

MOBILE APP TRANSACTIONS AND ECONOMIC SUSTAINABILITY: EVIDENCE FROM NIGERIA.

¹Eke Promise

²Innocent Okah

Email: promiseeke40@gmail.com

^{1&2}Department of Accounting, Ignatius Ajuru University of Education
Rumuolumeni, Port Harcourt, Rivers State, Nigeria

Abstract

This study investigated the effect of mobile app transactions (MAT) on economic sustainability in Nigeria. This study employed an ex-post facto research design. The population includes the entirety of the Nigerian economy represented by the Central Bank of Nigeria (CBN), with a purposive sampling technique used to select a sample size of 12 years (2012-2023) annual observations. Data were collected through Secondary source. The collected Data were further analysed using descriptive statistics, Pairwise Granger Causality Tests, Variance Inflation Factors and Multiple Regression. Our study revealed that mobile app transactions significantly affect the Human Development Index in Nigeria. Hence, the study concluded that mobile app transactions (MAT) significantly affect economic sustainability in Nigeria. The study further suggested that the Nigerian government and private sector should continue to foster the widespread adoption of mobile payment systems, especially mobile app transactions, as they have been shown to positively affect human development outcomes. Also, given the positive effect of mobile app transactions on HDI, financial inclusion initiatives that emphasize mobile banking and mobile payment platforms should be expanded.

Keywords: Mobile App Transactions, Human Development Index.

INTRODUCTION

The rise of mobile app transactions has brought about a significant transformation in the Nigerian economy, providing new opportunities for growth and financial inclusion. Over the past decade, Nigeria has seen a rapid increase in mobile phone usage and internet connectivity, which has led to the widespread adoption of digital financial services. Mobile payment systems such as Paystack, Flutterwave, and mobile money apps have become central to the economy, enabling Nigerians to access banking services, make payments, and conduct business transactions efficiently. These digital platforms have the potential to drive economic sustainability by enhancing financial inclusion, facilitating business operations, and promoting access to a broader range of financial services (Akinbo & Ogunseye, 2021).

While mobile transactions present opportunities for economic development, they also introduce significant challenges. Cybersecurity issues, such as fraud and data breaches, have emerged as major concerns, threatening the trust and security of users and businesses alike. Additionally, the regulatory framework for mobile app transactions in Nigeria remains underdeveloped, leading to uncertainties about legal compliance and data protection (Aliyu et al., 2022). Despite these challenges, mobile transactions offer substantial potential to enhance economic sustainability in Nigeria, provided the necessary infrastructure, regulation, and security measures are established to mitigate these risks.

Mobile app transactions have the potential to significantly improve economic sustainability in Nigeria by promoting financial inclusion, particularly in underserved rural areas. Many regions in Nigeria lack traditional banking infrastructure, limiting individuals and small businesses from participating in the formal economy. Mobile transactions offer a cost-effective and efficient alternative to traditional banking, allowing people to make payments, access loans, and save money through their

smartphones (Fola & Sulaimon, 2020). By expanding financial access, mobile transactions can contribute to reducing poverty, inequality, and promoting long-term economic stability.

Furthermore, mobile transactions enhance business operations by improving efficiency, reducing transaction costs, and enabling businesses to tap into a larger customer base. Small and medium-sized enterprises (SMEs) in Nigeria benefit from mobile platforms by reaching more customers and expanding their operations. The ability to conduct transactions digitally also reduces the reliance on cash and fosters greater transparency, potentially aiding in the fight against corruption and promoting sustainable business practices (Sambo, 2021).

Despite the advantages, the rise of mobile app transactions in Nigeria also presents various challenges that may hinder their impact on economic sustainability. Cybersecurity risks, such as fraud, identity theft, and data breaches, pose significant threats to the integrity of financial systems and users' privacy (Aliyu et al., 2022). Addressing these risks requires strengthening security protocols, ensuring the protection of user data, and enhancing public trust in mobile financial services.

