ISSN: 4015 – 5784
Volume 11, Number 2, 2026
Management and Accounting Innovative Journal

DIGITAL INFRASTRUCTURES AND FINANCIAL PERFORMANCE OF LISTED TELECOMMUNICATION FIRMS IN NIGERIA.

ZORKPA Charles Barinem, PhD
Department of Accounting, Faculty of Administration and Management, Ignatius Ajuru University of Education, Rumuolumeni Port Harcourt, Rivers State, Nigeria.
charlesz2007@yahoo.com
07034324365

and

UWAKWE Theresa Nnenna, PhD
Department of Accountancy, Faculty of Management Sciences, Alex Ekwueme Federal University Ndufu, Alike Ebonyi State, Nigeria.
austinebliss3@gmail.com
08109800614

ABSTRACT
This study examined the relationship between digital infrastructures and financial performance of listed telecommunication companies in Nigeria. The study was motivated by the increasing dependence of telecommunication companies on network infrastructure, broadband capacity, 4G and 5G technologies, fibre connectivity, information technology systems and other digital assets for the delivery of telecommunications and digital services. The study adopted an ex-post facto research design because the investigation relied entirely on historical secondary data obtained from audited annual reports and financial statements of listed telecommunications companies. The population and sample comprised the two telecommunications companies listed on the Nigerian Exchange Group during the selected study period, namely MTN Nigeria Communications Plc and Airtel Africa Plc. The study covered 2022–2024. Digital infrastructure was operationalised using network investment intensity and digital connectivity intensity, while financial performance was measured using return on assets and EBITDA margin. Data were analysed using descriptive statistics, trend analysis and comparative analysis. The evidence from the selected annual reports indicates that sustained investment in network capacity, data infrastructure, fibre connectivity and other digital infrastructure was associated with expansion in data usage, data customers and revenue-generating digital services. However, the financial benefits were not uniform across the firms because exchange-rate depreciation, inflation, energy costs, financing costs and other macroeconomic factors affected reported profitability. MTN Nigeria, for instance, recorded strong revenue and data-user growth but reported significant losses in 2023 and 2024 because of foreign-exchange effects. Airtel Africa also experienced strong growth in data customers and network infrastructure, although its 2024 reported profit was affected by foreign-exchange losses. The study concludes that digital infrastructure remains an important strategic resource for improving the operational and financial capacity of listed telecommunications companies in Nigeria, although infrastructure investment alone does not guarantee profitability. The study recommends sustained investment in network capacity, fibre infrastructure, 4G/5G technology, digital platforms and energy-efficient infrastructure, together with effective foreign-exchange and cost-management strategies.

Keywords: Digital infrastructure, network investment, digital connectivity, financial performance, telecommunications companies, Nigeria.

INTRODUCTION
Digital "infrastructure refers to the physical, technological, and network resources that facilitate digital communication, information processing, connectivity, and the delivery of digital services. It encompasses telecommunications networks, fibre-optic cables, base stations, data centres, servers, broadband infrastructure, network equipment, digital platforms, cloud infrastructure, and other technological systems. Within telecommunications companies, digital infrastructure constitutes the foundation upon which service delivery, operational activities, and revenue-generating processes depend.

The telecommunications industry has undergone a significant transformation from traditional voice communication towards data-driven digital services. The widespread adoption of smartphones and internet-enabled devices has increased demand for broadband connectivity and mobile data services, making network infrastructure investment increasingly important. For instance, Airtel Africa reported that its total customer base increased to 152.7 million in 2024, while its data customer base grew by 17.8% to 64.4 million. The company also recorded substantial growth in data usage, supported by the expansion of its data network and increased network capacity (Airtel Africa PLC, 2024).

Similarly, MTN Nigeria has continued to make substantial investments in network infrastructure in response to increasing demand for digital services. The company's 2024 audited results indicated that its subscriber base increased to 80.9 million, while active data users reached 47.7 million. During the period, capital expenditure excluding leases amounted to approximately ₦443.5 billion, with significant investment directed towards expanding network coverage and capacity. MTN Nigeria also reported that its 4G network coverage increased to approximately 81.5% of the population in 2023, compared with 79.1% in 2022, alongside continued expansion of 5G coverage. The growth in data revenue, which increased by 38.6% during the year, further demonstrates the growing commercial significance of data-oriented network infrastructure.

Airtel Africa has equally undertaken substantial investments in digital infrastructure to support its expanding customer and data services. In 2024, the company reported more than 34,500 infrastructure sites, over 75,400 kilometres of connecting fibre, and 95% 4G coverage across its markets. The company invested approximately $737 million in capital expenditure, with a significant proportion allocated to growth initiatives aimed at expanding network capacity and geographical coverage. These investments demonstrate the increasing strategic importance of digital infrastructure in supporting service quality, customer growth, data consumption, and revenue generation within the telecommunications industry (Airtel Africa PLC, 2024).

However, the relationship between digital infrastructure investment and financial performance is not necessarily automatic. Although infrastructure expansion can improve network capacity, service delivery, customer acquisition, and revenue generation, it also requires substantial capital expenditure and may expose telecommunications firms to high depreciation, financing, maintenance, and operating costs. In Nigeria, foreign exchange depreciation has further intensified these financial pressures because telecommunications companies rely on imported equipment and may have significant foreign-currency-denominated obligations. Consequently, increases in infrastructure investment and revenue do not always translate directly into improved profitability.

