currently residing in Nigeria. The survey considered various demographic factors, including gender, occupation, and geographic location, in order to capture a diverse representation of the country's population. By considering these variables, the study aimed to obtain a comprehensive and nuanced understanding of the research topic within the broader context of Nigeria.

Sample Size

The sample size of 151 respondents was determined based on prior research in the field, such as the study "Understanding the Technologies for Cashless Economy on Nigeria's GDP Growth: Post COVID-19" (Ude, 2020), which considered a target population of 224 individuals using 12 electronic payment channels. Data collection involved a structured questionnaire, and analysis utilized Gretl Econometric software and SPSS version 2.0, employing statistical techniques like T-Test for paired samples and Ordinary Least Squares (OLS) multiple regression model for estimating GDP growth (Ude, 2020).

Scales and Measurements

The questionnaire implemented a five-point Likert scale, a specialized form of multiple-choice questions in which respondents were asked to rate their agreement level on a scale of (5) representing "Strongly Agree," (4) denoting "Agree," (3) indicating "Indifference," (2) representing "Disagree," and (1) signifying "Strongly Disagree." The questionnaire covered demographics, perceptions, behaviors, and experiences regarding existing infrastructures and the cashless transition, with neutral questions to avoid bias.

3.2.2. Techniques and Method of Analysis

Descriptive Analysis

Descriptive statistics concisely summarize and interpret dataset features, measuring central tendency (mean, median, mode) and variability. Researchers use it to identify correlations, trends, and patterns for a meaningful interpretation of results (Mikyo and Pyrczak, 2023).

Chi-square test

The chi-square distribution, denoted by χ^2 (chi-square), is a crucial probability distribution frequently used in statistical analysis, particularly in inferential statistics (Abebe, 2019). The

chi-square distribution is pivotal for assessing goodness-of-fit, independence, and hypotheses on variance or standard deviation, utilizing degrees of freedom to aid research conclusions. (Alkarkhi, 2021).

Cronbach's alpha
This is a statistical measure used to assess questionnaire reliability and internal consistency. It produces scores from 0 to 1, where higher values indicate stronger internal consistency. A high alpha value means the items consistently measure the same construct, while a low value indicates inadequate consistency. In this study, Cronbach's alpha is crucial for ensuring data reliability and drawing meaningful conclusions (Amirrudin, et. al., 2020).

Exploratory Factor Analysis (EFA)
This serves as a valuable tool for examining the dimensionality of a dataset and exploring the interrelationships among variables (Noora, 2021). It allows the identification of fundamental factors that effectively capture the underlying structure of a dataset and also reduce the complexity to extract essential parameters that represent the core essence of the variables under investigation. This technique aids in uncovering meaningful patterns and relationships within the dataset, facilitating a deeper understanding of the research topic (Tavakol & Wetzel, 2020)

3.3. Ethical Considerations

This study employed a questionnaire-based primary data collection method that ensured respondents' anonymity and privacy. Participants were fully informed about the study's objectives and data handling procedures, emphasizing voluntary participation and the option to withdraw their responses. Collected data were encrypted and used solely for academic research, assuring confidentiality and creating a risk-free environment for valuable input.

4. Design Specification

The Unified Theory of Acceptance and Use of Technology (UTAUT) model, proposed by Venkatesh et al. in 2003, is widely used to predict individuals' intention to adopt and use technology. It has been integrated and modified to understand acceptance and use behaviors in the context of FinTech services (Bajunaied et al., 2023). This theoretical framework combines various models, including TRA, TAM, MM, TPB, C-TAM-TPB, the model of PC utilization, IDT, and SCT (Ahmad, 2014). The effectiveness of the UTAUT model in examining technology adoption and usage factors is well-established in previous studies. This study adopts the UTAUT model to understand the adoption and usage of electronic payment systems, focusing on four main constructs: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FCS) (Alduais and Al-Smadi, 2022). These constructs are directly related to user acceptance and usage of e-payment systems, enabling a comprehensive analysis of technology adoption behavior in the context of FinTech.

- *Performance Expectancy (PE) -* Performance expectancy, a vital aspect of the UTAUT model, predicts users' belief in technology's task-enhancing capabilities. It is a top predictor of user behavioral intention in UTAUT2, particularly crucial in FinTech analysis where customer expectations drive usefulness. Users are more likely to adopt FinTech if they perceive improved financial performance (Bouteraa, et. al., 2023).

- *Effort Expectancy (EE)* - Effort expectancy, a part of the UTAUT model, gauges system use convenience, affecting behavioral intention variably. Long-term use diminishes its significance, as shown in previous research. Variables like age, gender, and experience can influence effort expectancy. Interface design, ease of use,

flexibility, and learning simplicity play crucial roles. UTAUT model studies consistently highlight effort expectancy's significant impact on intention to use (Ayaz and Yanartaş, 2020).

