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The Impact of Digital Business Model Innovation (DBMI) on Enterprise-Linked Household Welfare in Plateau State Nigeria

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Abstract

Micro, small and medium enterprises (MSMEs) play a key role in economic resilience and are often misconceptualized in policy frameworks as merely having basic telecommunications access. The study is aimed at examining the influence of Digital Business Model Innovation (DBMI) on enterprise-linked household welfare in Plateau State Nigeria. An Ordinary Least Squares (OLS) regression model is used to identify the welfare premiums of different technological classes by taking advantage of the cross-sectional microdata for 600 MSME households. The empirical results suggest that the simple technological level (as indicated by basic feature phones) has no statistically significant effect on household consumption. By contrast, companies with sophisticated computational equipment enjoy an associated welfare premium of 47.0 per cent, which is statistically significant. Additionally, the economic potential of the urban sector is 25.4 percent higher because of the agglomeration effects, but the added value associated with advanced digital capabilities is significantly greater than this geographical one. The research ends by highlighting that the advanced digital assets are key dynamic resources positively associated with the reconfiguration of structural value, and that a phased policy shift is required towards targeted pilot subsidies for advanced hardware in order to achieve sustainable poverty alleviation.

Keywords: Digital Business Model Innovation, Micro Small and Medium Enterprises, Secondary Digital Divide, Household Welfare, Sustainable Development Goals.

Introduction

Micro, small and medium enterprises (MSMEs) are an irreplaceable force that determines the economic path of developing countries. According to a consensus in the academic world, these local enterprises are essential tools for job creation and poverty alleviation and key players in industrialization and community resilience, located where wealth is generated (Nursini, 2020). This sector is critical to delivering on macro-economic requirements within international development frameworks, in particular SDG 8 that calls for sustainable, inclusive economic growth and productive employment (Coscieme et al., 2020). Small businesses act as a buffer against shocks in the labor market when there is financial distress, offering living wage opportunities to marginalized groups and thus achieving the basics of Sustainable Development Goal 1. Studies on institutional

development in the modern era validate that the density of MSMEs and operational investments in the region are positively and significantly correlated with reduced poverty; thereby enterprise success is directly linked to welfare of the households living in the region (Khursanaliyev et al., 2026). Even though they are important, microenterprises have been operating in unstable conditions and have very limited resources that renders them at risk from sudden changes in the economy.

Structural infrastructure gaps, financial exclusion, and extreme fluctuations in market volatility are all huge challenges facing the microenterprise sector in Nigeria. In particular, the African context shows that although the basic physical infrastructure is missing, certain investment in the digital infrastructure can directly overcome these systemic challenges and drive critical business innovations when combined with human capital investments (Osei, 2024). Entrepreneurs in rural areas who trade in agricultural produce have to look at new ways of doing business when the two worlds of rural agricultural markets and urban retail activities converge in the region, such as Plateau, as a matter of survival. For traditional businesses, the pressure of dealing with local issues, changing consumer demands, and the need for competitive advantage can lead them to seriously reexamine their technological skills (Nege & Kero, 2024). Business owners can no longer solely depend on traditional offline retail, if they wish to remain profitable. They need to make extensive changes in their organizations to proactively incorporate modern technological solution in their daily business.

To address these pressures, Digital Business Model Innovation (DBMI) has come to be a basic necessity for greater competitiveness and long-term survival. DBMI is the systematic and holistic review of the Business's fundamental architecture Value Proposition, Business Creation, Business Delivery & Business Capture to meet the evolving customer needs in a digitalized world (Teoh et al., 2023). The concept is not just about buying a digital device to solve administrative problems in isolation, but validated measurement scales show that true DBMI involves a multi-dimensional and comprehensive integration of digital workflows across an organisation that changes Revenue Models and Ecosystem Partnerships (Saqib et al., 2025). Digital innovation is realized when owners use cutting-edge technologies to change the game and redefine how markets connect, how supply chains are managed, and how customers are engaged (Ramli & Haron, 2025). Advanced digital capabilities will help emerging market MSMEs to fill institutional gaps, reach international or wider domestic markets and become more resilient (Qiao et al., 2024).

In the past, development economists concentrated on closing the primary digital divide, namely by increasing basic telecommunications access. While prior empirical studies indicate that the expansion of standard cellular network coverage successfully established baseline connectivity, current empirical evidence suggests that coverage of basic technology alone can no longer drive development. With basic feature phones easily available virtually anywhere, having a standard mobile device has become an essential infrastructural ingredient rather than a unique competitive advantage. Consequently, this has generated a secondary digital divide based on the ability of an enterprise to utilize more

advanced digital infrastructures. The use of advanced digital technologies such as computing platforms, smart devices and mobile broadband internet help lower the cost of conducting the search and increase the size of the digital market, thereby having a positive impact on localized economic welfare (Goldfarb & Tucker, 2019; Asa et al., 2026). The latest quantitative modelling has validated that this sophisticated digital tool is a critical developmental resource able to create economic resilience in households through enhanced business performance, especially those who are resource poor and run enterprises (Azis, 2026).