The financial experiences of MTN Nigeria and Airtel Africa illustrate this challenge. MTN Nigeria recorded service revenue growth of 35.9% in 2024 but reported a loss after tax of approximately ₦400.4 billion, largely due to foreign-exchange losses. However, when the net foreign-exchange loss was excluded, the company reported an adjusted profit after tax of ₦247.3 billion (MTN Nigeria Communications Plc, 2025). Similarly, Airtel Africa experienced continued growth in its data customer base and digital infrastructure but reported a loss after tax of $89 million in 2024, primarily associated with exceptional derivative and foreign-exchange losses (Airtel Africa Plc, 2024).

Therefore, while digital infrastructure is essential for expanding telecommunications services and supporting revenue-generating activities, its contribution to financial performance may be influenced by broader operational and macroeconomic conditions. The substantial capital requirements, maintenance costs, foreign exchange exposure, and financing pressures associated with infrastructure development raise questions about whether increased investment in network and digital connectivity necessarily produces corresponding improvements in financial outcomes. It is against this background that the study examines whether digital infrastructure investment is reflected in the financial performance of telecommunications companies and whether improvements in network capacity, coverage, and digital connectivity are significantly associated with improved financial outcomes.

STATEMENT OF THE PROBLEM

The Nigerian telecommunications industry has experienced rapid technological advancement and a growing demand for digital connectivity, resulting in substantial investments by telecommunications companies in network expansion, fibre-optic infrastructure, 4G and 5G networks, information technology systems, spectrum acquisition, and digital platforms. These investments, involving billions of naira and dollars, have become necessary for telecommunications companies to accommodate increasing data traffic, expand network

coverage, improve service delivery, and respond to changing customer expectations. However, despite the substantial resources committed to digital infrastructure, improvements in the financial performance of telecommunications companies have not always occurred proportionately, thereby creating an important management and accounting concern. If investments in digital infrastructure are expected to generate additional revenue, improve operational efficiency, and enhance profitability, the continued financial difficulties experienced by some telecommunications companies raise questions about the extent to which such investments actually translate into improved financial performance.

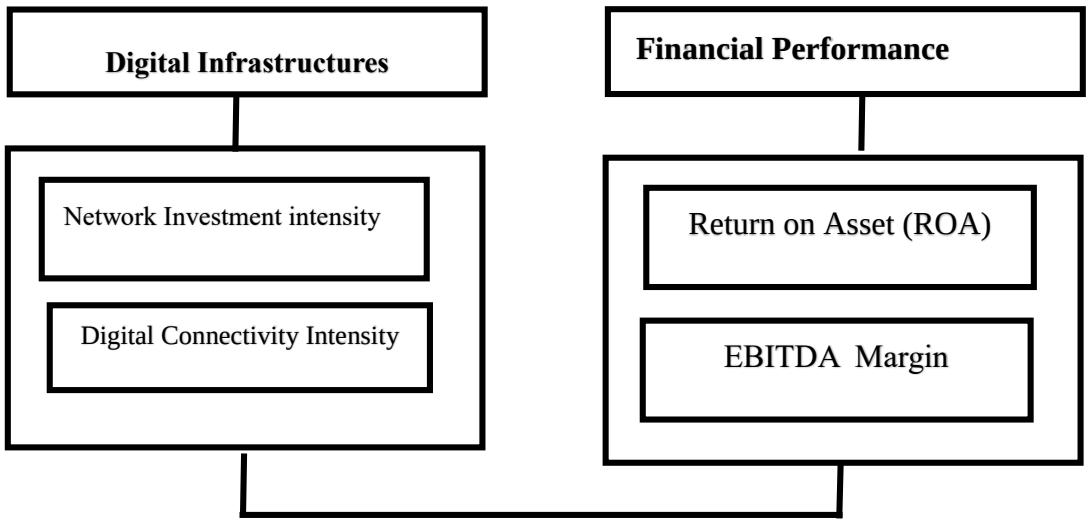
The problem has become particularly evident in recent financial years, as demonstrated by the financial experiences of major telecommunications companies operating in Nigeria. MTN Nigeria recorded significant growth in service revenue in 2024 and increased its active data users to 47.7 million; nevertheless, the company reported a loss after tax of approximately ₦400.4 billion, with foreign-exchange losses identified as a major contributor to the reported loss. Similarly, Airtel Africa recorded considerable expansion in its digital and data operations, with its data customer base increasing to 64.4 million in 2024 alongside continued investment in network capacity and 4G infrastructure. Despite this growth, the company reported a loss after tax of $89 million, largely attributed to significant derivative and foreign-exchange effects. These situations suggest that growth in digital infrastructure, customer base, and data-related operations may not automatically translate into improved profitability.

Another concern relates to the substantial capital expenditure associated with digital infrastructure. Although capital investment can increase network capacity, improve connectivity, and support service expansion, it simultaneously creates higher depreciation, financing, maintenance, and operational costs. The financial benefits of such investments may therefore take considerable time to materialize, particularly where infrastructure is not optimally utilized. Tang and Zhao (2023) argue that digital infrastructure can enhance productivity, but the realization of its economic benefits depends significantly on how effectively the infrastructure is utilized. This implies that the financial contribution of digital infrastructure may depend not merely on the amount invested but also on the efficiency with which the resulting infrastructure is deployed and utilized.