- *Social Influence (SI)* - Social influence, within the UTAUT model, relates to others' expectations for system use. It includes image, subjective norms, and social factors. Subjective norms significantly impact technology acceptance models. People's beliefs about social expectations influence system adoption. If influential users adopt a payment system, others are likely to follow, contributing to e-payment success. The research model incorporates customers' beliefs on e-payment acceptance and usage (Alduais and Al-Smadi, 2022).
- *Facilitating Conditions (FC)* – This refer to the extent to which an individual believes that there is adequate organizational and technical infrastructure in place to support the usage of the system (Dwivedi, et. al., 2019). The facilitating conditions construct is derived from various theories, including the Theory of Planned Behavior (TPB), Decomposed Theory of Planned Behavior (DTPB), Combined TAM and TPB (C-TAM-TPB), and Model of PC Utilization (MPCU). Initially, facilitating conditions have a direct positive impact on the intention to use. However, after the initial use, this effect becomes nonsignificant. Nonetheless, the model suggests that facilitating conditions continue to have a direct and significant effect on use behavior (Ahmad, 2014).
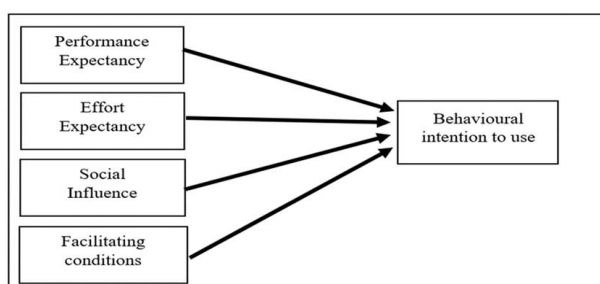

Figure 2. *CONSTRUCTS OF UTAUT*

5.   Implementation

The evaluation of Nigeria's infrastructural readiness for a cashless society and the handling of technological limitations in enforcing the cashless policy involved several essential steps. Data collected from the survey was meticulously transformed and analysed with excel and R studio. Demographic data was assessed using Chi-Square tests to examine its significance with respect to UTAUT constructs. Cronbach's Alpha measured the survey instrument's reliability, while Exploratory Factor Analysis visually represented variable distributions to detect potential relationships among them.

These steps provided various outputs, including goodness-of-fit indices, factor loadings, Rotation factor analysis, correlation, and score adequacy for goodness of fit. Considering Nigeria's unique context and challenges, this thorough analysis offered valuable insights for policymakers, businesses, and consumers, facilitating a successful transition to a more efficient and inclusive cashless ecosystem.

6.   Evaluation

6.1.   Descriptive Analysis

The dataset consists of 151 respondents and contains 22 columns, including demographic variables such as Age, Gender, Occupation, and Location. The main focus of the analysis is on eight constructs related to technology acceptance: Effort Expectancy (EE1, EE2), Facilitating Conditions (FC1 to FC6), Performance Expectancy (PE1 to PE3), and Social Influence (SI1 to SI4). The combined demographic table 2 presents characteristics of 151 survey respondents. The majority were female (83), aged 18-29 (65), and employed (105). Urban residents comprised 101 participants, while 50 lived in rural areas. Understanding these demographics is essential for interpreting survey results and potential biases in the study.

Demographic Variable	Categories	Frequency	Percentage
Age	18-29	65	43%
	30-39	51	34%
	40-65	30	20%
	Prefer to not say	5	3%
Total		**151**	**100%**
Gender	Female	83	55%
	Male	68	45%
Total		**151**	**100%**
Occupation	Employed	105	70%
	Self Employed	22	15%
	Student	18	12%
	Unemployed	6	4%
Total		**151**	**100%**
Location	Rural	50	33%
	Urban	101	67%
Total		**151**	**100%**

Table 1: *Demographic distribution of Respondents [n = 151]*

Descriptive Statistics of UTAUT Model Variables

Table 2 presents the descriptive analysis of the UTAUT model variables, including the mean score indicating the average level of agreement, the standard deviation (sd) showing the variability in responses, Skewness indicates the symmetry, kurtosis tail heaviness of the distribution, and standard error (se) that provides standard deviation of the sampling distribution of the mean.