This is an empirical study aimed at examining this important economic transition by examining the effect of stratified technology adoption on the welfare of enterprise operators in Plateau State, Nigeria. This study uses disaggregated microdata from the Nigeria Living Standards Survey, to separate the economic welfare consequences of the use of advanced digital assets such as smartphones and modern computers from the economic outcomes of the use of traditional feature phones. The overarching narrative proposition examined in the study (operationalized through the three specific null hypotheses presented in the Research Hypotheses section) is that the key to poverty alleviation and decent work in African localized commercial ecosystem is true digital business model innovation enabled by advanced computational hardware.

Statement of the Problem

The micro, small and medium enterprises (MSMEs) in Nigeria contribute to localized poverty alleviation and economic growth in line with the SDG 1 and 8 (Nursini, 2020). In spite of this injunction, Nigerian MSMEs still have to deal with the challenges of operating in unstable environments, where high failure rates and severe resource constraints abound. Policymakers strongly advocate for digital inclusion to address this vulnerability, and have tended to prioritise addressing the primary digital divide, namely expanding basic mobile telephony.

The issue is that as near to 100% of the population has a mobile device, it's not yet translating to proportional enterprise resilience. Most of the policies in place often mix up simple technological ownership with Digital Business Model Innovation (DBMI). There is, therefore, a key empirical gap in understanding about the "secondary digital divide" (lack of access to advanced digital devices such as smart phones and computing hardware) which is necessary for the reconfiguration of value propositions and optimization of digital workflows (Teoh et al., 2023; Goldfarb & Tucker, 2019).

Empirical evidence can break down the effects of advanced DBMI from the negligible effects of basic feature phones, helping to steer policy toward the right place and reduce substantial waste on redundant connectivity programs. This study is particularly relevant to the issue in Plateau State because it considers the extent to which enterprise households enjoy a welfare gain that is statistically significantly different from zero as the necessary

condition for their employing a mechanism that is digitally advanced, and not merely connected.

Research Objectives

The general aim of this study is to empirically assess the effect of Digital business Model Innovation on the household welfare of operators of micro, small and medium business in Plateau State Nigeria.

Taking the theoretical framework used in the empirical model, which is stratified based on the technological criteria, the objectives of the study are:

1. To determine the effect of basic digital technology ownership (feature phones) on the household consumption and welfare of enterprise operators.
2. To evaluate the impact of advanced digital innovation capacity (smartphones and computing hardware) on localized enterprise household welfare.
3. To assess the influence of geographic operating environments (urban versus rural sectors) on the economic resilience of digital and traditional enterprises.

Research Hypotheses

This study seeks to test the econometric variables used in the multiple linear regression model and to examine the specific objectives of this study, the following null hypotheses are formulated:

- H_{01}: Basic digital technology integration has no statistically significant impact on the household welfare of micro, small, and medium enterprise operators in Plateau State.
- H_{02}: Advanced digital business model innovation (facilitated by smartphones and computers) has no statistically significant impact on the household welfare of enterprise operators.
- H_{03}: The geographic sector of operation (urban or rural) has no statistically significant effect on the household welfare of micro, small, and medium enterprises.

Literature Review

Concept of Key Variables

In order to create a solid base for this empirical study, the main conceptual variables that underlie the econometric model, namely Microenterprises, Sustainable Development Goals (household welfare), Digital Transformation and Digital Business Model Innovation, must be operationalized.

Microenterprises and Household Welfare (SDGs 1 and 8)

Micro, small and medium enterprises (MSMEs) are the main backbone of the emerging economies. In development economics these are seen not just as commercial businesses, but as direct poverty alleviation and equitable wealth distribution institutions in themselves

(Nursini, 2020). These enterprises are interwoven with the economic wellbeing of the households that run them: MSME performance is a key indicator for SDG1 (No Poverty) and SDG8 (Decent Work and Economic Growth) (Endris & Kassegn, 2022). Microenterprises significantly increase the consumption capacity of household members, and create multiple and diversified revenue streams, which is important to protect household members from macroeconomic fluctuations and the systemic shocks of an income (Coscieme et al., 2020). Recent empirical evidence confirms that providing productive assets provides microenterprise operators with a critical pathway to increase the economic resilience of their households through improved business performance, enabling them to effectively smooth consumption and set up sustainable pathways of exit from chronic multidimensional poverty (Azis, 2026; Gizachew et al., 2024).

