



IMPACT OF DIGITAL PAYMENT SYSTEMS ON THE AVIATION SECTOR GROWTH IN NIGERIA

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Cite this article:

Oyakegha Ekiyeghazi Samuel,
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(2026), Impact of Digital
Payment Systems on the
Aviation Sector Growth in
Nigeria. African Journal of
Accounting and Financial
Research 9(3), 1-18. DOI:
10.52589/AJAFR-6EJJDWEG

Manuscript History

Received: 30 May 2026

Accepted: 2 Jul 2026

Published: 14 Jul 2026

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ABSTRACT: *This study examined the effect of digital payment systems on the growth of the aviation sector in Nigeria using quarterly data spanning from 2010Q1 to 2024Q3. Specifically, the study assessed the effects of Point of Sale (POS) transaction values, Mobile Banking (MB) transaction values, Web-based Internet (WBI) transaction values, and Automated Teller Machine (ATM) transaction values on aviation sector output. Aviation sector output served as the dependent variable, while the selected digital payment indicators constituted the explanatory variables. The study adopted an ex post facto research design and a quantitative time-series econometric methodology, utilizing fifty-nine quarterly observations obtained from the Central Bank of Nigeria (CBN) and the Federal Airports Authority of Nigeria (FAAN). Data were analysed using descriptive statistics, correlation analysis, the Augmented Dickey-Fuller (ADF) unit root test, Johansen cointegration test, and Error Correction Model (ECM) estimation with EViews 10. EViews 10 was adopted because it provides robust and reliable procedures for time-series econometric analysis, including unit root, cointegration, and error correction estimation. The unit root results revealed that all variables were integrated of order one, $I(1)$, while the Johansen cointegration test confirmed the existence of a stable long-run relationship among the variables. The empirical findings indicated that POS transaction values exerted a positive and statistically significant effect on aviation sector output; MB transaction values had a negative and statistically significant effect; WBI transaction values had a negative but statistically insignificant effect; and ATM transaction values had a positive and statistically significant effect on aviation sector output. The study concluded that digital payment systems significantly influence aviation sector growth, although the magnitude and direction of the effects vary across payment channels. Consequently, the study recommended expanding POS infrastructure, improving the reliability and security of mobile banking services, strengthening web-based payment platforms, and sustaining the deployment of Automated Teller Machines at airports to enhance the growth of Nigeria's aviation sector.*

KEYWORDS: Digital Payment Systems, Aviation Sector Growth, Point of Sale, Mobile Banking, Web-based Transactions, Automated Teller Machine, Nigeria.



INTRODUCTION

The aviation sector is greatly recognised as a major push of economic advancement because it supports trade, tourism and the movement of people and goods across regions, which in turn boosts national productivity (Adewale, 2021). Aviation sector growth essentially refers to the steady increase in air transport activities, airline operations, passenger traffic, cargo movement and the sector's contribution to national output or GDP. This growth is important because strong aviation performance improves global connectivity, attracts investment, increases government revenue and helps countries integrate more effectively into the global economy (Ebimobowei & Tonye, 2022). Countries with a growing aviation sector experience wider economic opportunity, improved business operations and better mobility for citizens. In Nigeria, the need for stronger aviation sector growth has become particularly important given the country's size, population and its role as a major economic hub in West Africa (Okoye & Nwankwo, 2023).

However, the aviation sector in Nigeria continues to face several challenges that limit its growth, such as high operating costs, poor infrastructure, inconsistent regulations and fluctuations in customer demand (Ogunyemi & Fagbemi, 2022). These issues have slowed the ability of airlines to expand operations and have affected the sector's overall output. Another major concern is the slow adoption of modern technologies that support seamless financial transactions, customer management and revenue collection (Chukwuma & Ibrahim, 2023). Many customers still experience difficulties in purchasing tickets, processing refunds or making real-time payments due to delays associated with traditional payment methods. Towards the end of these discussions, experts increasingly highlight that improving digital payment systems may help address many of these operational and customer-service barriers and support the growth of the aviation sector (Adeoti, 2022).

Digital payment systems refer to technology-driven platforms that allow customers and businesses to send, receive and record payments electronically, such as point-of-sale systems, mobile wallets, online banking and automated teller machines (Adewuyi, 2021). These systems have transformed the financial landscape in Nigeria by making transactions faster, more secure and more convenient for both businesses and consumers. In the aviation sector, digital payments can make ticket buying, seat reservations and other service-related transactions faster, which improves customer satisfaction and increases airline revenue (Nwachukwu & Hassan, 2023). By reducing cash-based operations and improving financial transparency, digital payment systems help airlines manage their finances more efficiently and reduce the risk of revenue leakages. This suggests that digital payment channels may hold essential part in supporting aviation sector growth in Nigeria by promoting efficiency, enhancing customer experience and increasing transaction reliability (Ojo & Salami, 2024).