Variables	Mean	Standard Deviation (sd)	Skewness	Kurtosis	Standard Error (se)
EE1	3.09	1.26	-0.04	-1.25	0.1
EE2	4.82	0.52	-4.23	23.39	0.04
FC1	4.7	0.75	-3.09	10.04	0.06
FC2	2.91	1.34	0.27	-1.31	0.11
FC3	2.56	1.31	0.49	-1.06	0.11
FC4	4.66	0.65	-2.83	11.33	0.05
FC5	3.6	1.13	-0.58	-0.55	0.09
FC6	2.85	1.24	0.06	-1.23	0.1
PE1	4.56	0.72	-2.13	5.75	0.06
PE2	4.23	0.85	-1.28	1.69	0.07
PE3	4.37	0.85	-1.42	1.43	0.07
SI1	3.48	1.15	-0.6	-0.57	0.09
SI2	3.81	0.99	-0.8	-0.08	0.08
SI3	3.81	1.11	-0.82	-0.11	0.09
SI4	4.44	0.75	-1.37	1.63	0.06

Table 2: *Statistical Analysis on Construct*

The descriptive analysis of the UTAUT model variables with 151 participants showed varying levels of agreement, spread, and distribution characteristics. Participants displayed moderate agreement with EE1, while FC2 had significant variability and negative skew. EE2 exhibited a heavy-tailed distribution with positive kurtosis. Standard error estimates indicated precise mean estimates for each variable. The analysis provides valuable insights into participants' perceptions and attitudes towards the UTAUT constructs, aiding in understanding their views on technology adoption and usage.

6.2. Chi-Square Test

Pearson Chi-square tests yielded X-squared statistics and p-values, assessing links between demographics and constructs (Effort Expectancy, Facilitating Condition, Performance Expectancy, Social Influence). The X-squared statistic gauges data observed vs. expected frequency differences. A p-value below 0.05 signifies significance, while a higher one suggests no substantial variable association.

	EE1		EE2			PE1		PE2	
	X - Squared	P-value	X - Squared	P-value		X - Squared	P-value	X - Squared	P-value
Age	10.947	0.5443	5.3579	0.7273		10.412	0.4837	8.3192	0.7226
Gender	1.628	0.8095	2.9671	0.3938		5.3475	0.2242	2.6087	0.6692
Occupation	11.642	0.4806	8.2484	0.4599		25.238	0.06539	11.197	0.4639
Location	1.0526	0.9067	2.6054	0.5621		4.0022	0.4243	5.4506	0.2388
	FC1		**FC2**			**PE3**			
Age	13.673	0.2986	8.8505	0.7208		7.8414	0.5504		
Gender	6.2752	0.1579	3.0623	0.5587		3.734	0.284		
Occupation	15.238	0.2618	21.553	0.0471		12.463	0.183		
Location	0.64022	1	0.78804	0.9458		2.1414	0.5745		
	FC3		**FC4**			**SI1**		**SI2**	
Age	11.807	0.4568	10.594	0.2928		10.363	0.5884	11.897	0.4187
Gender	3.7026	0.4628	4.4865	0.2086		2.3421	0.6836	1.1735	0.8894
Occupation	8.0862	0.7911	4.4976	0.8296		9.921	0.6325	11.647	0.445
Location	3.5826	0.4791	5.6556	0.1362		5.4289	0.2473	4.8636	0.3122
	FC5		**FC6**			**SI3**		**SI4**	
Age	18.431	0.1031	10.88	0.544		18.198	0.1058	2.9404	0.9676
Gender	8.5675	0.07349	3.9354	0.424		5.6102	0.2298	3.6418	0.3031
Occupation	15.69	0.2002	12.497	0.4136		15.757	0.1918	8.188	0.4951
Location	8.1529	0.08599	3.1435	0.5357		3.5698	0.4817	3.6532	0.2908

Table 3: *Association between demographic variables and UTAUT four construct using Pearson Chi Square*

The table displays Pearson Chi Square test results, examining links between demographic variables and key constructs (Effort Expectancy, Performance Expectancy, Facilitating Condition, and Social Influence) in the Unified Theory of Acceptance and Use of Technology (UTAUT). The X-Squared statistic measures variable association strength, while the P-value indicates significance. Generally, demographic variables' associations with UTAUT constructs are not significant ($P > 0.05$). An exception is a potential link between Occupation and Performance Expectancy ($P = 0.06539$), implying occupation slightly affects tech perception.

6.3. Cronbach's alpha

Reliability analysis	Cronbach's alpha		Cronbach's alpha
Overall alpha	**0.74**		
95% confidence boundaries	**[0.68, 0.80]**		
EE1	0.71	**PE1**	0.75
EE2	0.75	**PE2**	0.73
FC1	0.75	**PE3**	0.74
FC2	0.71	**SI1**	0.7
FC3	0.71	**SI2**	0.72
FC4	0.75	**SI3**	0.73
FC5	0.73	**SI4**	0.74
FC6	0.72		
Combined alpha	**0.73**		

Table 4: *Cronbach's Alpha on Utaut Constructs*

The reliability analysis involved calculating Cronbach's alpha, a measure of internal consistency, to assess the reliability of each construct. The Cronbach's alpha values for each construct are as follows:

- Effort Expectancy (EE): 0.73
- Facilitating Condition (FC): 0.73
- Performance Expectancy (PE): 0.74
- Social Influence (SI): 0.72

Cronbach's alpha ranges from 0 to 1, with higher values indicating better internal consistency. All constructs exhibit acceptable reliability with values surpassing the common threshold of 0.70. This suggests that items within each construct consistently measure the same underlying concept. Additionally, the overall internal consistency of the entire UTAUT model, indicated by the combined reliability of 0.73, is also above the threshold, affirming the model's overall robustness

6.4. Factor Analysis

This study employed exploratory factor analysis (EFA), a statistical technique revealing relationships between variables without designating dependencies. EFA explored data interdependencies, unveiling latent factors influencing observed patterns and gaining a comprehensive understanding of complex relationships. This facilitated deeper exploration of the research topic, extracting essential factors shaping the investigated phenomenon.