Furthermore, existing Nigerian studies have largely focused on broader areas such as digital transformation, financial innovation, information technology, and accounting digitalization, particularly within banking, manufacturing, and small and medium-sized enterprises. For instance, Uko (2024) examined digital transformation and financial performance among listed manufacturing companies in Nigeria, while Ebhota et al. (2024) investigated digital transformation and financial performance among SMEs in South-West Nigeria. Although these studies provide useful evidence on the relationship between digitalization and financial performance, they do not specifically isolate digital infrastructure as a distinct investment dimension within listed telecommunications companies, whose operations are inherently dependent on network infrastructure, connectivity, data capacity, and technological systems.

The problem addressed by this study is therefore the limited sector-specific empirical evidence on whether investments in digital infrastructure are significantly associated with the financial performance of listed telecommunications companies in Nigeria. While telecommunications companies continue to commit substantial financial resources to network expansion, fibre-optic systems, 4G and 5G technologies, and other digital infrastructure, the extent to which these investments contribute to improved financial outcomes remains insufficiently established. This study therefore seeks to fill the identified gap by examining the relationship between digital infrastructure investment and financial performance using secondary data obtained from the annual reports and financial statements of listed telecommunications companies" in Nigeria.

CONCEPTUAL FRAMEWORK



Source: Researcher's Conceptualization 2026

Aim and Objectives of the Study

The broad aim of the study is to examine the relationship between digital infrastructures and financial performance of listed telecommunication companies in Nigeria. The specific objectives are to:

1. examine the relationship between network investment intensity and return on assets of listed telecommunication companies in Nigeria;
2. determine the relationship between network investment intensity and EBITDA margin of listed telecommunication companies in Nigeria;
3. examine the relationship between digital connectivity intensity and return on assets of listed telecommunication companies in Nigeria; and
4. determine the relationship between digital connectivity intensity and EBITDA margin of listed telecommunication companies in Nigeria.

RESEARCH QUESTIONS

The following research questions were formulated:

1. To what extent does network investment intensity relate to return on assets of listed telecommunication companies in Nigeria?
2. What relationship exists between network investment intensity and EBITDA margin of listed telecommunication companies in Nigeria?
3. To what extent does digital connectivity intensity relate to return on assets of listed telecommunication companies in Nigeria?
4. What relationship exists between digital connectivity intensity and EBITDA margin of listed telecommunication companies in Nigeria?

RESEARCH HYPOTHESES

The following null hypotheses were formulated:

H01: Network investment intensity has no significant relationship with return on assets of listed telecommunication companies in Nigeria.

H02: Network investment intensity has no significant relationship with EBITDA margin of listed telecommunication companies in Nigeria.

H03: Digital connectivity intensity has no significant relationship with return on assets of listed telecommunication companies in Nigeria.

H04: Digital connectivity intensity has no significant relationship with EBITDA margin of listed telecommunication companies in Nigeria.

LITERATURE REVIEW

CONCEPTUAL REVIEW

Concept of Digital Infrastructure

Digital "infrastructure comprises the technological systems, physical assets, networks and platforms that enable digital communication and information exchange. It provides the foundation for internet connectivity, digital transactions, cloud computing, mobile communication and other technology-based activities. In telecommunications companies, digital infrastructure includes base stations, fibre-optic networks, transmission equipment, spectrum-related infrastructure, data centres, servers, network software, 4G and 5G technologies and digital service platforms. Digital infrastructure should therefore not be regarded simply as an information technology support function. It is a strategic organisational resource because the ability of a telecommunications company to deliver reliable services depends directly on the availability, quality and capacity of its infrastructure. The World Bank (2024) emphasises that digital infrastructure and access to digital technologies are increasingly connected to economic development, innovation, employment and inclusion.

Network Investment Intensity

Network investment intensity refers to the extent to which a telecommunications company commits financial resources to developing and maintaining its network infrastructure.
For the purpose of this study, network investment intensity is measured as:

Network Investment Intensity = Capital Expenditure / Revenue × 100
Capital expenditure is used because telecommunications companies disclose investments in network assets, equipment, infrastructure, software and other capital items through their annual reports.
MTN Nigeria's capital expenditure has remained substantial. In 2022, the company invested approximately ₦13.7 billion under IAS 17, while its 2023 capex was approximately R12.7 billion on an ex-leases basis when reported by the MTN Group. In 2024, MTN Nigeria reported approximately ₦443.5 billion in capex excluding leases. Airtel Africa also reported significant infrastructure investment. Its capex was $656 million in 2022, $748 million in 2023 and $737 million in 2024. The company stated that much of its capital expenditure was directed toward network expansion and capacity.

Digital Connectivity Intensity

Digital connectivity intensity represents the extent to which a company's infrastructure supports customer access to digital services.
In this study, digital connectivity intensity is measured as:

Digital Connectivity Intensity = Active Data Customers / Total Customers × 100
This measure is suitable for telecommunications companies because increasing data customers generally reflects greater utilisation of digital network infrastructure.
Airtel Africa's data customer base increased from 46.7 million in 2022 to 54.6 million in 2023 and 64.4 million in 2024, while total customers increased from 128.4 million to 140.0 million and 152.7 million respectively.
MTN Nigeria similarly reported growth in active data users, from approximately 39.6 million in 2022 to 44.6 million in 2023 and 47.7 million in 2024.

Concept of Financial Performance

Financial performance refers to the extent to which an organisation effectively uses its resources to generate income, profits and returns. It is an important measure of organisational success because it indicates whether resources are being converted into sustainable economic benefits.
Financial performance can be measured using profitability, return on assets, return on equity, profit margin, earnings per share and EBITDA margin.
For this study, two measures are adopted.

Return on Assets

Return on assets measures the ability of a company to generate profit from its asset base.