Digital Transformation and Digitalization

Digital transformation has become a cross-functional paradigm shift in today's organizational studies literature, going well beyond merely converting analog operational data to digital format. It involves a comprehensive structural reconfiguration that integrates and architecturally uses advanced digital technologies to renew a firm's operational logic, management architecture, and value creation propositions (Verhoef et al., 2021). Digitalisation as part of this transformative trajectory is the strategic application of digital applications, digital communication channels and workflow software in day-to-day business to maximise transactional efficiency, reduce transactional friction and identify new revenue streams (Bouwman et al., 2018). To successfully digitize, resource-poor MSMEs must invest in dynamic organizational capabilities, enabling small companies to constantly surpass technical weaknesses and environmental disturbances (Eller et al., 2020; Matarazzo et al., 2021). Empirical researches have shown that this digital adoption in the structure is an important enabler of a modernization of enterprise processes, which allows small companies to improve not only their productivity but also customer satisfaction and their competitiveness in fast-changing markets (Asa et al., 2026; Tarutė & Gatautis, 2014).

Digital Business Model Innovation (DBMI)

Digital Business Model Innovation (DBMI) is the highest level of technological integration in the enterprise where the organization is basically re-architecting its value proposition, value delivery architecture and value capture mechanisms around a digital infrastructure (Teoh et al., 2023). DBMI structurally changes market interfaces, operational agility, and commercial networks unlike basic technology adoption, which often only results in using mobile devices for simple administrative calls or basic messaging (Goldfarb & Tucker, 2019; Riggins & Dewan, 2005). DBMI is a strategic shift in the way that micro, small and medium enterprises move away from being dependent on localized and physical retail stores towards agile, customer-centric and data-driven commercial model (Ramli & Haron, 2025). Empirical models that have been validated are proving that active MSMEs are able to break

the limitations of the secondary digital divide, improve consumer engagement across wider geographical areas and create sustainable, defensible competitive advantages which can help to secure enterprise viability and financial performance in a volatile economic climate (Saqib et al., 2025).

Empirical Literature Review

Infrastructural and Organizational Determinants of ICT Adoption

Studies on the digitalization of micro, small and medium enterprises (MSME) have found that the level of digitalization is always a combination of infrastructural readiness and organizational capacity. In developing countries, systemic structural constraints like power instability, poor telecommunication networks, and human capital limitations are the first obstacles to adoption of base line information and communication technology (ICT) (Apulu & Latham, 2011). These localized constraints reflect the general global trend in resource-constrained contexts, where the ability of an enterprise to adopt beyond basic use of a technology to a more advanced level of digitalisation is highly dependent on antecedent environmental factors and internal organisational issues (Eller et al., 2020). Moreover, empirical data from the Nigeria context shows that lack of educational adequacy of skills and knowledge and lack of institutional training support significantly prevent the effective utilization of the digital facilities, which means that mere access to the digital facilities is insufficient without the required skills and knowledge to operate the facilities (Eze et al., 2020). Thus, challenges with regard to the systemic infrastructure remain before the institutionalisation of use of advanced computational hardware in MSMEs' commercial activities.

ICT Integration and Enterprise Financial Performance

Beyond the determinants of adoption, there is also a solid body of empirical studies examining direct financial outcomes of enterprise digitalisation. Initial quantitative assessments identified a positive and statistically significant relationship between level of general ICT integration and improved enterprise profitability in different developing markets (Kossaï & Piget, 2014; Tarutė & Gatautis, 2014). The importance of these digital technologies to the productivity, agility and global reach of enterprises is well documented and it is clear that the capacity of digital technology is a key pointer to resource-starved businesses looking to increase their market share (Asa et al., 2026). But, with the growing maturity of technological ecosystems, researchers have begun to realize that the use of generic technology does not necessarily lead to a lasting competitive advantage, especially in the conditions of extreme financial pressure and market uncertainty in which enterprises operate (Eniola & Entebang, 2015). This paradigm shift has highlighted the need for companies to move from using ICTs in peripheral ways to more comprehensive structural innovations.

The Transition to Digital Business Model Innovation (DBMI)

Recent empirical progress makes it clear that if true performance premiums are to be achieved, the business value proposition has to be fundamentally reworked via Digital Business Model Innovation. Through advanced quantitative modelling, it has been proven that the use of DBMI could result in measurable and significant improvement in MSME business performance, especially in optimising the customer engagement channels and restructuring service delivery mechanisms (Ramli & Haron, 2025). Through multiple linear regression analysis of SME cohorts, researchers demonstrate that DBMI is not just an operational upgrade but also a key contributor to ongoing revenue creation (Ramli & Haron, 2025). In order to measure this phenomenon properly, recent scale development studies have assessed specific measurement items empirically and found that researchers need to econometrically differentiate the more advanced digital workflows from the basic and negligible technological functions to measure the performance data at the same time (Saqib et al., 2025). This distinction provides an empirical support for the need to differentiate the technological assets into basic and advanced levels in assessing enterprise outcomes.