6.4.1. Bartlett's Test of Sphericity and Scree Plot

Prior to conducting factor analysis, Bartlett's Test of Sphericity was employed to assess the data's suitability. The test indicated significant correlations between variables, confirming the appropriateness of factor analysis. Using the Scree plot, three factors were selected for retention, effectively explaining considerable variance and capturing underlying patterns. This analytical approach facilitates a comprehensive exploration of the dataset's structure and interrelationships.
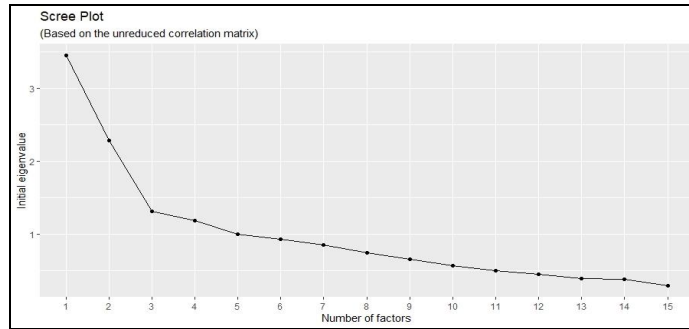
Fig 3: *Scree Plot showing the number of factors and initial eigenvalue*

This scree plot which graphical represent the eigenvalues, shows the variance explained by each factor. In this analysis, the scree plot indicates a steep drop in eigenvalues after the fourth factor, suggesting that the most relevant factors are the first four which are greater than 1. The eigenvalues for the first three factors are 3.45, 2.28, 1.31, and 1.18, respectively.

6.4.2. Preliminary Exploratory Factor Analysis and Varimax Loading

The conducted factor analysis, employing varimax rotation, has provided a deep understanding of the intricate structure within the data. This analysis extracted four distinct factors, collectively elucidating a remarkable 90% of the data's variability. The pronounced loadings of variables onto these factors vividly showcase the intricate relationships between the observed variables and their latent constructs. The exceptional goodness of fit, denoted by the root mean square residuals (RMSR) of 0.04, signifies a successful replication of the original correlation matrix. Moreover, the factor score adequacy measures, further affirming the model's reliability (RMSR = 0.04, Fit = 0.97), paint a clear picture of the robustness of the analysis. In essence, this in-depth examination not only enriches our understanding of the latent constructs at play but also presents a comprehensive visualization of these connections through the factor analysis diagram. The cumulative explanation of 39.9% of total variance by these factors undeniably showcases their pivotal role in unraveling the intricate structure of the dataset.
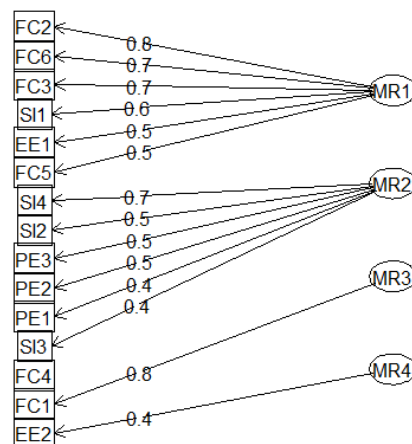

Fig 4: *Initial analysis with varimax rotation*

6.4.3. Enhanced Factor Analysis: Kaiser's Rule with Promax Rotation

In accordance with the Kaiser's rule, which suggests retaining factors with eigenvalues greater than 1, our subsequent analysis determined that two factors adequately explain the data after the initial EFA. A rotated factor analysis using promax rotation was then conducted, focusing on these two factors (MR1 and MR2). It identified Factor 1 (MR1) with