The expansion of mobile app transactions offers a promising avenue for fostering economic sustainability in Nigeria. However, addressing the challenges associated with security, regulation, and infrastructure development is essential for fully realizing its potential. With the proper measures in place, mobile transactions can play a pivotal role in Nigeria's journey towards a more inclusive and sustainable economy.

Previous studies have primarily focused on the relationship between e-payment systems and broad economic indicators like GDP, with less emphasis on their direct impact on human development indices (Suleiman et al., 2023; Zwingina et al., 2023). While these studies often employ methodologies such as ARDL or VECM, few have specifically analyzed the role of mobile app transactions in shaping human development outcomes, such as HDI (Andrea et al., 2022; Isamade et al., 2022). Additionally, many studies rely on limited time frames or sample sizes, which can constrain the generalizability of their findings (John, 2019). The present study fills these gaps by examining the specific impact of mobile app transactions on the Human Development Index in Nigeria, using a more robust sample size (12 years of data) and employing methods like multiple regression, which offers deeper insights into the long-term effects of digital payment systems on economic sustainability, particularly human development.

Objective of the Study

1. To investigate the effect of mobile app transactions on human development index in Nigeria.

Research Hypothesis

H01: There is no significant effect of mobile app transactions on human development index in Nigeria.

LITERATURE REVIEW

Conceptual review

Mobile app transactions

These refer to the use of smartphones and other mobile devices to conduct financial transactions, such as payments, money transfers, and access to banking services. These transactions are facilitated by mobile apps provided by financial institutions, payment processors, and mobile money services, enabling users to make purchases, pay bills, transfer funds, and even access credit. With the rapid growth of mobile internet penetration and smartphone adoption, mobile app transactions have become an essential aspect of modern financial systems, offering convenience, speed, and accessibility. In regions like Nigeria, where traditional banking infrastructure is limited in rural areas, mobile app transactions have played a crucial role in enhancing financial inclusion and connecting individuals to the formal financial ecosystem (Akinbo & Ogunseye, 2021).

Economic sustainability

This refers to the ability of an economy to support long-term economic growth without negatively impacting social, environmental, and cultural aspects of life. It emphasizes maintaining an equitable distribution of resources, promoting environmental conservation, and ensuring that the economy remains resilient to future challenges. The concept of economic sustainability links closely with the Human Development Index (HDI), which is a composite measure used to assess a country's overall social and economic development. HDI considers three key dimensions: life expectancy (health), education level, and per capita income (economic standard of living) (UNDP, 2020). These dimensions are central to evaluating whether economic growth in a country leads to improvements in the quality of life for its citizens, thereby contributing to sustainable development goals.

The relationship between economic sustainability and HDI is crucial for understanding the broader impact of economic policies. A high HDI score signifies a balance of economic prosperity with improvements in health and education, essential for long-term sustainability. For instance, countries with robust healthcare systems, quality education, and steady economic growth tend to have higher HDI scores, which are indicative of their efforts to achieve sustainable development. On the other hand, countries that focus solely on economic growth without considering the broader social implications may experience growth in GDP but lag in improving overall human development, thus hindering long-term sustainability. Achieving economic sustainability, therefore, requires policies that foster not only economic growth but also the enhancement of human development indicators like education and health (Sachs, 2020).

Theoretical review

Technology Acceptance Model (TAM)

This was developed by Davis (1989). This model explains how users come to accept and use a technology, emphasizing two key factors: perceived ease of use and perceived usefulness. According to TAM, the more a user believes that a technology will enhance their performance (usefulness) and is easy to use (ease of use), the more likely they are to adopt it.

In the context of mobile app transactions in Nigeria, TAM can provide insights into how individuals and businesses perceive the usefulness and ease of using mobile payment systems. The widespread adoption of mobile apps for financial transactions in Nigeria is driven by their ability to simplify transactions, improve access to financial services, and provide a convenient, secure, and low-cost alternative to traditional banking. As mobile app transactions become more prevalent, understanding the factors influencing their adoption can help policymakers, businesses, and technology developers create strategies to enhance mobile payment system usage and, consequently, drive economic sustainability. By increasing the adoption of mobile transactions, Nigeria can promote financial inclusion, reduce poverty, and create a more sustainable economic environment.