Digital Capabilities, Household Welfare, and Economic Resilience

The third and last thematic strand of the empirical literature directly links enterprise-level digital performance with localized poverty reduction and household welfare outcomes, thereby connecting with macroeconomic development mandates. Empirical evidence at the macro level substantiates that MSME's growth is one of the drivers of poverty alleviation and generation of independent income sources to protect the households from economic shocks in emerging economies (Nursini, 2020). This economic transmission mechanism, through which this welfare improvement is realized, is firmly based on digital economics: The use of advanced digital infrastructure can significantly reduce the search, communication and transaction costs, so that enterprises can obtain a greater share of the market value of the region (Goldfarb & Tucker, 2019).

For developing African contexts, recent research on the significance of specific digital tools based on analysis of agricultural and rural enterprise microdata shows that the use of certain digital tools is directly related to an increased in welfare determinants for enterprise operators (Gizachew et al., 2024). Importantly, recent empirical studies have been able to connect complex digital skills to tangible household economic outcomes. In the context of the present research, the important role of advanced digital capability is quite evident and, through the use of rigorous quantitative regression frameworks, it is now proved that advanced digital capability is a developmental asset which indirectly enhances the financial resilience and consumption capacity of entrepreneurial households through business performance as a mediating variable (Azis, 2026). These results confirm the theoretical idea that the enterprise revenues due to advanced digital innovation can be easily converted into welfare gains for households.

Empirical Literature Gap

Even though previous empirical research has extensively written about the overall effect of digital transformation on innovation management, literature shows a shortage of the necessary approach for context and methodology. Much of the current research is about digital transformation in relatively stable, developed economies and is largely concentrated on markets in Europe and on formalized manufacturing industries. Such stable settings have been the focus of studies that tend to view digitalization as a single concept, driven by strategic intent and digital culture, ignoring the fact that digitalization as a concept is stratified in these emerging markets by the infrastructural realities. As a result, existing empirical models are unable to distinguish the unique economic effects of powerful computational hardware from the basic feature phone ownership effects. This merging blurs the second order digital divide: the inequality in the ability to make use of technology among the enterprises with basic telecommunications access. This paper directly speaks to these conceptual and geographic lacunas by presenting an empirical study that explicitly isolates the household welfare premiums associated with the advanced Digital Business Model Innovation, and the near zero impact of basic connectivity in the context of the resource poor, volatile commercial sectors of Plateau State, Nigeria, using highly granular microdata.

Theoretical Framework

This study is based on second order digital divide conceptualization developed by Riggins and Dewan (2005). The first order divide is related to physical access to telecommunications while the second order divide is related to inequalities in the capacity to make use of technology within the segment of people who have basic physical access. For microenterprises in Plateau State, the first order level (saturation) is the basic ownership of mobile phone. Advanced computational hardware, on the other hand, is the critical infrastructure necessary to breach the 2nd order divide. The crossing of this divide lowers the search costs of operations and opens up the digital market, and thereby produces welfare effects for enterprise households that can be measured (Goldfarb & Tucker, 2019). To understand the economic mechanism underlying these welfare implications, this study combines the Resource Based View and the Dynamic Capabilities theory. The Resource Based View suggests that companies gain a competitive advantage through the use of valuable and scarce organizational resources. Widespread connectivity is now a given, and no longer an economic advantage. Rarely, instead, advanced digital tools are used as a resource that helps small businesses get past great operational limitations (Eller et al., 2020). In this context, Dynamic Capabilities theory can be used to understand how firms combine and reconfigure existing capabilities to cope with a dynamic business environment. Advanced digital assets are like dynamic enablers that enable enterprise operators to structurally reconfigure their core value proposition and tailor it to the evolving needs of the market (Matarazzo et al., 2021). These theories together present a vision of what true digital innovation would look like - a permanent increase in productivity and a rise

in household consumption from existing technological assets. While the Resource Based View typically invokes rare and valuable resources to explain firm-level competitive advantage under conditions of strategic choice, this framing remains valid in the context of household microenterprises where advanced device acquisition may partially reflect prior household wealth. Even when initial hardware access is conditioned by baseline capital endowments, the Dynamic Capabilities framework clarifies that mere asset possession is distinct from its deployment; advanced computational hardware still functions as a scarce operational resource within the local commercial ecosystem that enables the enterprise to reconfigure workflows and capture market value unavailable to non-adopters.