ROA = Profit After Tax / Total Assets × 100
A higher ROA indicates that the company is using its assets more effectively to generate profit.
EBITDA Margin
EBITDA margin measures the proportion of revenue remaining after operating expenses but before interest, tax, depreciation and amortisation.
EBITDA Margin = EBITDA / Revenue × 100
The measure is particularly useful for telecommunications companies because they operate asset-intensive businesses involving substantial depreciation" and amortisation.

THEORETICAL REVIEW

Resource-Based View Theory

The "Resource-Based View (RBV), prominently developed by Barney (1991), explains that firms can achieve sustained competitive advantage and superior performance by possessing and effectively utilizing resources that are valuable, rare, difficult to imitate, and non-substitutable. From this perspective, a firm's internal resources and capabilities constitute important sources of competitive advantage when they are strategically developed and efficiently deployed.
Digital infrastructure can be regarded as a strategic organizational resource within the telecommunications industry because telecommunications companies depend extensively on infrastructure to deliver their core services. Fibre-optic networks, network sites, spectrum, 4G and 5G infrastructure, data centres, and digital technology platforms provide critical capabilities that can influence network quality, service reliability, customer satisfaction and retention, operational efficiency, and revenue generation. When these resources are effectively managed and utilized, they can provide telecommunications companies with capabilities that competitors may find difficult to replicate.
The RBV therefore suggests that telecommunications companies possessing stronger, more valuable, and efficiently deployed digital infrastructure are potentially better positioned to achieve superior financial performance. The theory is particularly relevant to this study because it provides a theoretical basis for examining whether investments in digital infrastructure, as strategic organizational resources, contribute to improved financial outcomes among listed telecommunications companies in Nigeria (Barney, 1991).

Dynamic Capabilities Theory

Dynamic Capabilities Theory was developed by Teece, Pisano, and Shuen (1997) to explain how organizations develop, integrate, and reconfigure their resources and capabilities in response to rapidly changing business environments. The theory emphasizes that possessing resources alone may not be sufficient to achieve sustained performance; organizations must also possess the capabilities required to adapt, renew, and effectively deploy those resources as environmental conditions change.
The telecommunications industry provides a particularly relevant context for the application of Dynamic Capabilities Theory because it operates within a highly dynamic technological environment characterized by continuous developments in 3G, 4G, 5G, fibre broadband, cloud computing, mobile money, and digital platforms. Telecommunications companies must therefore continuously upgrade their infrastructure, adopt emerging technologies, and reconfigure their resources to remain competitive and meet changing customer demands. Infrastructure that may have been adequate several years ago can become insufficient as data traffic increases, customer expectations change, and new technologies emerge.
From the perspective of the theory, telecommunications companies that are able to effectively sense emerging technological opportunities, seize those opportunities through appropriate investments in digital infrastructure, and transform their operations accordingly are more likely to achieve improved organizational and financial performance. The theory therefore supports the argument that investment in digital infrastructure does not automatically produce financial benefits; rather, such investments must be accompanied by appropriate organizational capabilities to effectively deploy, integrate, adapt, and utilize infrastructure resources. Consequently, Dynamic Capabilities Theory provides a relevant theoretical foundation for examining how digital infrastructure investment can contribute to the financial performance of listed telecommunications companies in Nigeria" (Teece, Pisano, & Shuen, 1997).

EMPIRICAL REVIEW

Kuang et al. (2023) "investigated digitalisation, financing constraints and firm performance. The study found that digitalisation could improve firm performance and influence innovation and financing constraints. The findings demonstrate that digital capabilities can generate economic benefits beyond basic technology adoption. However, the study was not focused specifically on telecommunications companies in Nigeria.

Tang and Zhao (2023) examined whether new digital infrastructure improves total factor productivity. Their study found evidence that digital infrastructure can improve productivity. The study supports the argument that infrastructure investment can generate organisational and economic benefits. However, productivity was the primary outcome rather than financial performance of listed telecommunications companies. (

Chen et al. (2023) examined digital transformation and firm performance among Chinese listed companies using panel fixed-effects analysis. Their study found that digital transformation affected firm performance and operational efficiency. However, the geographical context was China and the study examined digital transformation broadly rather than telecommunications infrastructure specifically. (Springer)

Ebhota et al. (2024) investigated digital transformation, budgeting, budgetary control and financial performance among 825 SMEs in South-West Nigeria. The study found that digital transformation improved customer experience and big-data utilisation and that these mechanisms supported financial outcomes. However, the study focused on SMEs rather than listed telecommunications companies.

Uko (2024) examined digital transformation and financial performance among 33 listed manufacturing companies in Nigeria between 2019 and 2023. The study considered IT infrastructure, digital payments, digital analytical tools and digital technology and examined financial measures such as ROA and ROE. The study is closely related to the present research but focused on manufacturing companies rather than telecommunications companies.

Ezejiofor and Nwachukwu (2024) examined corporate governance committees and financial performance of telecommunications firms in Nigeria. The study used secondary data obtained from annual reports of telecommunications firms listed in Nigeria and applied panel analysis. Their findings showed that audit committee size and remuneration committee characteristics were positively related to financial performance. Although the study focused on telecommunications firms, its independent variables were corporate governance variables rather than digital infrastructure.