Empirical review

Suleiman et al. (2023), examined the influence of e-payment systems on the economic development of Nigeria. The analysis utilised quarterly time series data spanning from 2012Q1 to 2021Q4. "The Philip Perron test, Johansen cointegration test, Vector Error Correction Model (VECM), and Dynamic Ordinary Least Square regression were employed. The findings indicate that point-of-sale and mobile payment channels have a substantial beneficial influence on economic growth, while web pay channels have a negligible impact.

Zwingina et al. (2023) studied the connection between Nigeria's economic expansion and e-payment systems between 2009 and 2018. The Auto Regressive Distributed Lag (ARDL) Model, correlation analysis, and descriptive statistics were all used in the study. The results showed that electronic payment systems have a positive impact on economic growth.

Andrea et al. (2022), investigated the impact of e-payment systems on Nigeria's gross domestic product (GDP). The research design utilised was ex-post facto, and the ARDL Model was employed.

The findings revealed a substantial beneficial impact of automated teller machines (ATMs), point of sale (POS) systems, and mobile application payment systems on economic growth.

In their study, Isamade et al. (2022), examined the relationship between E-payment systems and the gross domestic product (GDP) in Nigeria. The research design utilised was ex-post facto, and the ARDL Model was employed. The findings revealed a substantial and beneficial influence of ATM, POS, and mobile application payment systems on the growth of the economy.

John (2019), examined the correlation between electronic payment methods and the economic expansion in Nigeria throughout the period of 2012-2017. The Autoregressive Distributed Lag (ARDL) regression model was utilised. The findings revealed a noteworthy positive correlation with substantial influence from ATMs, POS, and web-based transactions, whereas mobile payment had a detrimental effect.

In their study, Njoku et al. (2020), examined the influence of electronic banking on the economic growth of Nigeria from 2009 to 2018. The Vector Error Correction Model (VECM) was utilised. The findings demonstrated a substantial influence of electronic banking on economic growth, with varying effects on individuals.

Al-Khasawneh (2023), assessed the level of effectiveness of electronic accounting information systems in enhancing the security and control of financial information in Jordanian payment and electronic transfer companies and its ability to provide reliability. The researcher used the inductive approach by referring to the literature related to the subjects of the study and the deductive approach in the field study by distributing a questionnaire to the electronic payment companies in Jordan. 96 questionnaires were retrieved, using the SPSS program to analyze the data and reach the results. The study found that there are factors that help to penetrate the accounting information systems in the Jordanian electronic payment and financial transfer companies. This study is considered one of the important and modern topics because electronic payment processes are considered one of the modern concepts with which many risks are associated. This study sheds light on these risks and threats and the ability of the strong accounting system to confront these threats and risks.

Momoh-Musa and Ironkwe (2021), examined the relationship between electronic payment product and quoted deposit money banks performance in Nigeria. Data on different sub-variables of electronic payment product and return on equity from 2007-2018 were collected from Central Bank of Nigeria statistical bulletin, annual Central Bank of Nigeria reports, federal Inland Revenue Service, annual reports and e-business unit report of deposit money banks. Ordinary Least Square of multivariate regression based on Auto-regressive distributed Lag, unit root test, panel co-integration, granger causality and panel dynamic error correction model was used in analyzing the data. The empirical results indicated that electronic payment product significantly relate to return on equity. Deposit money banks and other specialized organizations should conduct awareness programs for clients on the importance and ease of using electronic payment products in financial transactions in local and international markets”.