strong connections to "EE1," "FC2," "FC3," "FC6," and "SI1," highlighting aspects related to Effort Expectancy, Facilitating Conditions, and Social Influence. Factor 2 (MR2) linked to "EE2," "FC1," "PE1," "PE2," "PE3," "SI2," "SI3," and "SI4," reflecting Effort Expectancy, Facilitating Conditions, Performance Expectancy, and Social Influence. Cumulatively, these factors capture 30% of variance. Despite a weak correlation, this distinctiveness underscores the complexity of the cashless adoption landscape. Considering the study's aim to evaluate infrastructural readiness for a cashless society considering technological limits, this analysis offers a comprehensive basis with its clear factor association which provides a robust basis for drawing conclusions and informed policy recommendations.
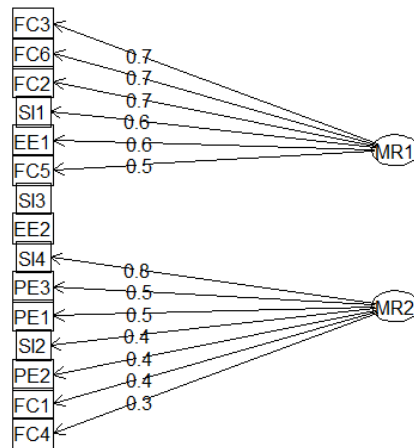

Fig 5: Subsequent rotation a*nalysis with Kaiser's rule and promax*

6.4.4. Factor Correlations and Score Adequacy

The correlation between Factor 1 (MR1) and Factor 2 (MR2) is 0.14, indicating a weak positive correlation. This implies that these two factors are somewhat related but distinct constructs. Each factor explains 60% (MR1) and 40% (MR2) of the variance in the data.

The factor score adequacy measures assess how well the factors predict the observed variables. The correlation of regression scores with factors is high for both Factor 1 (MR1) and Factor 2 (MR2), with values of 0.91 and 0.88, respectively. This suggests that the extracted factors are reliable predictors of the observed variables. The multiple R square of scores with factors for Factor 1 (MR1) is 0.83, and for Factor 2 (MR2) is 0.78, indicating that the factors account for a substantial proportion of the variance in the observed variables.

Fit Indices	Value
Root Mean Square of Residuals	0.07
DF Corrected RMSR	0.08
Fit Based on Off Diagonal Values	0.91
Correlation of (Regression) Scores with Factors	MR1: 0.91, MR2: 0.88
Multiple R Square of Scores with Factors	MR1: 0.83, MR2: 0.78
Minimum Correlation of Possible Factor Scores	MR1: 0.66, MR2: 0.55

Table 5: *Fitting Indices of Rotation Factor Analysis*

6.5. Discussion

The survey results and subsequent analyses presented in this study are directly related to the research topic, question, and objectives, which focus on assessing the infrastructural readiness for transitioning to a cashless society in Nigeria and navigating technological limitations in the enforcement of a cashless policy.

The conducted survey, comprising 151 participants, sheds light on Nigeria's prevailing cashless platforms and infrastructure. This resonates with recent research highlighting the growing acceptance of digital payment systems as alternatives to conventional transactions (Priananda et al., 2020). Among the employed respondents (70%), regions with robust job opportunities display higher cashless prevalence, accentuating the correlation between economic activity and digital transactions (Ogbeide, 2019). Urban (67%) versus rural (33%) distribution underscores more developed cashless infrastructure in urban areas, accentuating challenges for rural financial inclusion due to inadequate infrastructure and limited mobile coverage (Ediagbonya and Tioluwani, 2022).

The subsequent EFA adheres to the Kaiser's rule, suggesting two factors. Subsequent rotated factor analysis reveals Factor 1 (MR1) with strong associations with "EE1," "FC2," "FC3," "FC6," and "SI1." Factor 2 (MR2) displays notable links with "EE2," "FC1," "PE1," "PE2," "PE3," "SI2," "SI3," and "SI4." Factor 1 explains 18% of variance, Factor 2 12%, cumulatively 30%. Factor correlations show a weak relationship (0.14) between MR1 and MR2. Factor score adequacy indicates strong correlations between computed factor scores and observed variables, affirming precise representation. The findings underscore the importance of Effort Expectancy (EE2) for convenience and accessibility, echoed by positive Performance Expectancy (PE) and Social Influence (SI) perceptions, signifying user trust in secure transactions driven by awareness campaigns and incentives. Facilitating Conditions (FC1) highlight reliable internet's significance for seamless cashless transactions.

This research, aligned with Ehiedu et al. (2020) and Musa et al. (2022), examines Nigeria's infrastructure capacity for a prosperous cashless economy. While transaction volume is not directly addressed, insights from these works contextualize cashless channel effectiveness and electronic payment system usability, demanding further analysis. Notably, rural areas grapple with technological constraints that hinder cashless adoption. The marginal link between Occupation and Performance Expectancy suggests technology perception disparities among occupational groups, emphasizing the need for sector-specific interventions. The survey data reflects technological constraints in rural areas and indicates key dimensions impacting technology adoption. With Cronbach's alpha values (0.70 to 0.75) ensuring reliability, UTAUT model constructs provide a sturdy foundation for policy recommendations. This research offers critical insights for policymakers and stakeholders aiming to propel cashless adoption in Nigeria, understanding adoption dynamics and addressing technological hindrances for a successful transition to a cashless society.