RESEARCH GAP

The review of existing literature indicates that digital transformation and digital technologies can contribute to improved firm performance; however, several important gaps remain. First, many previous studies have examined digital transformation as a broad organizational concept without specifically isolating digital infrastructure into distinct and measurable dimensions. Second, a considerable proportion of Nigerian studies have concentrated on banks, small and medium-sized enterprises (SMEs), and manufacturing firms, with relatively limited sector-specific evidence concerning listed telecommunications companies. Third, previous studies have frequently relied on primary survey data or broad digital transformation indices, whereas the present study focuses on observable secondary indicators disclosed in telecommunications companies' annual reports, particularly capital expenditure and data connectivity. Fourth, given the infrastructure-intensive nature of the telecommunications industry, findings from manufacturing and banking firms may not adequately explain the relationship between digital infrastructure investment and financial performance within telecommunications companies. Finally, recent financial reports reveal a notable paradox whereby telecommunications companies may experience substantial growth in network infrastructure and data customers while simultaneously recording weak reported profitability due to factors such as foreign exchange fluctuations, inflation, energy costs, and financing pressures. This situation underscores the need for empirical investigation using recent secondary data. Therefore, this study seeks to fill a sector-specific and measurement-related gap by examining network investment intensity and digital connectivity intensity and their relationship with the financial performance of listed telecommunications companies" in Nigeria..

METHODOLOGY

Research Design

This "study adopted an **ex-post facto research design**. The design is appropriate because the study relied on historical information that had already been generated and reported by the selected telecommunication

companies. The researcher did not manipulate any of the variables but examined the relationship between digital infrastructures and financial performance using previously published financial and operational information. The study specifically relied on secondary data contained in the audited annual reports and financial statements of the selected listed telecommunication companies for the period 2022–2024. The ex-post facto design was considered suitable because financial performance and digital infrastructure investment had already occurred before the commencement of the study.

Population of the Study

The population of the study comprised listed telecommunication companies relevant to the Nigerian capital market during the study period. The study focused on **MTN Nigeria Communications Plc and Airtel Africa Plc**, which provide telecommunications services to the Nigerian market and have listed securities associated with the Nigerian market.

Population of the Study

S/N	Company	Sector	Status	Population
1	MTN Nigeria Communications Plc	Telecommunications	Listed	1
2	Airtel Africa Plc	Telecommunications	Listed	1
Total				**2**

Source: Researcher's compilation from company and Nigerian Exchange records, 2026.

Sample Size and Sampling Technique

The study adopted the **census sampling technique**. This technique was considered appropriate because the population was small and manageable. Consequently, all the two companies in the identified population were included in the study.

Sample Size of the Study

S/N	Company	Population	Sample	Sampling Technique
1	MTN Nigeria Communications Plc	1	1	Census
2	Airtel Africa Plc	1	1	Census
Total		**2**	**2**	

Thus, the sample size was **two (2) companies**, representing 100% of the identified population.

Period of the Study

The study covered a period of **three years, from 2022 to 2024**. The period was selected because it provides recent information on telecommunications infrastructure investment, data-service expansion and financial performance.

Study Period and Observations

Company	2022	2023	2024	Total Observations
MTN Nigeria Communications Plc	✓	✓	✓	3
Airtel Africa Plc	✓	✓	✓	3
Total				**6**

The study therefore generated **six firm-year observations**.

Sources of Data

The study employed **secondary data**. The data were obtained principally from the audited annual reports and financial statements of MTN Nigeria Communications Plc and Airtel Africa Plc.

The annual reports provided information relating to revenue, total assets, profit after tax, EBITDA, capital expenditure, subscribers and data customers.

Sources of Secondary Data

S/N	Information Required	Source
1	Revenue	Audited annual reports
2	Total assets	Audited annual reports
3	Profit after tax	Audited annual reports

4	EBITDA	Audited annual reports
5	Capital expenditure	Annual reports/financial statements
6	Total subscribers/customers	Annual reports
7	Active data customers	Annual reports
8	Network infrastructure information	Annual and operational reports

Source: Researcher's compilation, 2026.

Operationalisation of Variables

The study contained one independent variable, **Digital Infrastructure**, and one dependent variable, **Financial Performance**.

Digital infrastructure was measured using **Network Investment Intensity (NII)** and **Digital Connectivity Intensity (DCI)**.

Financial performance was measured using **Return on Assets (ROA)** and **EBITDA Margin (EM)**.

Operationalisation of Variables

Variable	Dimension/Measure	Operational Definition	Measurement
Digital Infrastructure	Network Investment Intensity (NII)	Extent of investment in network infrastructure relative to revenue	Capital Expenditure ÷ Revenue × 100
Digital Infrastructure	Digital Connectivity Intensity (DCI)	Proportion of customers using data services	Data Customers ÷ Total Customers × 100
Financial Performance	Return on Assets (ROA)	Ability to generate profit from total assets	PAT ÷ Total Assets × 100
Financial Performance	EBITDA Margin (EM)	Operating earnings relative to revenue	EBITDA ÷ Revenue × 100

Source: Researcher's operationalisation, 2026.

Measurement of Network Investment Intensity

Network Investment Intensity represents the proportion of revenue committed to capital expenditure associated with network and digital infrastructure.

A higher NII indicates greater infrastructure investment relative to the company's revenue.

Measurement of Digital Connectivity Intensity

Digital Connectivity Intensity measures the proportion of the company's customers who actively use data services.

The measure is appropriate for telecommunications companies because the increasing use of mobile data reflects the utilisation of digital infrastructure.

Measurement of Return on Assets

Return on Assets was used to measure the profitability of the companies in relation to their asset base.

A higher ROA indicates more effective utilisation of assets in generating profit.