The key dimensions of digital payment systems that are relevant to the aviation sector include Point-of-Sale (POS) transactions, mobile payment transactions, web-based internet transactions and Automated Teller Machine (ATM) transactions. POS transactions allow customers to pay physically at airline counters or booking centres, and improved POS efficiency may reduce delays and increase customer convenience (Oluwole & Ajayi, 2022). Mobile payment channels, such as mobile banking apps and mobile wallets, make it easier for customers to buy tickets from anywhere, which may increase ticket sales and support aviation growth (Hassan & Udo, 2023). Web-based internet transactions, which include online bank transfers and digital card payments on websites, support online booking platforms and



improve access to airline services, especially for tech-savvy customers (Olatunde & Mike, 2024). ATM transactions also support aviation operations by providing customers with access to cash and banking services that can be used for travel-related payments. As each of these digital payment channels improves accessibility, reduces transaction time and enhances customer satisfaction, they can collectively contribute towards improving aviation sector output. Given the important role digital payments play in stimulating economic activities, there is a strong need to empirically examine how these digital payment systems influence aviation sector growth in Nigeria. This study therefore becomes necessary to provide evidence-based insights that can guide aviation operators, policymakers and financial institutions towards improving sector performance and national economic development.

Problem Statement/Justification

The growth of the aviation sector in Nigeria remains below its potential despite its recognised role in supporting national development, enhancing mobility and contributing to GDP performance. Studies such as Adewale (2021) and Okoye and Nwankwo (2023) emphasise that the aviation sector is a major driver of economic competitiveness, yet Nigeria continues to struggle with operational inefficiencies, revenue leakages and slow technological adoption. The sector still relies heavily on manual or semi-digital processes, which limit transaction speed, financial transparency and customer satisfaction, thereby restricting aviation output. Evidence from Olakulehin, Afolayan, Olagbemiro and Babalola (2024) indicates that although aviation businesses in Nigeria increasingly adopt digital tools for marketing and customer engagement, the financial side of aviation operations remains largely under-optimised. This creates a performance gap, as digital marketing alone is insufficient to stimulate sectoral growth without a corresponding shift toward efficient, technology-driven payment systems. Furthermore, studies on technology adoption such as Opuola Charles (2025) show that digital transformation within aviation institutions depends significantly on organisational readiness and the integration of supporting digital systems, suggesting that the absence of robust digital payment structures may be one of the missing elements slowing aviation growth.

While digital payment systems have been shown to stimulate economic performance and enhance financial efficiency in broader economic contexts, their specific influence on the aviation sector in Nigeria remains underexplored. Empirical evidence from digital payment research by Donald, Olopade and Eseyi (2023), as well as Chukwunulu (2019) and Afaha (2019), demonstrates that digital payment channels such as POS transactions, mobile payments and internet-based transactions significantly affect economic output by improving transaction convenience, reducing operational delays and promoting financial inclusion. However, none of these studies isolate the aviation sector despite its heavy reliance on timely and secure financial transactions for activities such as ticket purchases, rescheduling, cargo payments and ancillary services. The gap becomes more pronounced considering that infrastructure limitations, unreliable ATM access, unstable network quality and customer dissatisfaction with delayed transactions continue to affect digital payment adoption in Nigeria, as highlighted by Donald et al. (2023). These shortcomings indicate the need to examine how digital payment systems may support or constrain aviation sector performance. Therefore, this study is justified because it provides a sector-specific assessment of how POS transactions, mobile payments, web-based payments and ATM transactions influence aviation sector growth in Nigeria, offering timely evidence to guide aviation regulators,



airlines and policymakers in strengthening digital financial infrastructure to enhance sectoral performance and economic output.

Objective(s) of the Study

The aim of this study is to examine the impact of digital payment systems on aviation sector growth in Nigeria. Specifically, the study will seek to:

1. Assess the impact of Point of Sale (POS) transaction values on aviation sector output in Nigeria.
2. Examine the impact of mobile payment transaction values on aviation sector output in Nigeria.
3. Investigate the impact of web-based internet transaction values on aviation sector output in Nigeria.
4. Evaluate the impact of Automated Teller Machine (ATM) transaction values on aviation sector output in Nigeria.

Research Hypotheses

H₀₁: Point of Sale (POS) transaction values have no significant impact on aviation sector output in Nigeria.

H₀₂: Mobile payment transaction values have no significant impact on aviation sector output in Nigeria.

H₀₃: Web-based internet transaction values have no significant impact on aviation sector output in Nigeria.

H₀₄: Automated Teller Machine (ATM) transaction values have no significant impact on aviation sector output in Nigeria.