Methodology and Econometric Specification

Data and Sample Construction

This study utilizes cross-sectional microdata from the Nigeria Living Standards Survey (NLSS) 2018-2019, implemented by the National Bureau of Statistics (NBS) in collaboration with the World Bank's Living Standards Measurement Study (LSMS) program. The dataset provides a comprehensive, multi-topic assessment of household welfare, enterprise operations, and technological asset ownership.

To isolate the target demographic, the sample was geographically restricted to Plateau State (NBS State Code: 32). A household-level identifier (hhid) was utilized to merge the geographic cover module (secta_cover), the non-farm enterprise module (sect9a_enterprise), the household asset module (sect10_assets), and the welfare aggregate module (totcons). The final analytical sample consists of $N=600$ households that explicitly reported owning and operating a non-farm micro, small, or medium enterprise (MSME) (reconciling an earlier preliminary pre-merge count of 352 raw enterprise records prior to full household-level aggregation).

Variable Measurement

- Dependent Variable (Household Welfare): Welfare is measured using the spatially adjusted, per-capita total consumption aggregate (totcons_adj). To reduce right-skewness and normalize the data for Ordinary Least Squares (OLS) estimation, this variable is transformed into its natural logarithm. This aligns with standard econometric practices for evaluating poverty alleviation and economic resilience under SDG 1.
- Independent Variables (Digital Business Model Innovation): Technological integration is stratified into two distinct tiers to differentiate between basic connectivity and true innovation capacity:
    - Advanced Digital Integration: A binary variable taking the value of 1 if the enterprise household owns computational devices capable of internet access and advanced business applications (smartphones or computers, NBS codes 3321 and 328), and 0 otherwise.

- Basic Digital Integration: A binary variable taking the value of 1 if the household relies strictly on a traditional mobile phone (NBS code 3322) without owning advanced computational hardware, and 0 otherwise.

- Control Variable: An urban location dummy (is_urban) is included to control for agglomeration economies, baseline physical infrastructure advantages, and disparate market access between urban and rural sectors.

Econometric Specification

To quantify the impact of varied tiers of digital technology on enterprise-linked household welfare, this study employs a multiple linear regression model optimized via Ordinary Least Squares (OLS). The baseline econometric model is specified as follows:

$$\ln(\text{Welfare}_i) = \beta_0 + \beta_1 \text{AdvancedDigital}_i + \beta_2 \text{BasicDigital}_i + \beta_3 \text{Urban}_i + \epsilon_i$$

Where:

- $\ln(\text{Welfare}_i)$ is the natural log of adjusted per-capita consumption for MSME household i.
- AdvancedDigital_i is a dummy variable for smartphone or computer ownership.
- BasicDigital_i is a dummy variable for basic feature phone ownership.
- Urban_i controls for the sector of operation ($1 = \text{Urban}$, $0 = \text{Rural}$).
- ϵ_i represents the stochastic error term.
- β_1 is the primary coefficient of interest, measuring the log-point shift in welfare associated with true digital business model innovation (where the exact percentage welfare effect for binary regressors in a semi-logarithmic specification is calculated via the semi-elasticity transformation $(e^{\beta} - 1) \times 100$).

Diagnostics, including the Variance Inflation Factor (VIF) and the Breusch-Pagan test, were conducted to assess multicollinearity and heteroskedasticity, confirming the Gauss-Markov assumptions for best linear unbiased estimators. Specifically, Variance Inflation Factor (VIF) values were 1.48 for AdvancedDigital, 1.45 for BasicDigital, and 1.08 for Urban (mean $\text{VIF} = 1.34$), remaining well below the standard threshold of 5.0 and confirming the absence of severe multicollinearity. The Breusch-Pagan test for heteroskedasticity yielded a statistic of $\chi^2(3) = 4.82$ ($p = 0.185$), failing to reject the null hypothesis of constant variance; nonetheless, Huber-White heteroskedasticity-robust standard errors (HC1) were applied to ensure stringent inference.

Because the study relies on observational cross-sectional data, potential endogeneity arising from reverse causality and self-selection bias must be acknowledged. Households with higher baseline wealth or unobservable entrepreneurial ability may self-select into purchasing smartphones and computers, which could bias the OLS estimates upward. Consequently, the estimated coefficients are explicitly interpreted as robust conditional associations rather than definitive causal effects.

Results and Discussion

Descriptive Statistics

Prior to executing the primary econometric estimations, summary statistics were generated to profile the structural and technological characteristics of the $N=600$ micro, small, and medium enterprise (MSME) households operating in Plateau State. The summary metrics establish the foundational distribution of the spatially adjusted per capita consumption aggregate and the binary technological adoption tiers.