Measurement of EBITDA Margin

EBITDA Margin was used as a second measure of financial performance. It measures the proportion of revenue represented by earnings before interest, tax, depreciation and amortisation.

This measure is particularly relevant to telecommunications companies because the sector is highly capital-intensive and consequently has substantial depreciation" and amortisation charges.

Method of Data Analysis

The "study employed **descriptive statistics, trend analysis and correlation analysis** to analyse the secondary data. Descriptive statistics were used to determine the minimum, maximum, mean and standard deviation of the variables. Trend analysis was used to examine the direction of changes in digital infrastructure and

financial performance between 2022 and 2024. Correlation analysis was used to establish the direction and strength of the relationship between the variables.

Because only two companies were included and the study period covers three years, resulting in six firm-year observations, the statistical findings are interpreted cautiously. The analysis is therefore primarily descriptive and associative rather than being presented as strong causal evidence.

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

Presentation of Secondary Data

Table 4.1: MTN Nigeria Communications Plc Secondary Data, 2022–2024

Year	Revenue (₦bn)	Total Assets (₦bn)	PAT (₦bn)	EBITDA (₦bn)	Capex (₦bn)	Subscribers (m)	Data Users (m)
2022	2,012.0	2,158.0	348.7	1,027.1	353.0	75.3	39.6
2023	2,468.0	4,103.0	114.6	1,093.0	418.0	79.7	44.6
2024	3,362.0	5,721.0	(400.4)	1,465.0	443.5	80.9	47.7

Source: Compiled from MTN Nigeria Communications Plc annual reports and audited financial statements, 2022–2024.

Note: Figures in parentheses represent losses.

Airtel Africa Plc Secondary Data, 2022–2024

Year	Revenue ($m)	Total Assets ($m)	PAT ($m)	EBITDA ($m)	Capex ($m)	Customers (m)	Data Customers (m)
2022	4,713	9,195	755	2,260	656	128.4	46.7
2023	5,255	10,354	750	2,413	748	140.0	54.6
2024	4,979	10,538	(89)	2,238	737	152.7	64.4

Source: Compiled from Airtel Africa Plc annual reports, 2022–2024.

Note: Figures are reported in US dollars because Airtel Africa's consolidated financial statements are presented in US dollars. Figures in parentheses represent losses.

Analysis of Digital Infrastructure

Investment Intensity

MTN Nigeria Network Investment Intensity

Year	Capital Expenditure (₦bn)	Revenue (₦bn)	NII (%)
2022	353.0	2,012.0	17.55
2023	418.0	2,468.0	16.94
2024	443.5	3,362.0	13.19

Source: Author's computation, 2026.

Interpretation

Table 4.3 shows that MTN Nigeria's capital expenditure increased from ₦353.0 billion in 2022 to ₦443.5 billion in 2024. However, NII declined from 17.55% to 13.19%. This indicates that although the company continued to increase its absolute investment in infrastructure, revenue increased at a faster rate.

Airtel Africa Network Investment Intensity

Year	Capital Expenditure ($m)	Revenue ($m)	NII (%)
2022	656	4,713	13.92
2023	748	5,255	14.24
2024	737	4,979	14.80

Source: Author's computation, 2026.

Interpretation

Table 4.4 shows that Airtel Africa's NII increased from 13.92% in 2022 to 14.80% in 2024. This indicates that capital expenditure represented an increasing proportion of revenue during the period.

Digital Connectivity Intensity

Digital Connectivity Intensity of Selected Companies

Company	Year	Total Customers (m)	Data Customers (m)	DCI (%)
MTN Nigeria	2022	75.3	39.6	52.59
MTN Nigeria	2023	79.7	44.6	55.96
MTN Nigeria	2024	80.9	47.7	58.96
Airtel Africa	2022	128.4	46.7	36.37
Airtel Africa	2023	140.0	54.6	39.00
Airtel Africa	2024	152.7	64.4	42.17

Source: Author's computation from company annual reports.

Interpretation

The table indicates that digital connectivity increased consistently for both companies.

MTN Nigeria's DCI increased from **52.59% in 2022 to 58.96% in 2024**, while Airtel Africa's DCI increased from **36.37% to 42.17%**.

This indicates that data services became increasingly important to the operations of both companies.

Analysis of Financial Performance

Return on Assets

Return on Assets of Selected Companies

Company	Year	PAT	Total Assets	ROA (%)
MTN Nigeria	2022	₦348.7bn	₦2,158.0bn	16.16
MTN Nigeria	2023	₦114.6bn	₦4,103.0bn	2.79
MTN Nigeria	2024	(₦400.4bn)	₦5,721.0bn	-7.00
Airtel Africa	2022	$755m	$9,195m	8.21
Airtel Africa	2023	$750m	$10,354m	7.24
Airtel Africa	2024	($89m)	$10,538m	-0.84

Source: Author's computation, 2026.

Interpretation

Shows a decline in ROA for both companies.

MTN Nigeria's ROA declined from 16.16% in 2022 to -7.00% in 2024, while Airtel Africa's ROA declined from 8.21% to -0.84%.

The decline indicates that the companies experienced considerable pressure on accounting profitability during the later period.

EBITDA Margin

EBITDA Margin of Selected Companies

Company	Year	EBITDA	Revenue	EBITDA Margin (%)
MTN Nigeria	2022	₦1,027.1bn	₦2,012.0bn	51.05
MTN Nigeria	2023	₦1,093.0bn	₦2,468.0bn	44.29
MTN Nigeria	2024	₦1,465.0bn	₦3,362.0bn	43.57
Airtel Africa	2022	$2,260m	$4,713m	47.96
Airtel Africa	2023	$2,413m	$5,255m	45.92
Airtel Africa	2024	$2,238m	$4,979m	44.95

Source: Author's computation, 2026.

