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Digital Financial Inclusion: Efficiency Analysis of Mobile Money Penetration by Nigerian Telecommunication Companies

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ABSTRACT

A more significant number of adult Nigerians still face financial exclusion. This study, therefore, makes an unprecedented effort to apply Data Envelopment Analysis (DEA) to analyse the efficiency of mobile network operators (MNOs) in providing mobile money services, using 12 sampled firms from the Nigerian telecommunications sector. An output-based DEA analysis of cross-sectional data from 206 MNO managers reveals that MTN and Airtel have efficiency scores (Thetas) of 100%. Consequently, they are efficient companies in the provision of mobile money in Nigeria, serving as benchmarks or peers for other inefficient MNOs in the sector. Further, both CRS-TE and VRS-TE DEA results illustrate that other sampled MNOs such as Spectranet, MainOne, L.M. Ericsson, Smile Nigeria, Globacom, Swift Network, Internet Solutions Nigeria Limited, Broad-based Communications Limited, NTEL and 9 Mobile are inefficient and could increase mobile money penetration (output) to become efficient by 6.5%; 9%; 11%; 16.4%; 17.8%; 30.4%; 31.7%; 33.9%; 50.4% and 51.5% respectively whilst holding their current input factors constant. Therefore, the study asserts that only MTN Nigeria and Airtel are the most efficient telecom firms in mobile money penetration in Nigeria; however, other inefficient telecom firms can improve their future performance. The study recommends that other telecom firms in Nigeria should adopt best practices for mobile money services similar to those implemented by MTN Nigeria and Airtel Nigeria.

INTRODUCTION

Mobile phone technology offers greater connectivity in which people and businesses seamlessly interact anywhere at any time. This opportunity explains why the use of mobile smartphones for economic and financial transactions continues growing exponentially and gaining momentum daily. Statistically, there are about 1.75 billion active registered accounts for mobile money transactions globally (Global System for Mobile Communications Association [GSMA], 2024) compared to 279 million registered accounts a decade ago (Masha, 2016; Orekoya, 2017). In effect, the increased use of mobile technology has contributed to a high financial inclusion rate in many regions and continents, particularly Sub-Saharan Africa, where mobile money accounts doubled between 2013 and 2023 (GSMA, 2024). However, despite the increased rate of mobile phone penetration in Sub-Saharan Africa a greater number of adult Nigerians are still financially excluded (Enhancing Financial Innovation and Access [EFInA] (2021); UK Government, 2023). For instance, Nigeria currently has a 36.8% (about 40 million adults) exclusion rate compared to the country's Apex exclusion target rate of 20% by 2020 (Elubode & Adejo, 2024). Those formally covered by mobile network operators (MNOs) find less satisfaction with providing formal financial products and services. Apart from the increasing pace of population growth rate in the country as a cause for the high exclusion rate (EFInA, 2021), an innovative model – mobile money penetration – has not significantly

brought a noticeable effect on financial inclusion in Nigeria (Central Bank of Nigeria [CBN], 2018). Thus, efficiency analysis of mobile money penetration by MNOs in Nigeria is critical to identifying active and productive MNOs that contribute to a reduction in the exclusion rate among Nigerians.

The argument for mobile money adoption is that it can help drive more financial inclusion, promote access to financial services, and improve welfare among the unbanked populace in developing countries (Djahini-Afawoubo *et al.*, 2023; Nguyen, 2023; Nyimbiri, 2021; N'dri & Kakinaka, 2020; Osabutey & Jackson, 2024; World Bank, 2024). However, information obtained from available research suggests a lack of specific studies focusing on the efficiency analysis of MNOs toward mobile money penetration in Nigeria. For instance, Elubode and Adejo (2024) – a purely qualitative study - only examined the evolution, incursion and importance of mobile money services using sources of law without empirical data analysis. Similarly, ARM research (2023) in its report found MTN and Airtel Nigeria as the most efficient MNOs for mobile money penetration in Nigeria other inefficient telecom companies were not identified by the report. Again, no noticeable econometric estimation strategy was employed by ARM Research, thus, creating room for inconclusive evidence. This study, therefore, contributes to the existing empirical literature on mobile money penetration in Nigeria to fill the identified gap. The study makes an unprecedented effort to apply Data