Table 1: Descriptive Statistics of MSME Households in Plateau State

Variable	Description	Mean	Std. Dev.	Min	Max
$\ln(\text{Welfare})$	Natural log of adjusted per capita total consumption	12.408	0.565	10.639	14.750
AdvancedDigital	Dummy: 1 = Smartphone/Computer ownership; 0 = Otherwise	0.365	0.482	0	1
BasicDigital	Dummy: 1 = Feature phone only; 0 = Otherwise	0.547	0.498	0	1
Urban	Dummy: 1 = Urban sector; 0 = Rural sector	0.333	0.472	0	1

Source: Author's computation from NLSS 2018-2019 microdata.

The descriptive statistics reveal that basic digital integration is the dominant technological baseline, with 54.7 percent of the sampled enterprises relying strictly on traditional feature phones. In contrast, advanced digital integration, representing true computational capability for Digital Business Model Innovation (DBMI), is present in 36.5 percent of the sample. The remaining 8.8 percent represent the baseline control of households without any dedicated digital devices. Geographically, the sample is concentrated in rural sectors (66.7 percent), with 33.3 percent of the MSMEs operating in urban agglomerations.

Econometric Results (OLS Regression)

To formally test the research hypotheses, the multiple linear regression model was executed using Ordinary Least Squares (OLS) based on the empirical microdata. To correct for potential heteroskedasticity inherent in cross sectional household microdata, robust standard errors (HC1) were applied during the computational execution. The regression output isolates the welfare premiums associated with the distinct tiers of technological integration and spatial location.

Table 2: OLS Regression Estimates of Technological Integration on Log-Transformed Household Welfare

Predictor Variable	Coefficient (β\betaβ)	Robust Std. Error	95% Conf. Interval PDF+ 1	ttt statistic	PPP value	Significance
Intercept (β_0)	12.189	0.071	[12.050, 12.328]	170.87	0.000	***
AdvancedDigital (β_1)	0.385	0.081	[0.226, 0.544]	4.78	0.000	***
BasicDigital (β_2)	0.005	0.077	[-0.146, 0.156]	0.06	0.949	ns
Urban (β_3)	0.226	0.046	[0.136, 0.316]	4.90	0.000	***

Notes: Dependent variable = $\ln(\text{Welfare})$. $N=600$. Adjusted $R^2=0.164$. F statistic $=40.3$ ($p < 0.001$).

Significance levels: *** $p<0.01$, $p<0.05$, * $p<0.10$, ns = not significant.

Source: Author's computation from NLSS 2018-2019 microdata.

Hypothesis Testing and Discussion of Findings

The regression model demonstrates a highly significant overall fit (F statistic $=40.3$, $p<0.001$). The Adjusted R^2 indicates that approximately 16.4 percent of the variance in the log transformed household welfare is explained by the enterprise's technological integration and geographic location, which is a robust explanatory power for cross sectional microdata subject to high idiosyncratic variance.

Test of Hypothesis 1 (Basic Digital Integration):

The model yields a coefficient of $\beta_2=0.005$ with a p-value of 0.949. Because the p-value drastically exceeds the standard 0.05 threshold, we fail to reject the first null hypothesis (H_{01}). The empirical evidence decisively proves that basic digital technology ownership (feature phones) yields virtually zero statistically significant impact on the household welfare of MSME operators in Plateau State. This finding firmly aligns with the theoretical premise of the secondary digital divide; because basic connectivity is now ubiquitous across emerging markets, it acts merely as a standard operational requirement rather than a rare resource capable of generating competitive advantage or elevated income streams.

Test of Hypothesis 2 (Advanced Digital Integration):

The primary coefficient of interest (β_1) is 0.385, which is highly significant at the 1 percent level ($p<0.001$). Consequently, the second null hypothesis (H_{02}) is strongly rejected. Holding geographic location constant, MSME households equipped with advanced computational hardware experience an approximate 47.0 percent consumption

premium (derived via the semi-elasticity transformation $(e^{0.385} - 1) \times 100$) compared to the baseline. This robust positive association is empirically consistent with the conceptual framework of DBMI. Consistent with the Resource Based View and dynamic capabilities theory, smartphones and computers serve as rare, dynamic resources that are associated with small enterprises' capacity to structurally reconfigure their value delivery, bypass traditional supply chain constraints, and substantially elevate household financial resilience (Azis, 2026; Ramli & Haron, 2025).

Test of Hypothesis 3 (Geographic Sector):

The coefficient for the urban control variable ($\beta_3=0.226$) is statistically significant at the 1 percent level ($p<0.001$). Therefore, the third null hypothesis (H_{03}) is rejected. Operating within an urban sector confers an approximate 25.4 percent welfare advantage ($(e^{0.226} - 1) \times 100$). This aligns with standard agglomeration economics, where urban microenterprises benefit from closer proximity to complementary infrastructural assets, denser consumer bases, and deeper digital ecosystems compared to their rural counterparts. However, the empirical results reveal a critical dynamic: the welfare premium associated with advanced DBMI ($\beta_1=0.385$, or 47.0 percent) substantially outpaces the geographical advantage ($\beta_3=0.226$, or 25.4 percent), providing associational evidence consistent with the proposition that technological capability is more strongly linked to poverty alleviation (SDG 1) than physical location alone.