In conclusion, the survey and analyses furnish crucial insights into Nigeria's cashless channels and infrastructure, aligning with research objectives. They spotlight accessibility, usability, and technological limitations, guiding policymakers towards informed recommendations to bolster infrastructural readiness and facilitate a seamless shift to a cashless society. Overall, this survey offers comprehensive evaluations and a substantial basis for policy decisions to boost cashless adoption in Nigeria.

7. Conclusion

The thesis successfully addresses the research question of assessing Nigeria's infrastructural readiness for a cashless society and overcoming technological limitations in enforcing a cashless policy. Through a comprehensive survey with 151 respondents, valuable insights into cashless channels and infrastructure were gained. Key findings include rapid cashless system development in urban areas with higher employment rates. Positive perceptions of Effort Expectancy, Performance Expectancy, and Social Influence indicate growing confidence in cashless transactions, supported by awareness campaigns. The crucial role of facilitating conditions, like reliable internet connectivity, in enabling a smooth transition to a cashless society was emphasized.

The research has valuable contributions but limitations too. It mainly focuses on perceptions, not behavioral patterns of cashless adoption. The sample size may not fully represent Nigeria's diversity. Further investigations are needed due to technology's rapid evolution. Addressing these limitations will strengthen the research landscape and guide policymakers, businesses, and consumers towards an efficient and inclusive cashless ecosystem. Ongoing research remains crucial for a successful transition to a cashless society.

To enrich the study, conducting longitudinal investigations to capture actual behavioral patterns and incorporating larger and diverse samples for comprehensive insights are recommended. Additionally, employing qualitative methods to explore user motivations and experiences deeply would be beneficial. Exploring the influence of financial education, government policies, and incentives on cashless adoption will provide valuable information. These efforts will contribute to a more inclusive and efficient cashless ecosystem in Nigeria.

References

Abebe, T.H. (2019) 'The derivation and choice of appropriate test statistic (Z, T, F and Chi-square test) in research methodology', *Mathematics Letters*, 5(3), pp. 33–40. doi:10.11648/j.ml.20190503.11.

Adeyemo, K. A., Isiavwe, D., Adetula, D., Olamide, O., and Folashade, O. (2020) "Mandatory adoption of the Central Bank of Nigeria's cashless and e-payment policy: Implications for bank customers," *Banks and Bank Systems*, 15(2), pp. 243–253.

Adigwe, A.I. (2022) "Review of cashless economy in Nigeria and the challenges of network infrastructures," *International Journal of Social Science and Human Research*, 05(03), pp. 1134–1142.

Adu, C.A. and Williams, A.C. (2023) 'Cashless Policy and The Financial Performance of Banks in Nigeria', *Sapientia Foundation Journal of Education, Sciences and Gender Studies (SFJESGS)*, 5(1), pp. 59–68.

Aduba, J.J. (2021) "Review for 'on the determinants, gains and challenges of electronic banking adoption in Nigeria,'" *International Journal of Social Economics*, 48(7), pp. 1021–1043.

Ahmad, M. I. (2014). Unified Theory of Acceptance and Use of Technology (UTAUT): A Decade of Validation and Development.

Akerejola, W. O., Okpara, E. U., Ohikhena, P., and Emenike, P. O., (2019) "Availability of infrastructure and adoption of point of sales of selected small and Medium Enterprises (SMEs) in Lagos State, Nigeria," *International Journal of Academic Research in Business and Social Sciences*, 9(1), pp. 137–150.

Alduais, F. and Al-Smadi, M.O. (2022) 'Intention to use e-payments from the perspective of the unified theory of acceptance and use of technology (utaut): Evidence from Yemen', *Economies*, 10(10), pp. 1–15. doi:10.3390/economies10100259.

Alkarkhi, A.F.M. (2021) 'Chi-square test for one sample variance', *Applications of Hypothesis Testing for Environmental Science*, pp. 63–78. doi:10.1016/b978-0-12-824301-5.00003-4.

Amirrudin, M., Nasution, K. and Supahar, S. (2020) 'Effect of variability on Cronbach Alpha Reliability in Research Practice', *Jurnal Matematika, Statistika dan Komputasi*, 17(2), pp. 223–230. doi:10.20956/jmsk.v17i2.11655.

Anyanwu, G.I. and Anumaka, C.I. (2020) 'Point of sale and cashless policy in Nigeria: Challenges and prospects', *Asian Journal of Economics, Business and Accounting*, 20(2), pp. 42–57. doi:10.9734/ajeba/2020/v20i230323.

Ayaz, A. and Yanartaş, M. (2020) 'An analysis on the unified theory of acceptance and use of technology theory (UTAUT): Acceptance of Electronic Document Management System (EDMS)', *Computers in Human Behavior Reports*, 2, pp. 1–7. doi:10.1016/j.chbr.2020.100032.