LITERATURE REVIEW

Conceptual Framework

The conceptual framework of this study links digital payment systems to aviation sector growth in Nigeria by illustrating how innovations in financial transactions can influence sectoral performance. Digital payment systems encompass electronic channels that facilitate cashless transactions, including Point of Sale (POS) terminals, mobile payments, web-based internet transactions, and Automated Teller Machine (ATM) transactions, which collectively enhance the speed, security, and efficiency of financial operations (Donald, Olopade & Eseyi, 2023; Chukwunulu, 2019). These systems reduce the reliance on physical cash, promote financial inclusion, and enable seamless revenue collection for service providers. Aviation sector growth, also, refers to the expansion of output, contribution to GDP, operational efficiency, and overall performance of the industry, capturing both passenger and cargo traffic, as well as ancillary revenue streams (Olakulehin, Afolayan, Olagbemi & Babalola, 2024). The conceptual relationship posits that increased adoption and usage of digital



payment channels can positively influence aviation sector growth by facilitating faster ticket sales, improving liquidity management for airlines, reducing transaction errors, and enhancing customer satisfaction.

Theoretical Framework

Technology Acceptance Model (TAM), formed by Davis in 1989, offers a foundational explanation for how users' acceptance and utilise new technological systems by emphasising expected usefulness and effortlessness of utilisation as the main factors of technology acceptance. According to Davis (1989), users are prone to adopt digital forums when they are convinced with such systems will enhance their performance and require minimal effort to operate. Later research by Venkatesh and Bala (2008) broaden TAM by demonstrating that external factors, including system characteristics, social influence and organisational context, shape user perceptions and determine behavioural intention. In the context of digital payment systems, TAM explains why consumers and businesses engage with platforms such as POS terminals, mobile payments, internet banking and ATM services. The model is useful to the present research as the adoption of digital payment systems in the aviation sector depends on passengers' and service providers' perceptions of ease, convenience and efficiency. As airlines and aviation agencies increasingly digitalise payment processes, TAM offers insight into how supposed convenience and simplicity of utilisation shape user behaviour, impact transaction adoption and ultimately affect aviation sector performance.

Innovation Diffusion Theory (IDT), proposed by Rogers in 1962, describes how new ideas spread across individuals, organisations and systems over time. According to Everett Rogers (2003), five major characteristics affect how quickly an innovation is adopted: relative advantage, compatibility, complexity, trialability, and observability. Technologies that provide visible advantages, align with existing systems, are stress-free to utilise and allow for experimentation are prone to be adopted widely. Numerous researchers, including Greenhalgh et al. (2004), have applied this theory to understand the acceptance of digital financial innovations and technology-driven service delivery. IDT is particularly relevant to digital payment systems, as it clarifies why certain channels such as mobile payments and web-based transactions diffuse more rapidly in modern economies. Within the aviation sector, the increased use of e-ticketing, online booking platforms and digital payment channels reflects the diffusion of innovation driven by convenience, speed and customer preference. IDT therefore supports this study by explaining the varying rates of adoption across different digital payment platforms and how these differences can influence aviation sector growth in Nigeria.

Unified Theory of Acceptance and Use of Technology (UTAUT), was advanced by Venkatesh, Morris, Davis and Davis in 2003, integrates eight previous models of technology acceptance to explain user behaviour through factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions. According to Venkatesh et al. (2003), individual adoption of technology depends on beliefs about the technology's ability to improve performance, the ease associated with its use, social pressures and the availability of infrastructural or organisational support. Subsequent studies, such as Williams, Rana and Dwivedi (2015), confirm the robustness of UTAUT in predicting behavioural intention across different technological contexts, particularly digital financial technologies. The model is relevant to digital payment adoption in aviation because users' willingness to adopt POS payments, mobile transactions, online banking or ATM transactions depends not only on



believed benefits and stress-free utilisation but also on social encouragement and availability of supportive infrastructure such as stable networks and secure platforms. UTAUT helps explain why certain digital payment platforms experience higher adoption rates and how infrastructural factors shape aviation customers' and operators' behaviour.

Anchoring this study on the Technology Acceptance Model (TAM) is most appropriate because digital payment adoption within the aviation sector is primarily driven by users' perceptions of importance and stress-free utilisation, which directly impact their readiness to embrace these systems. While IDT and UTAUT provide broader explanations of innovation diffusion and technology acceptance, TAM offers a more specific and widely validated framework for analysing how digital financial technologies are accepted by consumers and organisations in service-driven industries. The focus of the present study on POS payments, mobile payment technologies, internet-based transactions and ATM usage aligns more closely with TAM's core constructs, making it the most suitable theoretical anchor for analysing how digital payment systems affects growth of aviation sector in Nigeria.