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Envelopment Analysis (DEA) to analyse the efficiency of MNOs toward mobile money services using 12 firms from the Nigerian telecommunication sector. At the firm level, an efficient analysis of mobile money penetration is required among telecommunication firms in Nigeria for two reasons. First, in case of divergence in the efficient delivery of mobile money financial services, there is a need to identify which firms are benchmarks or peers for others (inefficient firms) to follow their best practices. Second, differences in the efficient delivery of mobile money services reveal the scope for scale expansion for some MNOs in Nigeria. These two reasons can help MNOs in Nigeria to implement best practices and policies to address differences and improve the efficiency of mobile money financial services provision in Nigeria. The paper is organised thus. The first section introduces the study and a review of related literature is contained in the second section. The third section provides the methodology adopted. While the fourth section contains the result and discussion section five entails a conclusion and drawn and recommendations made thereof.

LITERATURE REVIEW

Mobile money of the technology-based low-cost distribution models for advancing the course of digital financial inclusion. The model, mobile money, means offering formal and functional financial services and products such as payments, transfers, credit and insurance via the use of mobile phone technology. With mobile money, customers of mobile network providers can enjoy financial services using their cell or mobile phones having maintained accounts with mobile network operators (Ahmad *et al.*, 2020). This model provides benefits for both users and investors, especially MNO firms. On one side, it offers affordable financial services to underserved or financially excluded groups which may include low-income people, youth, women or people with disabilities conveniently and safely. On the other hand, it provides business opportunities to MNOs as the model transforms how people access financial services (GSMA, 2024). However, from the MNO standpoint, mobile money service operation needs more than a mobile phone and enabling accessories for effective functioning. It requires massive investment in Information and Communication Technology (ICT) and software innovations (Andrianaivo & Kpodar, 2012) by mobile network operators that will frequently guarantee reliable network connections and effective service deliveries. According to the African Development Bank [ADB] (2013), there are three business models through which technology-based financial services can be provided to clients/users. These are bank-focused models, bank-led models and non-bank-led models. These three models are, however, different and depend on the existing relationship between the institution providing the services and the end users. Under the bank-focused model, deposit-taking financial institutions (banks) use modern and innovative low-cost delivery channels such as ATM, internet or mobile banking through mobile phones

to provide financial and banking services to their existing customers or target clients.

In a bank-led model, bank customers are presented with opportunities to use a wide range of retail agents or mobile phones to perform some financial transactions. Here, the bank uses a corresponding agent or adopts agency banking to render financial services to its target clients where there is an absence of such a bank branch. Alternatively, a bank may enter into a joint venture business agreement or collaborate with a mobile network operator or Telecom operator (ADB, 2013). This approach is popular in Nigeria. Intuitively, the approach has greater potential to improve financial inclusion due to its capacity to capture those previously excluded by the formal financial system. However, the bank-led model reduces market competition for the provision of financial services in favour of banks at the expense of mobile network operators. It has been observed that reliance on a bank-led model for offering digital financial services in Nigeria accounts for the slow uptake of financial inclusion in Nigeria (CBN, 2018). On the contrary, the adoption of a non-bank-led model implies that banks have a limited role in the provision of digital financial services in the economy. Such a limited role of banks is reflected in the safe-keeping of customers' funds. However, Telecom operators or MNOs take greater responsibility in the day-to-day account management of customers' accounts. This is much more possible because the MNOs or Telecom operators usually have direct contact with individual customers (ADB, 2013). In most cases, MNOs do not have formal partnerships with the banks (Aron, 2018). Unlike the bank-led model, customers are not required (or mandated) to have an account relationship with the banks. These factors have made the non-bank-led model a more successful economic and transformational tool for achieving greater financial inclusion in countries where it has been applied (Ahmad *et al.*, 2020; ADB, 2013; CBN, 2018).

In an earlier study by Nyimbiri (2021), a fixed effect estimation of panel data obtained from 14 Sub-Saharan African countries shows that mobile money plays a significant role in increasing financial inclusion in the countries sampled including Nigeria. This evidence is recently validated by the World Bank's (2024) descriptive analysis that the remarkable growth of financial inclusion in Sub-Saharan African countries is driven by mobile money adoption. At a country level, Nguyen (2023) employed PLS-SEM to analyze 391 suitable cross-sectional data drawn from a population of adult Vietnam in 2020 and found a significant positive relationship between mobile money adoption and financial inclusion. Thus, a higher mobile money adoption level among adult Vietnamese leads to greater financial inclusion. Specifically, Suleiman, Hemed and Wei (2018) earlier adopted the slack-based measure of DEA (SBM-DEA) to analyse the efficiency of seven (7) telecom operators in Tanzania using their annual reports from 2010 to 2016. The authors found that only three firms were productive in providing mobile money services in the country. As rated, these companies include