METHODOLOGY

This study employed an ex-post facto research design. The population includes the 215 million active mobile phone users in Nigeria. According to the Nigerian Communications Commission (NCC), the country had around 215 million active mobile phone customers at the end of 2023. Purposive sampling technique was used to select a sample size of 12 years (2012-2023) annual observations. Data were collected through Secondary source via Central Bank of Nigeria (CBN) Statistical Bulletin. The collected data were further analysed using descriptive statistics, Pairwise Granger Causality Tests, Variance Inflation Factors and Multiple Regression. The mathematical representations of the functional effect that represents our stated hypotheses is expressed econometrically as follows:

$$HDI_t = \beta_0 + \beta_1 VAT_t + t..... (1)$$

Where;

HDI = Human Development Index

MAT= Mobile App transactions
 β_0 = Constant
 β_1 - β_1 = Coefficients attached to explanatory variables
t = Time Period

DATA ANALYSIS AND RESULTS

Data analysed here are the properties of Mobile App transactions and economic sustainability (Human Development Index) in Nigeria.

Table 1: Descriptive statistics

	MAT	HDI
Mean	8.104710	0.525083
Median	7.809709	0.528500
Maximum	9.720943	0.548000
Minimum	6.361291	0.499000
Std. Dev.	0.971331	0.014519
Skewness	0.049481	-0.331767
Kurtosis	2.229732	2.147673
Jarque-Bera	0.301553	0.583370
Probability	0.860040	0.747004
Sum	97.25651	6.301000
Sum Sq. Dev.	10.37831	0.002319
Observations	12	12

The descriptive statistics reveal that Mobile App Transactions (MAT) have a mean of 8.10 and a standard deviation of 0.97, indicating moderate variability in transaction volumes, while the Human Development Index (HDI) has a mean of 0.525 with minimal variability (standard deviation of 0.014). MAT exhibits a near-symmetric distribution (skewness: 0.049), and HDI shows a slight left skew (-0.331). Both variables demonstrate platykurtic distributions, with kurtosis values below 3. The Jarque-Bera test confirms normality for both MAT ($p = 0.86$) and HDI ($p = 0.75$). These patterns suggest dynamic trends in MAT adoption and steady HDI performance, underscoring the potential link between technological advancements and economic sustainability in Nigeria.

Table 2: Variance Inflation Factors

Date: 01/22/25 Time: 12:22
Sample: 1 12
Included observations: 12

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.000135	76.95027	NA
MAT	2.04E-06	76.95027	1.000000

The Variance Inflation Factors (VIF) in Table 2 show that the MAT (Mobile App Transactions) variable

has a centered VIF value of 1.00, indicating no multicollinearity concerns in the model. The uncentered VIF for the constant term (C) is higher at 76.95, but this is expected and does not impact the interpretation of the individual explanatory variable. These results confirm that MAT is a reliable predictor for the dependent variable, with no significant redundancy in the data that could distort regression outcomes.