Empirical Evidence

Olakulehin, Afolayan, Olagbemiro and Babalola (2024) investigated the influence of online marketing on aviation firms in Nigeria using twenty-three years of secondary data sourced from the Nigeria Civil Aviation Authority, and their findings showed that e-ticketing, web traffic and social media reach have long-run co-movement with aviation business performance, implying that digital interaction enhances sectoral outcomes. Their study, however, focused on digital marketing rather than financial technologies. Similarly, Donald, Olopade and Eseyi (2023) examined how digital payment indicators such as ATM transactions, POS transactions, mobile application payments and instant payments affect Nigeria's GDP using quarterly data from 2009–2020, discovering that POS and mobile payments positively influence GDP while ATM and instant payments exert negative but significant effects, largely due to infrastructural limitations. Although insightful, their study was economy-wide and did not explore sector-specific outcomes such as aviation. In the same vein, Opuola-Charles (2025) analysed technology adoption within the Nigerian Civil Aviation Authority using a cross-sectional survey and Structural Equation Modelling, finding that organisational readiness, perceived usefulness and compatibility strongly predict digital transformation, but the study did not examine digital payment systems or their economic implications. Additionally, studies by Chukwunulu (2019) and Afaha (2019) reported that financial innovation and electronic payment systems positively influence Nigeria's economic performance, yet both studies used aggregated data, focused on the general economy and did not disaggregate digital payment channels in relation to a specific sector. These empirical works collectively show that while digital technology, financial innovation and digital payment systems influence economic activity, none has directly examined how distinct digital payment channels such as POS transactions, mobile payments, web-based transactions and ATM transactions affect aviation sector growth in Nigeria. This omission presents a critical gap in literature, particularly because the aviation sector relies heavily on fast, secure and reliable payment systems for ticket sales, reservations and ancillary services. The present study fills this gap by offering a sector-specific, disaggregated analysis of digital payment indicators and their impact on aviation sector output, thereby offering more targeted policy evidence than previous generalised or non-financial studies.



METHODOLOGY

The research adopts an ex post facto design to ascertain how POS transactions, mobile payments, web-based transactions and ATM transactions influence aviation sector growth in Nigeria, measured by Aviation Sector Output. This design is suitable because it uses historical data without manipulating variables and is widely applied in economic and financial research (Sekaran & Bougie, 2016).

Study Area

The study focuses on Nigeria, using national-level data on digital payment activities from the Central Bank of Nigeria (CBN) and aviation sector output from the Federal Airports Authority of Nigeria. The period covered is from the first quarter of 2010 to the fourth quarter of 2024.

Sources of Data Collection

The study relies entirely on data from CBN bulletin for digital payment indicators and the Federal Airports Authority of Nigeria (FAAN) for aviation sector output. These institutions publish audited and regulated data, ensuring accuracy, consistency and reliability across the period under review. Using aggregate quarterly time series data from Q1 2010 to Q4 2024 yields sixty observations for each variable, forming the complete dataset for analysis. A purposive sampling technique guides the selection of variables, ensuring that the study focuses solely on digital payment channels and aviation growth indicators that directly align with the research objectives.

Method of Data Analysis

The data analysis begins with stationarity testing using the Augmented Dickey Fuller (ADF) test, followed by the A cointegration test to identify long-run relationships among the variables. The Vector Error Correction Model (VECM) is then employed to estimate both short-run and long-run effects of digital payment systems on aviation sector output in Nigeria.

Model Specification

The study uses multiple regression analysis to ascertain the effect of electronic banking channels on the profitability of deposit money banks. The model is specified as follows:

$$AVSO = f(POS, MB, INTBT, ATM) \quad (i)$$

Econometric Form:

$$AVSO = \beta_0 + \beta_1 POS_t + \beta_2 MOB_t + \beta_3 WEB_t + \beta_4 ATM_t + \varepsilon \quad (ii)$$

VECM Equation

The empirical VECM is specified as:

$$\Delta AVSO_t = \alpha + \sum \beta_1 \Delta POS_{t-i} + \sum \beta_2 \Delta MOB_{t-i} + \sum \beta_3 \Delta WEB_{t-i} + \sum \beta_4 \Delta ATM_{t-i} + \lambda ECT_{t-1} + \varepsilon_t \quad (iii)$$



Where:

- AVSO = Aviation Sector Output (dependent variable)
- POS = Point of Sale transaction values (independent variable)
- MB = Mobile Banking transaction values (independent variable)
- WEB = Web-based Internet transaction values (independent variable)
- ATM = Automated Teller Machine transaction values (independent variable)
- β_0 = Intercept
- $\beta_1, \beta_2, \beta_3, \beta_4$ = Coefficients of the independent variables
- ε = Error term

RESULT AND DISCUSSION

Table 1: Descriptive Statistics

	AVSO	POS	MOB	WEB	ATM
Mean	42971.39	5696969.	11142636	37223173	2666032.
Median	26534.60	324131.5	260589.4	45577.66	1539266.
Maximum	248153.0	54937293	85909815	1.81E+08	10336556
Minimum	7223.910	910.0000	380.0000	3370.000	25330.00
Jarque-Bera	245.8854	153.5626	81.19623	12.91871	10.99520
Probability	0.000000	0.000000	0.000000	0.001566	0.004097
Sum	2535312.	3.36E+08	6.57E+08	2.20E+09	1.57E+08
Sum Sq. Dev.	1.20E+11	9.09E+15	2.96E+16	1.95E+17	4.53E+14
Observations	59	59	59	59	59