Vodacom-Tanzania (first), Airtel-Tanzania (second), and Tigo (third). However, the use of the SBM approach of DEA has been heavily criticised on account of the lack of capacity of the SBM method to produce Pareto optimal solution – technical efficient firms – particularly when the number of Decision-Making Units (DMUs) keeps increasing (Ji & Lee, 2010). Therefore, a more robust technical efficiency method either constant return to scale (CRS) or variable return to scale (VRS) or both need to be employed for policy-guide research studies. To counter the issue associated with the estimation strategy by Suleiman *et al.* (2018), this study then employs both CRS-TE and VRS-TE methods of the DEA technique. As noted earlier, this strategy is unprecedented in mobile money efficiency analysis, particularly among MNOs in developing countries. In Nigeria, two obtained seemly-related research articles - Elubode and Adejojo (2024) and ARM Research (2023) - utilised qualitative approaches and descriptive statistics to analyse mobile money services by MNOs in Nigeria. ARM Research indicates that only two telecom firms – MTN and Airtel Nigeria – are the most efficient companies in Nigeria for mobile money services. However, the study fails to identify inefficient MNOs for rendering mobile money in the country. More importantly, a robust estimation is required for well-informed inference about the efficiency of MNOs toward mobile money penetration in Nigeria. Such a requirement forms the crux of the current study.

MATERIALS AND METHODS

This study adopts a survey research design. Survey design allows a researcher to obtain data from the population under study through a sample. The population of the unit of analysis covered in this study consists of all MNOs currently operating in Nigeria. According to Tracxn (2024), there are about 215 telecom start-up companies in Nigeria. However, the study's target population comprises MNOs that specifically provide mobile money services to their clients in the country. Relying on data obtained from Adetiloye (2024) and Oluka (2022), there are only 12 MNOs that offer such services in Nigeria. These companies include MTN Nigeria, 9 Mobile, Globacom, Airtel Nigeria, Smile Nigeria, Mainone, Spectranet, Swift Network Limited, NTEL, L.M. Ericson (NIG) Limited, Internet Solutions Nigeria (ISN) Limited and Broad-based Communication Limited (BCL). The sample size is determined in line sample size formula for the known population size recommended by Krejcie and Morgan (1970). The formula is specified thus:

$$S = \frac{X^2 NP(1-P)}{d^2 (N-1) + X^2 P(1-P)} \dots (1)$$

Where s = sample size; X^2 = table value of chi-square at 1 degree of freedom for desired confidence level (0.95); N = population size (12); and P = population proportion (0.5). The result still produces a sample size of 12 mobile network operators (MNOs). Therefore, all the 12 telecom companies in Nigeria are sampled. A sample size of 240 staff (20 employees per MNO)

from the 12 MNOs was purposively employed to obtain the study's required primary data. Furthermore, the study selected a sample from the target population of MNO managers via a stratified sampling method. The stratification is conducted by classifying the respondents based on the telecommunication network they work for. The respondents are then selected from each stratum from a sampling frame that specifically consists of desk officers, technical staff and administrative officers of telecom companies in Ogun and Lagos States, Nigeria. Strategically, the data from the respondents was collected via structured questionnaires which were physically administered from 21st February 2024 to 12th November 2024.

Moreover, this study uses Data Envelopment Analysis (DEA) as a statistical method. DEA is a non-parametric analytical tool to assess the efficiency of programs policies or economic operations for a set of firms or business units. Historically, DEA was developed to measure the efficiency of non-profit firms. However, in recent times, DEA has been successfully explored to measure the efficiency of both non-profit and profit-making organisations (Roman & Gotiu, 2017). The method's basic aim is to model the production function of Decision Making Units (DMUs) and then identify an efficient frontier on which efficient units are positioned. Specifically, this study employs DEA to evaluate the efficiency of telecommunication companies in Nigeria to increase digital financial inclusion through mobile money penetration. Thus, DMUs here are telecommunication firms in Nigeria. According to the extant literature on DEA studies, the number of DMUs selected in a DEA study depends on the number of input and output variables that are considered in research activity (Charnes, Cooper & Rhodes, 1978; Cooper, Seiford & Tone, 2007; Roman & Gotiu, 2017; Jung *et al.*, 2023). However, this study follows a rule of thumb by Cooper *et al.* (2007), specifying a function for a minimum number of DMUs as stated in Roman and Gotiu (2017).