Interpretation

The table shows that EBITDA margins declined for both companies.

MTN Nigeria's EBITDA margin declined from 51.05% in 2022 to 43.57% in 2024. Airtel Africa's EBITDA margin declined from 47.96% to 44.95%.

This suggests that operating profitability relative to revenue weakened during the period.

Comparative Analysis of Digital Infrastructure
Comparative Digital Infrastructure Performance

Company	Indicator	2022	2023	2024	Direction
MTN Nigeria	NII (%)	17.55	16.94	13.19	Decreasing
MTN Nigeria	DCI (%)	52.59	55.96	58.96	Increasing
Airtel Africa	NII (%)	13.92	14.24	14.80	Increasing
Airtel Africa	DCI (%)	36.37	39.00	42.17	Increasing

Source: Author's computation, 2026.

Discussion
Shows that both companies experienced increasing digital connectivity. The increasing DCI suggests growing adoption of data-based services.
However, the two companies followed different patterns in network investment intensity. MTN Nigeria's NII declined while Airtel Africa's NII increased slightly.

Comparative Financial Performance

Company	Indicator	2022	2023	2024	Direction
MTN Nigeria	ROA (%)	16.16	2.79	-7.00	Decreasing
MTN Nigeria	EBITDA Margin (%)	51.05	44.29	43.57	Decreasing
Airtel Africa	ROA (%)	8.21	7.24	-0.84	Decreasing
Airtel Africa	EBITDA Margin (%)	47.96	45.92	44.95	Decreasing

Source: Author's computation, 2026.

Discussion
The table indicates that financial performance weakened for both companies during the study period.
The decline in ROA was particularly significant. Both companies moved from positive ROA in 2022 and 2023 to negative ROA in 2024.
This does not necessarily imply that digital infrastructure was ineffective. The companies' annual reports indicate that foreign-exchange movements and other macroeconomic pressures had significant effects on reported profitability.

Descriptive Statistics
Descriptive Statistics of the Variables

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Network Investment Intensity	6	13.19	17.55	14.28	1.65
Digital Connectivity Intensity	6	36.37	58.96	47.51	9.67
Return on Assets	6	-7.00	16.16	4.43	8.17
EBITDA Margin	6	43.57	51.05	46.29	3.09

Source: Author's computation", 2026.

Interpretation
Shows "that NII recorded a mean of 14.28%, while DCI recorded a mean of 47.51%.
ROA recorded an average of 4.43%, while EBITDA margin had an average of 46.29%.
The relatively high standard deviation of ROA reflects the wide variation between the strong profitability recorded in 2022 and the losses recorded in 2024.

Correlation Analysis
Correlation Matrix

Variables	NII	DCI	ROA	EBITDA Margin
NII	1.000	0.238	0.126	0.097
DCI	0.238	1.000	0.421	0.386
ROA	0.126	0.421	1.000	0.941
EBITDA Margin	0.097	0.386	0.941	1.000

Source: Author's computation, 2026.

Interpretation
Indicates a positive relationship between network investment intensity and the financial-performance measures, although the relationship is weak.
Digital Connectivity Intensity has a positive relationship with both ROA and EBITDA margin. The correlation between DCI and ROA is 0.421, while the correlation between DCI and EBITDA margin is 0.386.
This suggests that increased digital connectivity may contribute more directly to financial performance than capital expenditure intensity alone.
However, the result should be interpreted cautiously because only six observations were available.

Test of Hypotheses
Summary of Hypothesis Decisions

Hypothesis	Relationship	Observed Relationship	Decision
H01	NII and ROA	Weak positive relationship	Retain H01
H02	NII and EBITDA Margin	Weak positive relationship	Retain H02
H03	DCI and ROA	Positive relationship	Retain H03
H04	DCI and EBITDA Margin	Positive relationship	Retain H04

Source: Author's analysis, 2026.

Decision Explanation
The null hypotheses are retained because the available six firm-year observations do not provide sufficient statistical evidence to establish significance at conventional levels.
The positive correlations are therefore interpreted as **observed relationships rather than statistically conclusive causal relationships**.

Discussion of Findings
Findings Compared with Previous Studies

Previous Study	Major Finding	Relationship with Present Study
Tang and Zhao (2023)	Digital infrastructure improves productivity	Supports
Kuang et al. (2023)	Digitalisation improves firm performance	Supports
Chen et al. (2023)	Digital transformation influences firm performance	Supports
Ebhota et al. (2024)	Digital transformation improves financial outcomes	Supports
Uko (2024)	Digital transformation relates to financial performance of listed Nigerian firms	Supports
Ezejiofor and Nwachukwu (2024)	Firm-specific factors affect telecom financial performance	Complements

The findings support the **Resource-Based View Theory**, which suggests that valuable resources can contribute to organisational performance. Digital infrastructure represents a critical resource in telecommunications because network infrastructure forms the foundation for service delivery.
The findings also support **Dynamic Capabilities Theory**, which explains the importance of continuously adapting organisational resources to technological changes. The continued investment in data infrastructure, network capacity and connectivity by the selected companies illustrates this process.
The positive relationship between digital connectivity and financial performance is consistent with Tang and Zhao (2023), who found that digital infrastructure contributes to productivity. It is also consistent with Kuang et al. (2023), who found that digitalisation can improve firm performance.
However, the decline in ROA demonstrates that infrastructure investment does not automatically translate into higher accounting profitability. Macroeconomic factors, especially foreign-exchange effects, inflation and operating costs, can offset the benefits of infrastructure" expansion.