Table 3: Pairwise Granger Causality Tests

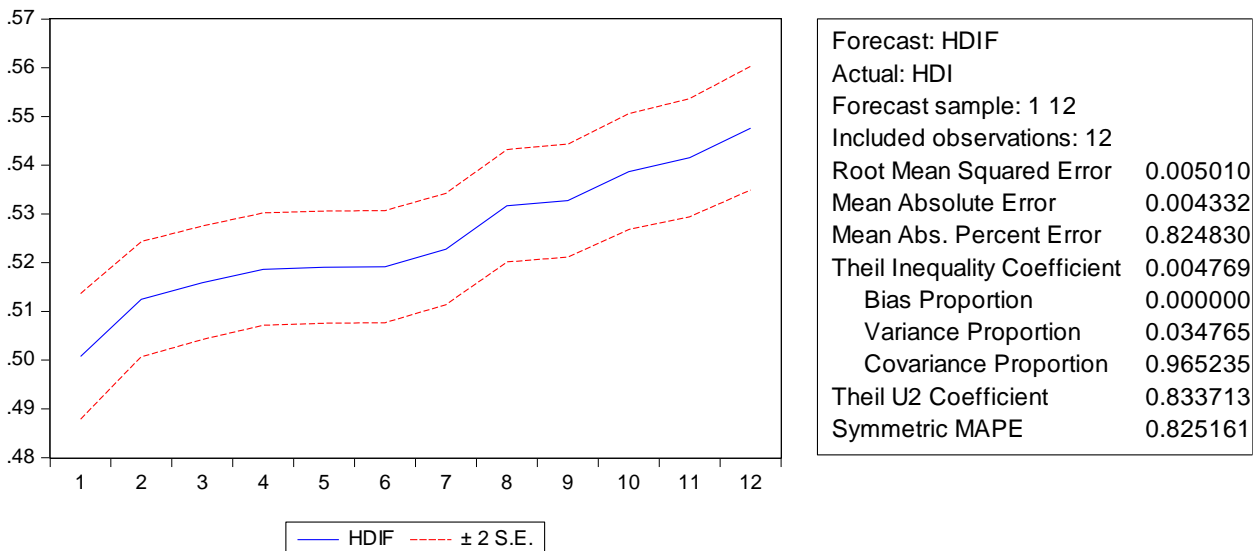
Date: 01/22/25 Time: 12:07

Sample: 1 12

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
HDI does not Granger Cause MAT	10	0.65225	0.5601
MAT does not Granger Cause HDI		0.73367	0.5255

The Pairwise Granger Causality Test examines the predictive relationship between mobile app transactions (MAT) and the Human Development Index (HDI) in Nigeria. The results reveal no significant causality in either direction, as evidenced by p-values of 0.5601 and 0.5255 for the hypotheses that HDI does not Granger cause MAT and MAT does not Granger cause HDI, respectively. This suggests that variations in MAT do not predict changes in HDI, and vice versa, within the sample period. The findings imply an absence of immediate causal influence between mobile app transactions and economic sustainability, measured through HDI. However, the limited sample size and short observation period may affect the reliability of these conclusions, underscoring the need for further research with a larger dataset to explore this relationship more comprehensively.



The forecasting evaluation for the Human Development Index (HDI) indicates the accuracy and reliability of the forecasted values (HDIF) compared to the actual values (HDI). The Root Mean Squared Error (RMSE) is 0.005010, indicating a low average error magnitude. Similarly, the Mean Absolute Error (MAE) is 0.004332, and the Mean Absolute Percent Error (MAPE) is 0.824830%, demonstrating high forecast precision. The Theil Inequality Coefficient (0.004769) highlights minimal disparity between forecasted and actual values, with the Covariance Proportion dominating

at 96.52%, signifying effective error variance explanation by the model. The Theil U2 Coefficient of 0.833713 and Symmetric MAPE of 0.825161 further confirm the model's strong forecasting capability. These results collectively show that the forecasted HDI values align closely with the actual values, reflecting the model's effectiveness in predicting economic sustainability metrics.

Test of Hypothesis

H01: There is no significant effect of mobile app transactions on human development index in Nigeria.

Decision rule: accept null hypothesis if PV is > 0.05; otherwise reject.

Table 4: Dependent Variable: HDI

Method: Least Squares

Date: 01/22/25 Time: 12:28

Sample: 1 12

Included observations: 12

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.412076	0.013897	29.65230	0.0000
MAT	0.013943	0.001703	8.185201	0.0000
R-squared	0.870126	Mean dependent var	0.525083	
Adjusted R-squared	0.857138	S.D. dependent var	0.014519	
S.E. of regression	0.005488	Akaike info criterion	7.421539	
Sum squared resid	0.000301	Schwarz criterion	7.340722	
Log likelihood	46.52924	Hannan-Quinn	-	
F-statistic	66.99751	Durbin-Watson stat	2.699769	
Prob(F-statistic)	0.000010			

The hypothesis test examines whether mobile app transactions (MAT) significantly affect the Human Development Index (HDI) in Nigeria. Based on the results in Table 4, the coefficient for MAT is 0.013943 with a p-value of 0.0000, which is less than the threshold of 0.05. This indicates that mobile app transactions have a statistically significant positive effect on HDI. The R-squared value of 0.870126 implies that 87% of the variation in HDI is explained by MAT, suggesting a strong explanatory power of the model. Furthermore, the F-statistic of 66.99751 with a p-value of 0.000010 confirms the overall significance of the regression model. As the p-value for MAT is less than 0.05, the null hypothesis (H01) is rejected, concluding that mobile app transactions significantly affect the Human Development Index in Nigeria.