Source: *Eviews 10*

Table 1. presents the descriptive statistics of Aviation Sector Output (AVSO) and the explanatory variables over 59 quarterly observations. The mean value of AVSO is 42,971.39, indicating the average level of aviation sector output during the study period. Among the digital payment variables, WEB recorded the highest average value of 37,223,173, followed by Mobile Banking (MOB) with 11,142,636, Point of Sale (POS) with 5,696,969, and ATM with 2,666,032. This suggests that web-based transactions were the most widely utilized digital payment channel. The high standard deviation values indicate significant fluctuations in all variables over time. The positive skewness coefficients show that the series are right-skewed, while the Jarque-Bera probabilities, all below 0.05, confirm that the variables are not normally distributed. These results indicate substantial variability in both aviation output and electronic payment activities during the period under review.

**Table 2: Correlation Results**

	AVSO	POS	MOB	WEB	ATM
AVSO	1.000000				
POS	0.820629	1.000000			
MOB	0.788632	0.887477	1.000000		
WEB	0.681689	0.742221	0.785052	1.000000	
ATM	0.587212	0.604004	0.669565	0.820322	1.000000

Source: *Eviews 10*

Table 2 presents the correlation, revealing the extent of association between Aviation Sector Output (AVSO) and the selected electronic payment variables. The results indicate that AVSO is positively correlated with all the explanatory variables, implying that a rise in digital payment activities is associated with improvements in aviation sector output. Specifically, AVSO has a strong positive relationship with Point of Sale (POS) transactions ($r = 0.820629$) and Mobile Banking (MOB) transactions ($r = 0.788632$), while Web-based Internet transactions (WEB) ($r = 0.681689$) and Automated Teller Machine (ATM) transactions ($r = 0.587212$) also exhibit moderate positive associations. The correlation among the independent variables is similarly positive, with the highest relationship observed between POS and MOB ($r = 0.887477$). Overall, the results suggest that digital payment channels move in the same direction as aviation sector output, indicating the potential for electronic payment adoption to contribute positively to the expansion and performance of the aviation sector in Nigeria.

Table 3: Augmented Dickey-Fuller (ADF) Unit Root Test Results at 5% Level

Variable	Level ADF Statistic	5% Critical Prob. Value	1st Df ADF Statistic	5% Critical Prob. Value	Order of Integration
AVSO	3.906290	-3.506374	0.0810 -5.434987	-3.508508	0.0300 I(1)
MOB	0.052707	-3.495295	0.9960 -5.925322	-3.508508	0.0000 I(1)
POS	2.139336	-3.502373	0.4200 -7.353000	-3.502373	0.0010 I(1)
WEB	-1.512997	-3.489228	0.8138 -9.967817	-3.490662	0.0000 I(1)
ATM	-2.732296	-3.489228	0.2281 -9.549876	-3.490662	0.0000 I(1)

Source: *EViews 10*.

Table 3 shows that none of the variables, namely Aviation Sector Output (AVSO), Mobile Banking (MOB), Point of Sale (POS), Web-based transactions (WEB), and ATM transactions, are stationary at their levels because their absolute ADF test statistics are smaller than the 5 percent critical values and their probability values are greater than 0.05. However, all variables become stationary after first differencing, as evidenced by probability values below 0.05 and ADF statistics that exceed the 5 percent critical values in absolute terms. This indicates that all variables are integrated of order one, I(1). Since the variables are all I(1), the next step is to conduct a cointegration test to determine whether a long-run equilibrium relationship exists among them.

**Table 4: Johansen Cointegration Test**

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.893765	215.4808	69.81889	0.0000
At most 1 *	0.570021	87.68112	47.85613	0.0000
At most 2 *	0.394818	39.57201	29.79707	0.0028
At most 3	0.157979	10.94513	15.49471	0.2149
At most 4	0.019870	1.143968	3.841466	0.2848

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.893765	127.7997	33.87687	0.0000
At most 1 *	0.570021	48.10911	27.58434	0.0000
At most 2 *	0.394818	28.62688	21.13162	0.0037
At most 3	0.157979	9.801159	14.26460	0.2253
At most 4	0.019870	1.143968	3.841466	0.2848

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

Source: *Eviews 10*

Table 4 presents the cointegration test results and shows that both the Trace and Maximum Eigenvalue statistics identify three cointegrating equations at the 5 percent significance level. This is evidenced by the rejection of the null hypotheses for “None,” “At most 1,” and “At most 2,” as their probability values are less than 0.05, while the null hypothesis is not rejected from “At most 3” onward. The result affirms the presence of a long-run equilibrium relationship among Aviation Sector Output (AVSO), Point of Sale (POS), Mobile Banking (MOB), Web-based transactions (WEB), and ATM transactions. Since cointegration exists among the variables, the next step is to estimate a VECM to capture both the short-run dynamics and the speed of adjustment toward long-run equilibrium.