$$n \geq \max \{m*s, 3(m+s)\} \dots (2)$$

Where n = number of DMUs; m = number of outputs (Mobile Money Prevalence Index – MMPI – as one variable); s = number of input variables (ratio of activity rate index to log 3000 as a single variable). By substitution, equation 2 produces six (6) minimum DMUs required in this study. This condition is satisfied as the study surveyed 12 telecommunication companies in Nigeria. Further, this study specifies the output-oriented DEA model which is considered appropriate for maximising the output (MMPI) while keeping the input factor constant. Subsequently, a linear programming problem formulated below is used for solving the output-based DEA model and returns to scale (constant and variable returns to scale) hypothesis following the practice by Charnes *et al.* (1978) and Roman and Gotiu (2017). Following the procedure in Roman and Gotiu (2017), the linear programming problem for each of the telecommunication (as DMU) in this study is formulated as:

$$\begin{cases} \max \sigma \\ \sigma, \rho \\ -\sigma y_i + Y\rho \geq 0 \\ x_i - X\rho \geq 0 \\ N_i\rho \leq 1 \\ \rho \geq 0 \end{cases} \quad (LPP) \dots (3)$$

From the linear programming problem (LPP) in equation (3), X and Y parameters are input and output variables respectively. The output variable Y is measured in equation (4) by following the methodological approach employed in GSMA (2023) using the Mobile Money Prevalence Index (MMPI) computation formula stated thus:

$$MMPI = \sqrt[3]{APR \times ARI \times ADI} \dots (4)$$

Where,

APR = Adult Penetration Rate; ARI = Activity Rate Index; and ADI = Agent Distribution Index

APR= (Active Accounts)/(Adult Population)

ARI= (Log (Active Accounts))/(Log (Registered Accounts))

ADI= (Log (Active Agents per 100,000 adults))/(Log (3,000))

X as the input factor is defined by the ratio of ARI to log 3000 (X = ARI/log(3000)). The parameter, σ , is a scalar factor and $1 \leq \sigma \leq \infty$ while $\sigma-1$ depicts a proportional rise in

outputs that could be achieved by i-th telecom firm (DMU) with input variables remaining constant. So $1/\sigma$ measures the technical efficiency of each telecommunication firm where the score varies between values of 0 and 1 (Roman & Gotiu, 2017). If the score is equal to 1, then the technical efficiency of a DMU is inferred which implies that a telecommunication firm lies on the frontier (and efficient for digital financial inclusion) but is inefficient if the score is less than 1. The ρ is a vector of constants that measure the location weights of inefficient telecom firms if, however, they are to be placed on an efficient frontier

RESULTS AND DISCUSSION

Presentation of Results

This part of the study provides the estimation outcomes of CRS-TE (constant return to scale technical efficiency) VRS-TE (variable return to scale technical efficiency) DEA analyses performed with STATA 12.1 software. The estimation procedures were made possible with the installation of a DEA user-written STATA program and commands on the software. Table 1 presents these DEA estimation outcomes.

Table 1: CRS-TE and VRS-TE Output-based DEA Estimation

(Number of Observations = 206)							
DMU	Rank	Theta	CRS_TE	VRS_TE	SCALE	RTS	Operational
Status							
Globacom	7	.822071	0.822071	0.822071	1.000000	0.000000	CRS
MTN	1	1	1.000000	1.000000	1.000000	0.000000	CRS
Swift Network	8	.696469	0.696469	0.696469	1.000000	0.000000	CRS
MainOne	4	.910576	0.892205	0.910576	0.979825	1.000000	IRS
ISN	9	.683188	0.635776	0.683188	0.930601	1.000000	IRS
Airtel	1	1	1.000000	1.000000	1.000000	0.000000	CRS
Smile Nigeria	6	.836885	0.754461	0.836885	0.901511	1.000000	IRS
BCL	10	.661848	0.615917	0.661848	0.930601	1.000000	IRS
9 Mobile	12	.485190	0.485190	0.485190	1.000000	0.000000	CRS
L.M. Ericsson	5	.890713	0.872743	0.890713	0.979825	1.000000	IRS
NTEL	11	.496010	0.496010	0.496010	1.000000	0.000000	CRS
Spectranet	3	.935765	0.888224	0.935765	0.949196	1.000000	IRS