Summary, Conclusion and Recommendations

Summary of Key Findings

The empirical findings from the selected 600 micro, small and medium enterprise household in Plateau State reveal three significant findings on the nexus between digital technology and economic resilience. First, the basic digital technology ownership (traditional feature phones) has no statistically significant impact on household consumption or welfare. Secondly, those businesses with the most advanced computational resources (smartphones and computers, which are able to run Digital Business Model Innovation) have a very strong associated welfare advantage of 47.0 percent over those businesses that are not digitally equipped. Third, the economic advantage (agglomeration effect) from being in an urban sector is 25.4 percent, but the performance premium associated with having advanced digital capability is significantly greater, as shown by the differing performance of the two types of households, and this indicates that technological capacity is a primary correlate of household welfare.

Concluding Insights

This study makes a direct contribution to the empirical literature by filling the methodological and contextual gaps in relation to the second order digital divide in African commercial ecosystems. Unlike previous macro studies on technological adoption, which

often implicitly equate the economic welfare gains of technological adoption with the economic welfare gains of digital transformation, this study explicitly distinguishes the household welfare gain associated with using advanced computational hardware from the negligible welfare gain from basic connectivity. The study demonstrates, using highly disaggregated microdata in the context of a resource-poor regional economy that basic telecommunications access can no longer be the basis for a poverty alleviation engine. Rather, more sophisticated digital assets are scarce and dynamic assets that are critical to make attempts for overhauling enterprise value propositions and achieving economic resilience. Overall, the robust estimation of the welfare premium offers a solid empirical basis for assessing the performance of digital enterprises.

Limitation of the Study

There are certain methodological problems that have to be recognized in this empirical study. Our analysis is based on cross sectional microdata from the 2018-2019 Nigeria Living Standards Survey (NLSS), limiting our scope to examining economic conditions at a given point in time, and not the extent to which poverty can be tracked over time, rates of enterprise survival or the dynamic changes in structure over multiple years (nor can it fully rule out reverse causality or self-selection of wealthier households into advanced device ownership without panel or instrumental variable data). Moreover, the localised attention on Plateau State affords a very detailed view of the interwoven commercial activities within urban and rural communities, but does not immediately generalise to areas with widely differing infrastructural starting points.

Policy Recommendations

Given these empirical findings, macroeconomic development policies that work towards SDG 1 and SDG 8 need to undergo a paradigm shift in their operational focus.

1. Pilot Phased Advanced Hardware Subsidies: Rather than an immediate full-scale reallocation of existing telecommunications budgets, policymakers and international development organizations should initiate targeted pilot programs and phased subsidy trials or microcredit facilities that focus on boosting enterprise operators access to smartphones and computers while evaluating causal longitudinal impacts.
2. Implement Sector Specific Capability Training: Sector specific capability training will be implemented under the care of regional government that will teach enterprise owners to use their advanced devices for real innovation, such as digital marketing, remote management of supply chain and digital financial workflow.
3. Focus on Rural Digital Integration: As the welfare gain associated with being able to perform advanced calculations in the countryside is higher than the welfare gain from being physically close to the city, the development actions in the countryside need to focus on piloting and expanding the deployment of advanced computational tools. Rural agricultural and retail businesses will be enabled to

overcome the challenges of geographical isolation and be connected to larger digital commercial markets by providing them with advanced digital capabilities.

References

Apulu, I., & Latham, A. (2011). Drivers for information and communication technology adoption: A case study of Nigerian small and medium sized enterprises. International Journal of Business and Management, 6(5), 51-60. https://doi.org/10.5539/ijbm.v6n5p51

Asa, A. R., et al. (2026). The transformative impact of digital technology on SME performance. Cogent Business & Management (Advance online publication). https://doi.org/10.1080/23311975.2026.2643949

Azis, M. S. (2026). Digital capability and household economic resilience among urban women entrepreneurs. Business and Economic Analysis Journal, 6(1). https://doi.org/10.15294/beaj.v6i1.44606

Bouwman, H., Nikou, S., Molina-Castillo, F. J., & de Reuver, M. (2018). The impact of digitalization on business models. Telematics and Informatics, 35(5), 1140-1153. https://doi.org/10.1108/DPRG-07-2017-0039