**Table 5: Vector Error Correction Model (VECM)**

Dependent Variable: D(AVSO)

Method: Least Squares

Date: 05/17/26 Time: 13:32

Sample (adjusted): 2010Q2 2024Q3

Included observations: 58 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	93.24442	2170.706	0.042956	0.9659
D(POS)	0.007795	0.001356	5.746550	0.0000
D(MOB)	-0.002648	0.000857	-3.091800	0.0032
D(WEB)	-8.53E-05	0.000142	-0.599135	0.5517
D(ATM)	0.005824	0.002840	2.050762	0.0453
ECM(-1)	-0.789458	0.150869	-5.232739	0.0000
R-squared	0.525752	Mean dependent var		4153.949
Adjusted R-squared	0.480151	S.D. dependent var		20259.37
S.E. of regression	14607.12	Akaike info criterion		22.11410
Sum squared resid	1.11E+10	Schwarz criterion		22.32725
Log likelihood	-635.3090	Hannan-Quinn criter.		22.19713
F-statistic	11.52945	Durbin-Watson stat		2.059415
Prob(F-statistic)	0.000000			

Source: *Eviews 10*

Table 5 presents the VECM results and shows that Point of Sale (POS) transactions and ATM transactions have significant positive effects on Aviation Sector Output (AVSO), while Mobile Banking (MOB) has a significant negative effect. Web-based transactions (WEB) have no significant short-run effect because their probability value exceeds 0.05. The error correction term, ECM(-1), is negative and statistically significant (-0.789458; $p < 0.05$), affirming the presence of a stable long-run interplay and indicating that approximately 78.9 percent of any short-run disequilibrium is corrected within one quarter. The R-squared value of 0.525752 shows that about 52.6 percent of the variations in aviation sector output are explained by the included digital payment variables, while the significant F-statistic indicates that the model is jointly substantial. Since the model is stable and statistically valid, the next step is to conduct post-estimation diagnostic tests to confirm the absence of serial correlation, heteroskedasticity, and model instability.

**Table 6: Model Reliability and Stability Test**

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	4.452339	Prob. F(2,50)	0.2166
Obs*R-squared	8.767918	Prob. Chi-Square(2)	0.2125

Variance Inflation Factors

Date: 05/17/26 Time: 13:34

Sample: 2010Q1 2024Q3

Included observations: 58

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	4711965.	1.280858	NA
D(POS)	1.84E-06	2.743770	2.295039
D(MOB)	7.34E-07	2.738660	2.301100
D(WEB)	2.03E-08	1.476432	1.422720
D(ATM)	8.07E-06	1.716292	1.677891
ECM(-1)	0.022761	1.255220	1.255129

Ramsey RESET Test

Equation: UNTITLED

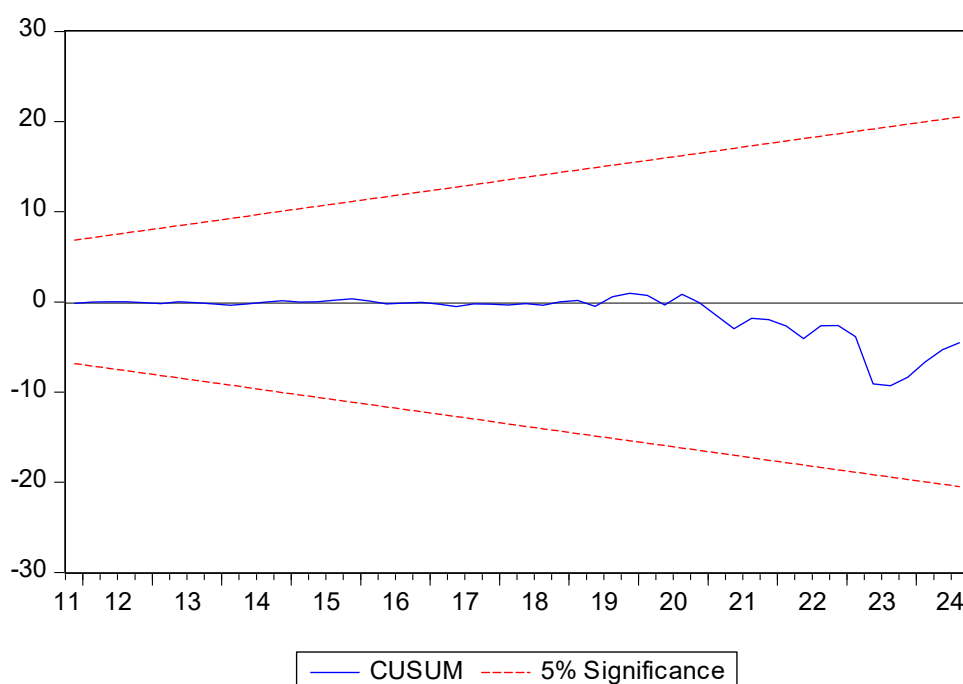
Specification: D(AVSO) C D(POS) D(MOB) D(WEB) D(ATM) ECM(-1)