Note: CRS indicates Constant Return to Scale; VRS means Variable Return to Scale; RTS means Return to Scale; TE indicates Technical Efficiency

Source: Authors' Computations from STATA 12.1 Outputs (2024)

Interpretation and Discussion of Results

Table 1 reveals the outcomes of the VRS output model DEA analysis for 206 observations obtained from managers of 12 MNOs in Nigeria. The data were collected via a simple structured questionnaire administered between March 25 and October 11, 2024. The retrieval rate represents approximately 86% of the total 240 sample size of the study. A VRS DEA model is employed due to the non-feasibility of optimal scale operations of MNOs in Nigeria. These firms continue to face stringent economic regulations such as exchange

rate policy changes and market-based increasing cost of fuel which in one or the other affect general business operations in the country. Thus, MNO firms cannot operate in a perfectly competitive environment in Nigeria and operate at a sub-optimal level. Again, an application of the VRS model enables this study to identify inefficient MNOs in Nigeria that are poorly managed or lack effective management thereof. Caveat, the outcomes of the study largely depend on the observed data. However, the study also presents the CRS technical efficiency scores for the MNOs to determine firms which face size issues

in delivering efficient mobile money services in Nigeria. The rationale behind the use of the CRS frontier model is premised on the need to identify inefficient MNOs with scale problems in Nigeria. Although similar efficiency results will be obtained irrespective of any orientation adopted (input-based or output-based) this study adopts an output-based orientation. The adopted orientation method is premised on the objective of maximizing mobile money penetration among phone users in Nigeria. According to Huguenin (2012), in the absence of any constraints faced by firms DEA orientation should be based on the objective of firms under study.

From Table 1, information was provided on the rank of the DMUs (MNOs), efficiency scores (theta), technical efficiencies of two DEA models (constant return to scale – CRS – and VRS), scale level, return to scale (RTS) and RTS status. Technical efficiency form is adopted due to physical measurements of input and outputs of mobile money penetration as observed from the field survey. More importantly, technical efficiency (TE) has been recognized as a firm performance measure globally Huguenin (2012). It garners global recognition in performance measurement studies because TE analysis can be broken into pure technical efficiency and scale efficiency to indicate sources of inefficiency. DEA analysis which is a performance measurement indicator shows a relative ratio of the sum of weighted output to weighted output, thus, the DEA score highlights whether a firm is efficient in its production process or there is room to improve. Caveat, no firm in DEA analysis can have an efficiency score (Theta) greater than one Huguenin (2012). In this study instance, an MNO firm that has an efficiency score of 1 (or 100%) is presumed to be efficient in the provision of mobile money in Nigeria while an MNO with a TE score of less than 1 can improve future productivity. Also, from Table 1, MNOs such as MTN and Airtel have efficiency scores (Thetas) of 1 respectively. These scores imply that both MTN and Airtel are efficient companies in the provision of mobile money in Nigeria; thus, they serve as benchmarks or peers to other inefficient MNOs (like Spectranet, MainOne, L.M. Ericsson, Smile Nigeria, Globacom, Swift Network, ISN, BCL, NTEL and 9 Mobile which have theta values of .935; .910; .890; .836; .822; .696; .683; .661; .496 and .485 respectively) in the area of digital financial inclusion in Nigeria.

In the output-oriented DEA model, the result implies that MTN and Airtel are the most efficient MNOs in the delivery of digital financial inclusion via mobile money penetration in Nigeria. However, other sampled MNOs such as Spectranet, MainOne, L.M. Ericsson, Smile Nigeria, Globacom, Swift Network, ISN, BCL, NTEL and 9 Mobile are inefficient and could increase mobile money penetration (output) to become efficient by 6.5% (100 - 93.5); 9% (100 - 91.0); 11% (100 - 89.0); 16.4% (100 - 83.6); 17.8% (100 - 82.2); 30.4% (100 - 69.6); 31.7% (100 - 68.3); 33.9% (100 - 66.1); 50.4% (100 - 49.6) and 51.5% (100 - 48.5) respectively whilst holding