Bajunaied, K., Hussin, N. and Kamarudin, S. (2023) 'Behavioral intention to adopt Fintech services: An extension of unified theory of acceptance and use of Technology', *Journal of Open Innovation: Technology, Market, and Complexity*, 9(1), p. 100010. doi:10.1016/j.joitmc.2023.100010.

Balakrishnan, V. and Shuib, N.L. (2021) 'Drivers and inhibitors for digital payment adoption using the cashless society readiness-adoption model in Malaysia', *Technology in Society*, 65, pp. 1–9. doi:10.1016/j.techsoc.2021.101554.

Bouteraa, M., Chekima, B., Lajuni, N., and Anwar, A. (2023) 'Understanding consumers' barriers to using FinTech services in the United Arab Emirates: Mixed-methods research approach', *Sustainability*, 15(4), pp. 1–22. doi:10.3390/su15042931.

Central Bank of Nigeria, (2023) *Cash-less Nigeria| Home*. Available at: https://www.cbn.gov.ng/cashless/ (Accessed: March 20, 2023).

Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M., and Williams, M. D. (2019) "Re-examining the Unified Theory Of Acceptance And Use Of Technology (UTAUT): Towards a revised theoretical model," *Information Systems Frontiers*, 21(3), pp. 719–734.

Ediagbonya, V. and Tioluwani, C. (2022) 'The role of Fintech in driving financial inclusion in developing and emerging markets: Issues, challenges and prospects', *Technological Sustainability*, 2(1), pp. 100–119. doi:10.1108/techs-10-2021-0017.

Ehiedu, V.C., Odita, A.O. and Kifordu, A.A. (2020) 'Cashless policy model and Nigeria Economic Growth', *Journal of Advanced Research in Dynamical and Control Systems*, 12(SP7), pp. 1975–1982. doi:10.5373/jardcs/v12sp7/20202313.

Ejiobih, C., Oni, A. A., APointyo, C. K., Bishung, J., Ajibade, A., Koyejo, O., and Olushola, A. (2019) "Empirical review of the challenges of the cashless policy implementation in Nigeria: A cross-sectional research," *Journal of Physics: Conference Series*, 1299(1).

Eniang-Esien, O. and Ekpe, M.D. (2019) "CBN Cashless Policy Implementation as Predictor of Sustainable Administration of Higher Education in South-South Nigeria: Implication from Management Perspective," *Global Scientific Journal*, 7(12), pp. 1515–1530.

Factors Affecting Teaching English as a Second Language (TESL) Postgraduate Students' Behavioural Intention for Online Learning during the COVID-19 Pandemic - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/UTAUT-Model-Venkatesh-et-al-2003_fig1_350301736 [accessed 24 Jul, 2023]

Gbadamosi, A.Y. (2019) 'Impact of Central Bank of Nigeria (CBN) Cashless Policy on Financial Liberalization of the Nigerian Economy', *Bingham University Journal of Accounting and Business (BUJAB)*, 7(1), pp. 442–453.

Ibukun, F.O. and Cynthia, A.C. (2020) 'A cashless policy and economic development in Nigeria', *Randwick International of Social Science Journal*, 1(2), pp. 53–59. doi:10.47175/rissj.v1i2.45.

Ijeoma, C., Akujor, J.C. and Mbah, J.C. (2020) 'Electronic banking and customer satisfaction in Imo State (a study of selected commercial banks in Imo State)', *European Journal of Business and Management Research*, 5(6), pp. 1–9. doi:10.24018/ejbmr.2020.5.6.607.

John, N. J., Emmanuel, N. C., Ikechi, K. S., & Eke, C. K. (2020). 'Cashless policy and the Nigerian Payment System', *International Journal of Innovation And Economic Development*, 5(6), pp. 7–28. doi:10.18775/ijied.1849-7551-7020.2015.56.2001.

Kirobo, A., Lissah, J. and Govella, M.M. (2022) 'Adoption of Cashless Economy in the World: A Review', *OSR Journal of Economics and Finance*, 13(2), pp. 37–48. doi:https://doi.org/10.9790/5933-1302083748.

Maitanmi, S.O., Adetunji, O. and Joshua, A. (2021) 'Evaluation of cashless policy in Nigeria: The pros and cons', *Information Management and Business Review*, 12(4(I)), pp. 39–46. doi:10.22610/imbr.v12i4(i).3127.

Mamudu, Z.U. and Gayovwi, G.O. (2019) "Cashless Policy and Its Impact on The Nigerian Economy," *International Journal of Education and Research*, 7(3), pp. 111–132.

Mikyo Oh, D. and Pyrczak, F. (2023) 'Descriptive, Correlational, and inferential statistics', *Making Sense of Statistics*, pp. 21–24. doi:10.4324/9781003299356-5.