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.601186	51	0.5504
F-statistic	0.361425	(1, 51)	0.5504
Likelihood ratio	0.409583	1	0.5222

Source: *Eviews 10*

Table 6 presents the model reliability and stability test results. The Serial Correlation LM test reports probability values of 0.2166 and 0.2125, which are greater than 0.05, indicating that the residuals are free from serial correlation. The Variance Inflation Factor results show that all centered VIF values range from 1.26 to 2.30, well below the threshold of 10, confirming the absence of multicollinearity among the explanatory variables. In addition, the Ramsey RESET test produces a probability value of 0.5504, which exceeds 0.05, indicating that the model is correctly specified and does not suffer from omitted variable bias. Overall, the results confirm that the estimated VECM is statistically reliable, stable, and suitable for valid interpretation and policy recommendations.



As shown in Fig.1 (CUSUM test), the CUSUM stability test reveals that the cumulative sum of recursive residuals remains entirely within the 5 percent alpha boundaries throughout the research interval. This implies that the estimated VECM is structurally stable and that the coefficients do not exhibit significant changes over time. In other words, there is no indication of structural instability in the model, confirming that the estimated parameters are consistent and reliable for inference, forecasting, and policy recommendations.

Test of Hypotheses

The research hypotheses were tested at the 5 percent level of significance using the VECM results presented in Table 5. The decision rule is to reject the null hypothesis if the p-value is less than 0.05; otherwise, the null hypothesis is not rejected.

Hypothesis One

H01: Point of Sale (POS) transaction values have no significant impact on aviation sector output in Nigeria.

The VECM result in Table 5 shows that (POS) transaction values have a coefficient of 0.007795, a t-statistic of 5.746550, and a probability value of 0.0000. Since the probability value is less than the 5 percent alpha, the null hypothesis is rejected. This implies that POS transaction values have a positive and statistically significant impact on aviation sector output in Nigeria. Specifically, an increase in POS transaction values results to a rise in aviation sector output. This suggests that the growing use of POS payment systems enhances transaction convenience and efficiency, thereby contributing positively to the expansion of the aviation sector in Nigeria.

Hypothesis Two

H02: Mobile payment transaction values have no significant impact on aviation sector output in Nigeria.



The VECM result reveals that (MOB) transaction values have a coefficient of -0.002648, a t-statistic of -3.091800, and a probability value of 0.0032. Since the probability value is less than 0.05, the null hypothesis is rejected. This means that mobile payment transaction values have a negative and statistically substantial influence on aviation sector output in Nigeria. The negative coefficient implies that increases in mobile payment transactions are associated with a decline in aviation sector output during the study period. This may reflect operational inefficiencies, substitution effects, or other structural factors affecting the aviation sector.

Hypothesis Three

H03: Web-based internet transaction values have no significant impact on aviation sector output in Nigeria.

The result for (WEB) transaction values show a coefficient of -0.0000853, a t-statistic of -0.599135, and a probability value of 0.5517. Since the probability value is greater than 0.05, the null hypothesis is not rejected. This indicates that web-based internet transaction values have an adverse and an insignificant influence on aviation sector output in Nigeria. Therefore, changes in web-based transaction values do not exert a meaningful influence on aviation sector growth during the period covered by the study.

Hypothesis Four

H04: Automated Teller Machine (ATM) transaction values have no significant impact on aviation sector output in Nigeria.

The VECM result indicates that ATM transaction values have a coefficient of 0.005824, a t-statistic of 2.050762, and a probability value of 0.0453. Since the probability value is less than 0.05, the null hypothesis is rejected. This infers that ATM transaction values have a favourable and statistically substantial influence on aviation sector output in Nigeria. The positive coefficient suggests that increased ATM transaction activity contributes to improvements in aviation sector output, likely by facilitating easier access to funds and supporting customer payment activities within the aviation industry.

DISCUSSION OF FINDINGS

The results revealed that Point of Sale (POS) transaction values have a positive and substantial effect on aviation sector output in Nigeria, with a coefficient of 0.007795 and a probability value of 0.0000. This infers that increases in POS transaction activity significantly enhance aviation sector growth by improving the ease and speed of ticket purchases, airport service payments and related commercial transactions. The positive and significant effect suggests that POS technology strengthens operational efficiency and customer convenience, thereby stimulating sectoral output. This result is consistent with the findings of Donald, Olopade and Eseyi (2023), who reported that POS transactions positively and significantly influenced Nigeria's Gross Domestic Product. It also supports the conclusions of Chukwunulu (2019) and Afaha (2019), who found that electronic payment systems and financial innovation contribute positively to economic performance. In addition, the result complements the study of Olakulehin et al. (2024), which established that digital interaction tools such as e-ticketing and web traffic improve aviation business performance. The



implication is that policies aimed at expanding POS infrastructure and improving transaction reliability can enhance expansion in the Nigerian aviation sector.