their current input factors constant. Similarly, while other MNOs in Nigeria are not CRS and VRS efficient (as revealed in Table 1), MTN and Airtel are CRS and VRS efficient with their 100% efficiency scores further underscoring their relative greatest productivity in digital financial inclusion among mobile money users in Nigeria. Furthermore, it is observed from Table 1 that some MNOs have VRS_TE (Variable Return to Scale Technical Efficiency) scores greater than their CRS_TE (Constant Return to Scale Technical Efficiency) scores. These MNOs include MainOne (CRS_TE = 0.892; VRS_TE = 0.910), ISN (CRS_TE = 0.635; VRS_TE = 0.683), Smile Nigeria (CRS_TE = 0.754; VRS_TE = 0.836), BCL (CRS_TE = 0.615; VRS_TE = 0.661), L. M. Ericsson (CRS_TE = 0.872; VRS_TE = 0.890) and Spectranet (CRS_TE = 0.888; VRS_TE = 0.935). The difference between the two technical efficiency scores for these companies suggests that those firms suffer more scale problems than managerial issues to be efficient in the delivery of digital financial inclusion through mobile money penetration in Nigeria. Surprisingly, in terms of return to scale, Table 1 illuminates that these firms have increasing returns to scale (IRS) status. This IRS status implies that if these firms increase their size such a higher scale would have a positive impact on their productivity in the delivery of digital financial inclusion in Nigeria. Thus, the IRS position offers economies of scale opportunity as these firms are yet to reach their optimal scale. In such a situation, a decline in the average input factors proportionally increases the output of mobile money penetration of MNOs.

However, MNOs like Globacom, MTN, Swift Network, Airtel, 9 Mobile and NTEL have CRS status implying that the firms' scale does not impact their productivity as higher outputs do not vary with minimized inputs. Hence, no economies of scale benefit exists. In this sense, a 1% increase in productivity is matched proportionally by a 1% increase in input factors offering no impact of scale. Thus, CRS MNOs have reached their optimal size. However, Table 1 further illustrates that despite some MNOs having CRS status (e.g. Globacom, Swift Network, ISN and NTEL) these firms still need to look up to best practices developed by MTN and Airtel Nigeria for delivery of digital financial inclusion particularly with the provision of mobile money services in Nigeria. This effort is equally important for companies like MainOne, ISN, Smile Nigeria, BCL, L. M. Ericsson, and Spectranet. The current study's findings align with ARM Research's (2023) evidence that only MTN and Airtel Nigeria are the most efficient telecom companies that offer mobile money services in Nigeria. However, the results obtained in this study suggest that the other 10 surveyed inefficient MNOs can improve their future performance if they could intensify mobile money penetration in the country. Consistent with Elubode and Adejo (2024), this study empirically supports that mobile money services could tremendously increase digital financial inclusion in Nigeria.

CONCLUSION

This study empirically investigates how MNOs are productive in providing mobile money services in Nigeria using a cross-sectional survey of 12 sampled registered telecom firms. The results demonstrate that MTN Nigeria and Airtel Nigeria are the only efficient telecom companies in the area of mobile money penetration in the country. Thus, these two firms serve as benchmarks (reference points) for other MNOs in the sector. Other telecom firms like Spectranet, MainOne, L.M. Ericsson, Smile Nigeria, Globacom, Swift Network, ISN, BCL, NTEL and 9 Mobile are inefficient but can improve future performance on mobile money penetration. However, such capacity varies differently among the telecom companies. Notably, this study provides background for efficient analysis of telecom firms on mobile money services for digital financial inclusion advancement in Nigeria. It also helps to identify that most telecom firms in Nigeria face scaling problems. This implies the existence of increasing return to scale should they increase size. Meanwhile, the employment of primary data as most telecom companies do not have published financial reports means that the results obtained are subject to response bias by the sampled MNO managers. Notwithstanding, information obtained from firms' managers is reliable to a greater extent as they are often adept with production operations. However, it is hoped that the public availability of secondary data on mobile money activities and investments of MNOs and its use in future research studies will validate or improve the current study evidence. The study recommends that other telecom firms in Nigeria should try to follow best practices for mobile money services adopted by MTN Nigeria and Airtel Nigeria. It is also recommended that companies like Spectranet, MainOne, ISN, Smile Nigeria BCL and L. M. Ericsson increase their scale (size) to boost their productivity in delivering mobile money services in Nigeria.

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JEL Classification Codes

E58, E59, C61, N7

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