Discussion of Findings

Our study revealed that mobile app transactions significantly affect the Human Development Index in Nigeria. The findings of this study align with previous research that underscores the positive impact of digital payment systems, such as mobile app transactions, on economic development. Suleiman et al. (2023) found that mobile payment channels, along with point-of-sale systems, have a significant positive influence on Nigeria's economic growth. Their study, which employed time series data from 2012Q1 to 2021Q4, demonstrated that digital payment systems foster economic

activity, which aligns with our finding that mobile app transactions positively affect the Human Development Index (HDI). Similarly, Zwingina et al. (2023) also highlighted the positive correlation between electronic payment systems and economic growth, reinforcing the notion that digital financial inclusion can promote broader economic development.

Further corroboration comes from Andrea et al. (2022), who found that mobile app payment systems, along with ATMs and POS systems, significantly contributed to GDP growth in Nigeria. Their use of the ARDL model mirrored our methodology, reinforcing the conclusion that mobile transactions can drive key economic indicators like HDI. John (2019) also observed a positive correlation between electronic payment systems and economic growth, specifically highlighting the substantial impact of ATMs, POS, and web-based transactions, though mobile payments showed mixed results. This study, alongside others like Isamade et al. (2022) and Njoku et al. (2020), points to a consistent theme: digital financial systems contribute significantly to improving economic performance, including human development outcomes such as the HDI, as found in this research.

CONCLUSION AND RECOMMENDATIONS

This study investigated the effect of mobile app transactions (MAT) on economic sustainability in Nigeria over the period from 2012 to 2023. The descriptive statistics revealed that mobile app transactions exhibit moderate variability, while HDI showed minimal variation, reflecting a steady trend in Nigeria's human development. The pairwise Granger causality test indicated no significant predictive effect between MAT and HDI, suggesting that changes in MAT do not directly cause variations in HDI within the sample period. However, the regression analysis revealed a statistically significant positive effect of mobile app transactions on HDI, with 87% of the variation in HDI explained by MAT. This supports the hypothesis that mobile app transactions contribute to economic sustainability, particularly in terms of human development.

The findings offer valuable insights into the role of mobile payment systems in fostering human development in Nigeria. While prior studies primarily focused on broader economic indicators, this study's focus on HDI provides a more understanding of how digital payment systems, especially mobile apps, influence economic sustainability in terms of health, education, and overall development. Despite the absence of Granger causality, the positive regression results underscore the importance of mobile technology in driving developmental outcomes in emerging economies like Nigeria.

1. The Nigerian government and private sector should continue to foster the widespread adoption of mobile payment systems, especially mobile app transactions, as they have been shown to positively affect human development outcomes. This could include enhancing internet infrastructure, offering financial incentives to businesses and individuals to adopt mobile payment systems, and improving digital literacy across the country.
2. Given the positive effect of mobile app transactions on HDI, financial inclusion initiatives that emphasize mobile banking and mobile payment platforms should be expanded. This would provide underbanked populations in rural and remote areas with access to financial services, improving overall economic sustainability by increasing access to education, healthcare, and employment opportunities.

Suggestion for future research

Future research should extend the analysis of mobile app transactions and human development by using a larger dataset with a longer time frame. This would provide more robust evidence regarding the long-term impact of digital payment systems on economic sustainability and offer clearer insights into causal relationships between digital transaction trends and development outcomes.

Competing interest

Authors harmoniously declare none existence of Competing interest.

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