The research further discloses that Mobile Banking (MOB) transaction values exert a negative and statistically significant effect on aviation sector output, with a coefficient of -0.002648 and a p-value of 0.0032. This indicates that increases in mobile payment transactions are associated with a reduction in aviation sector output during the period under review. The negative and significant effect suggests that the benefits of mobile payment adoption may be constrained by network instability, transaction failures, cybersecurity concerns or operational inefficiencies that discourage effective use within the aviation sector. This finding contradicts the results of Donald et al. (2023), who found that mobile payment transactions positively influenced Nigeria's GDP, and also differs from the general conclusions of Chukwunulu (2019) and Afaha (2019), which emphasized the growth-enhancing role of financial innovation. The divergence implies that while mobile payments may support the broader economy, their impact on the aviation sector may be weakened by industry-specific challenges. This finding highlights the need to strengthen mobile payment security, infrastructure and user confidence in aviation-related transactions.

The result also indicates that Web-based Internet (WEB) transaction values have a negative but statistically insignificant effect on aviation sector output, as shown by a coefficient of -0.0000853 and a probability value of 0.5517. This means that changes in web-based transaction values do not exert a meaningful influence on aviation sector growth. Although the aviation industry relies heavily on online booking and reservation systems, the insignificant result suggests that web-based payments alone may not be sufficient to drive output when other digital payment channels are taken into account. This finding partially contrasts with Olakulehin et al. (2024), who found that e-ticketing and web traffic exhibit long-run co-movement with aviation business performance. However, the difference is understandable because their study focused on digital marketing indicators rather than actual financial transaction values. The implication is that web-based transactions may support customer engagement but may not independently contribute significantly to aviation sector growth unless complemented by broader operational improvements.

Finally, the findings show that Automated Teller Machine (ATM) transaction values have a favourable and statistically substantial outcome on aviation sector output, with a coefficient of 0.005824 and a probability value of 0.0453. This indicates that increases in ATM transaction activity significantly promote aviation sector growth. The positive effect suggests that ATM networks continue to facilitate access to funds for passengers and businesses, thereby supporting the purchase of tickets and other aviation-related services. This result differs from Donald et al. (2023), who found that ATM transactions exerted a negative but significant effect on Nigeria's GDP, which they attributed to infrastructural limitations. The present study suggests that, within the aviation sector, ATM transactions remain a useful payment channel that contributes positively to sectoral performance. This finding also aligns broadly with the conclusions of Chukwunulu (2019) and Afaha (2019), who emphasized the beneficial role of electronic payment systems in promoting economic activity. The implication is that maintaining reliable ATM infrastructure around airports and travel hubs can continue to support aviation sector expansion in Nigeria.



CONCLUSION AND RECOMMENDATIONS

Conclusion

The research concludes that digital payment systems hold an essential part in shaping aviation sector growth in Nigeria, although the effects vary across payment channels. Point of Sale and Automated Teller Machine transactions significantly enhance aviation sector output by improving payment accessibility and operational efficiency. Mobile Banking transactions, however, exert a significant negative effect, suggesting that unresolved issues such as network failures, transaction reversals, and security concerns may hinder the benefits of mobile payment adoption within the aviation sector. Web-based Internet transactions do not significantly influence aviation sector output, indicating that online payment channels alone are insufficient to drive growth without complementary improvements in service delivery and infrastructure. Overall, the evidence demonstrates that the growth of the Nigerian aviation sector hinges on not only on the expansion of digital payment systems but also on the reliability, security, and efficiency of those systems. Strengthening effective payment channels and addressing weaknesses in underperforming platforms will improve customer experience, enhance revenue generation, and support sustainable aviation sector growth.

Recommendations

Based on the findings, the study suggests that:

1. Airport operators, airlines, and financial institutions should expand and upgrade Point of Sale infrastructure across airports and ticketing outlets to ensure faster and more reliable transactions, since POS transactions had a favourable and substantial outcome on aviation sector output.
2. Regulatory authorities, payment service providers, and telecommunication companies should improve the reliability and security of mobile banking platforms by reducing transaction failures, strengthening cybersecurity, and enhancing network stability, in order to reverse the negative and significant impact of mobile payment transactions on aviation sector growth.
3. Airlines and airport service providers should enhance the functionality and integration of web-based payment systems with reservation and customer support platforms so that online transactions can contribute more effectively to aviation sector performance.
4. Banks and airport management should maintain and increase the availability of Automated Teller Machines in and around airports while ensuring consistent cash availability and system uptime, given the favourable and substantial outcome of ATM transactions on aviation sector output.

Acknowledgement: The authors gratefully acknowledge the support of the Tertiary Education Trust Fund (TETFUND), through the African Aviation and Aerospace University Abuja, Nigeria.



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