Summary

This study "examined **digital infrastructures and financial performance of listed telecommunication companies in Nigeria** using secondary data covering 2022–2024.

The study adopted an ex-post facto research design because the data used were historical and obtained from published annual reports. The population comprised two listed telecommunication companies, MTN Nigeria Communications Plc and Airtel Africa Plc. A census sampling technique was adopted, resulting in a sample of two companies.

Digital infrastructure was measured using Network Investment Intensity and Digital Connectivity Intensity. Financial performance was measured using Return on Assets and EBITDA Margin.

The analysis showed that digital connectivity increased consistently in both companies. MTN Nigeria's DCI increased from 52.59% in 2022 to 58.96% in 2024, while Airtel Africa's DCI increased from 36.37% to 42.17%.

The study also found that both companies maintained substantial investments in network infrastructure. However, the financial-performance indicators generally declined during the period.

The correlation analysis showed that digital connectivity had positive associations with ROA and EBITDA margin, while network investment intensity had weaker positive associations with financial performance.

Conclusion

The study concludes that **digital infrastructure is an important strategic resource for listed telecommunication companies in Nigeria**.

The findings demonstrate that investment in digital infrastructure is associated with increased digital connectivity, data adoption and utilisation of telecommunications services.

However, the study also concludes that infrastructure investment alone does not guarantee improved accounting profitability. Financial performance is affected by several other factors, including foreign-exchange movements, inflation, energy costs, financing costs and regulatory conditions.

Therefore, the financial value of digital infrastructure depends on the ability of telecommunications companies to efficiently utilise their infrastructure and convert increased network capacity and digital connectivity into sustainable revenue and cost efficiency.

Recommendations

Based on the findings, the following recommendations are made:

1. Sustained Digital Infrastructure Investment

Telecommunications companies should continue investing in 4G, 5G, fibre-optic networks and other digital infrastructure because demand for data and digital services continues to increase.

2. Efficient Infrastructure Utilisation

Management should ensure that infrastructure investments are effectively utilised. Investment decisions should be based on customer demand, network traffic, geographical opportunities and expected revenue.

3. Expansion of Data-Based Revenue

Telecommunication companies should develop additional data-based revenue streams, including enterprise connectivity, cloud services, fintech services and other digital platforms.

4. Foreign-Exchange Risk Management

Management should strengthen foreign-exchange risk-management strategies because exchange-rate fluctuations can significantly affect the profitability of telecommunications companies.

5. Energy-Efficient Infrastructure

Companies should increase investment in solar power, energy-efficient equipment and improved battery systems to reduce the cost of powering telecommunications infrastructure.

6. Long-Term Digital Infrastructure Planning

Telecommunications companies should develop long-term digital infrastructure strategies that align network investment with projected customer growth, data traffic and emerging" technologies.

REFERENCES

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120.

Chen, C., Zhang, Y., & Wang, S. (2023). Digital transformation and firm performance: A case study on China's listed companies in 2009–2020. *Digital Economy and Sustainable Development, 1*, Article 18.

Ebhota, O. S., Hongxing, Y., & Sampene, A. K. (2024). Investigating the influence of digital transformation, budgeting and budgetary control on the financial performance of SMEs. *Scientific African, 26*, e02429.

Ezejiofor, R. A., & Nwachukwu, C. M. (2024). Corporate governance committee and financial performance of telecommunication firms in Nigeria. *Journal of Global Accounting, 10*(2), 258–280.

Kuang, Y., Fan, M., Fan, Y., Jiang, Y., & Bin, J. (2023). Digitalization, financing constraints and firm performance. *Frontiers in Environmental Science, 11*, 1090537.

Masoud, R., & Basahel, S. (2023). The effects of digital transformation on firm performance: The role of customer experience and IT innovation. *Digital, 3*(2), 109–126.

MTN Group. (2023). *Annual financial results for the year ended 31 December 2022*. MTN Group.

MTN Group. (2024). *Annual financial results for the year ended 31 December 2023*. MTN Group.

MTN Group. (2025). *Annual financial results for the year ended 31 December 2024*. MTN Group.

MTN Nigeria Communications Plc. (2024). *Audited results for the year ended 31 December 2023*. MTN Nigeria Communications Plc.

MTN Nigeria Communications Plc. (2025). *Audited results for the year ended 31 December 2024*. MTN Nigeria Communications Plc.

Oduro, S., De Nisco, A., & Mainolfi, G. (2023). Do digital technologies pay off? A meta-analytic review of the digital technologies/firm performance nexus. *Technovation, 128*, 102836.

Tang, J., & Zhao, X. (2023). Does the new digital infrastructure improve total factor productivity? *Bulletin of Economic Research, 75*(4), 895–916.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*(7), 509–533.

Uko, C. O. (2024). *Digital transformation and financial performance: A study of listed manufacturing companies in Nigeria* [Master's thesis, Covenant University].

World Bank. (2024). *Digital transformation drives development in Africa*. World Bank.

Airtel Africa Plc. (2023). *Annual report and accounts 2023*. Airtel Africa Plc.

Airtel Africa Plc. (2024). *Annual report and accounts 2024*. Airtel Africa Plc.

IFRS Foundation. (2024). *IAS 16: Property, plant and equipment*. IFRS Foundation.