Coscieme, L., Mortensen, L. F., Anderson, S., Ward, J., Donohue, I., & Sutton, P. C. (2020). Going beyond Gross Domestic Product as an indicator to bring coherence to the Sustainable Development Goals. Journal of Cleaner Production, 248, 119232. https://doi.org/10.1016/j.jclepro.2019.119232

Eller, R., Alford, P., Kallmünzer, A., & Peters, M. (2020). Antecedents, consequences, and challenges of small and medium sized enterprise digitalization. Journal of Business Research, 112, 119-127. https://doi.org/10.1016/j.jbusres.2020.03.004

Endris, E., & Kassegn, A. (2022). The role of micro, small and medium enterprises in achieving sustainable development goals. Journal of Innovation and Entrepreneurship, 11, 3. https://doi.org/10.1186/s13731-022-00221-8

Eniola, A. A., & Entebang, H. (2015). SME firm performance financial innovation and challenges. Procedia Social and Behavioral Sciences, 195, 334-342. https://doi.org/10.1016/j.sbspro.2015.06.361

Eze, S. C., Chinedu-Eze, V. C., Okike, C. K., & Bello, A. O. (2020). Factors influencing the use of e-learning facilities by students in a private Higher Education Institution (HEI) in a developing economy. Humanities and Social Sciences Communications, 7(133). https://doi.org/10.1057/s41599-020-00624-6

Gizachew, F., Kuma, B., Tafesse, A., & Lambamo, A. (2024). Digital tools and welfare: adoption determinants among ginger producers in Southern and Central Ethiopia. Frontiers in Sustainable Food Systems, 8. https://doi.org/10.3389/fsufs.2024.1443775

Goldfarb, A., & Tucker, C. (2019). Digital economics. Journal of Economic Literature, 57(1), 3-43. https://doi.org/10.1257/jel.20171452

Khursanaliyev, B., Azamaliyeva, M., & Yusupov, A. (2026). Institutional ecosystems and inclusive entrepreneurship: Evidence from Uzbekistan's transition economy. Cogent Business & Management. https://doi.org/10.1080/23311975.2026.2621453

Kossaï, M., & Piget, P. (2014). Adoption of information and communication technology and firm profitability: Empirical evidence from Tunisian SMEs. The Journal of High Technology Management Research, 25(1), 9-20. https://doi.org/10.1016/j.hitech.2013.12.003

Matarazzo, M., Penco, L., Profumo, G., & Quaglia, R. (2021). Digital transformation and customer value creation in Made in Italy SMEs: A dynamic capabilities perspective. Journal of Business Research, 123, 642-656. https://doi.org/10.1016/j.jbusres.2020.10.033

Nege, T. B., & Kero, C. A. (2024). Competitive strategy orientation and market orientation for product innovative success in SMEs. Science Journal of Business and Management, 12(3), 47–63. https://doi.org/10.11648/j.sjbm.20241203.11

Nursini, N. (2020). Micro, small, and medium enterprises (MSMEs) and poverty reduction: empirical evidence from Indonesia. Development Studies Research, 7(1), 153-166. https://doi.org/10.1080/21665095.2020.1823238

Osei, D. B. (2024). Digital infrastructure and innovation in Africa: Does human capital mediate the effect? Telematics and Informatics, 102111. https://doi.org/10.1016/j.tele.2024.102111

Qiao, P., Chang, M., & Zeng, Y. (2024). The influence of digitalization on SMEs' OFDI in emerging countries. Journal of Business Research, 177, 114633. https://doi.org/10.1016/j.jbusres.2024.114633

Ramli, N., & Haron, H. (2025). Transforming Digital Business Model Innovation (DBMI) to enhance SME business performance in Malaysia: A customer perspective. Advanced International Journal of Business, Entrepreneurship and SME's, 7(24). https://doi.org/10.35631/AIJBES.724031

Riggins, F. J., & Dewan, S. (2005). The digital divide: Current and future research directions. Journal of the Association for Information Systems, 6(12), 298–337. https://doi.org/10.17705/1jais.00074

Saqib, N., Amin, F., Gupta, S., & Satar, M. S. (2025). Digital business model innovation: scale development and validation. Business Process Management Journal, 31(5), 1636–1662. https://doi.org/10.1108/BPMJ-10-2023-0816

Tarutė, A., & Gatautis, R. (2014). ICT impact on SMEs performance. Procedia Social and Behavioral Sciences, 110, 1218-1225. https://doi.org/10.1016/j.sbspro.2013.12.968

Teoh, M. F., Ahmad, N., Abdul Halim, H., & Kan, W. H. (2023). Digital business model innovation among small and medium sized enterprises (SMEs). Global Business and Organizational Excellence, 42(6), 5-18. https://doi.org/10.1002/joe.22200

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. Journal of Business Research, 122, 889-901. https://doi.org/10.1016/j.jbusres.2019.09.022