Musa, I., Magaji, S. and Hassan, A.A. (2022) "Analysis of infrastructural challenges, cybercrime, and the cashless policy in Nigeria," *ARIS2 - Advanced Research on Information Systems Security*, 2(1), pp. 13–27.

Noora, S. (2021) "Factor Analysis as a Tool for Survey Analysis." *American Journal of Applied Mathematics and Statistics*, vol. 9, no. 1 (2021): 4-11. doi: 10.12691/ajams-9-1-2.

Ogbeide, S.O. (2019) 'Empirical assessment of the effects of cashless policy on financial inclusion in the Nigerian Emerging Economy', *Accounting*, 5, pp. 61–68. doi:10.5267/j.ac.2018.7.003.

Omodero, C.O. (2021) "Fintech innovation in the financial sector: Influence of E-money products on a growing economy," *Studia Universitatis „Vasile Goldis" Arad – Economics Series*, 31(4), pp. 40–53.

Onah, E. O., Ujunwa, A. I., Ujunwa, A., and Ogundele, O. S. (2021) 'Effect of financial technology on cash holding in Nigeria', *African Journal of Economic and Management Studies*, 12(2), pp. 228–249. doi:10.1108/ajems-04-2020-0190.

Otapo, T.W. and Obagunwa, O.T. (2021) "Electronic Banking and Customers' Satisfaction in Akure, Ondo State, Nigeria. View project Electronic Banking and Customers' Satisfaction in Akure, Ondo State, Nigeria," *IOSR Journal of Mathematics*, 17(2), pp. 15–22.

Ozoji, A. P., Iwara, O. E., Ezuwore-Obodoekwe, C. N., Inyada, S. J., Ezechukwu, B. O., Ayem-Fella, T. F., Ezuma, C. O., Ebisi, L. N., and Okoroiwu, K. L. (2021) 'Insecurity of Cash-Less Banking Transactions: An Empirical Evidence from Nigerian Banks', *Academy of Accounting and Financial Studies Journal*, 25(5), pp. 1–23.

Priananda, I., Stevani, M., Sutanto, T. I., and Mariani, M. (2020) 'Grassroots Economy Towards Cashless Society: An Empirical Analysis of Micro-Merchant's Readiness In Continuing The Usage of Cashless Payment System', *International Journal of Scientific & Technology Research*, 9(3), pp. 929–938.

Rachmatika, A.G., Saifi, M. and Worokinasih, S. (2023) 'The influence of Financial Literacy, financial technology on Financial Inclusion mediated by cashless policy', *Journal of Indonesian Applied Economics*, 11(1), pp. 1–12.

Raji, A.A., Zameni, A. and Abdulwakil, M.M. (2021) "Effect of electronic banking on customer satisfaction in Kwara State, Nigeria," *International Journal of Academic Research in Business and Social Sciences*, 11(7), pp. 1572–1585.

Raya, J.M. and Vargas, C. (2022) 'How to become a cashless economy and what are the determinants of eliminating cash', *Journal of Applied Economics*, 25(1), pp. 543–562. doi:10.1080/15140326.2022.2052000.

Tade, O. and Adeniyi, O. (2020) 'Dimensions of electronic fraud and governance of trust in Nigeria's cashless ecosystem', *International Journal of Offender Therapy and Comparative Criminology*, 64(16), pp. 1717–1740.

Tavakol, M. and Wetzel, A. (2020) "Factor analysis: A means for theory and instrument development in support of construct validity," *International Journal of Medical Education*, 11, pp. 245–247.

Ude, E.N. (2020) 'Understanding the Technologies for Cashless Economy on Nigeria's GDP Growth: Post COVID – 19', *Global Journal of Enterprise Information System*, 12(2), pp. 10–23.

Ugwoke, R.O., Okafor, M. and Ugwoke, V.O. (2019) 'Cashless perceived effect of the cashless policy of the Central Bank of Nigeria on improvement of the payment system in Nigeria', *International Journal of Management (IJM)*, 10(6), pp. 294–316. doi:10.34218/ijm.10.6.2019.029.

Urhie, E., Amonu, O. C., Mbah, C., Ewetan, O. O., Matthew, O. A., Adediran, O., Adesanya, O., and Adekeye, A. (2021) 'Banking Technology and cashless economy in selected Sub-Saharan African countries: Does education matter?', *Journal of Money Laundering Control*, 24(3), pp. 584–595. doi:10.1108/jmlc-10-2020-0122.

Vaidya, N., Holscher, J., Vergne, C., PSV, V., Ghanem, E., Thakral, C., Singh, V., and Pandey, V. (2023) *World payments report 2022*, *Capgemini*. Available at: https://www.capgemini.com/insights/research-library/world-payments-report/ (Accessed: 01 July 2023).