

**EFFECT OF DIGITAL TRANSFORMATION ON THE PERFORMANCE OF SELECTED  
MANUFACTURING FIRMS IN SOKOTO STATE**

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**Abstract**

This study investigated the effect of digital transformation operationalised as business-model innovation and digital infrastructure on the performance of manufacturing firms in Sokoto State, Nigeria. Adopting a survey design, the researchers purposively sampled knowledgeable personnel from ten firms, drawing a Yamane-derived sample of 346 respondents; 450 questionnaires were distributed to secure the minimum required returns. Data from 381 valid responses were analysed with multiple regression. Results show a strong model fit indicating that BMI and DI together explain 61.4 % of the variance in organisational performance. Individually, business-model innovation exerted the larger impact, while digital infrastructure also contributed significantly; multicollinearity diagnostics were acceptable. The findings confirm that firms achieving higher levels of innovative business-model reconfiguration and robust digital infrastructure attain superior productivity, profitability and competitive strength. The study recommends that Sokoto manufacturers should institutionalise continuous business-model innovation through structured ideation, rapid prototyping and incentive schemes, and commit to phased upgrades of broadband, cloud and analytics platforms, coupled with targeted digital-skills training and collaborative financing arrangements. Implementing these measures is expected to amplify organisational agility and sustain long-term performance gains in the region's industrial sector.

**Keywords:** Digital Transformation, Business-Model Innovation, Digital Infrastructure, Performance, Manufacturing Firms.

**INTRODUCTION**

Digital transformation describes the deliberate, enterprise-wide deployment of advanced digital technologies artificial intelligence, industrial IoT, cloud platforms, data analytics, and cyber-physical systems to re-engineer value-creation processes and business models across the manufacturing value chain (Sokolova, 2025). Recent analyses noted that digital transformation's power lies in its capacity to turn formerly linear, siloed production flows into interconnected, data-driven ecosystems,

helping manufacturers respond to real-time shifts in demand, energy prices, and supply-chain shocks (World Economic Forum, 2024).

Globally, the performance pay-off as documented show firms that have reached the scaled stage of Digital transformation report 30–50 percent cuts in unplanned equipment downtime and double-digit gains in labour productivity compared with firms at the pilot stage (Sustainable Manufacturing Expo, 2024). Large-sample econometric studies likewise find significant positive effects on total-factor

productivity; for instance, a 2024 panel analysis of 2,300 manufacturers showed digital transformation raising efficiency by 6–8 percent within two years of adoption (Zhang & Li, 2024). These outcomes are reinforced by global surveys such as Deloitte’s 2025 Manufacturing Outlook, where 78 percent of executives link AI investments directly to digital transformation - led performance goals.

In emerging economies, Nigeria has become a focal point, market analysts project the country’s digital-transformation spend to reach USD 11.7 billion in 2025, expanding at 18 percent CAGR through 2030 (Mordor Intelligence, 2025). Yet adoption within manufacturing is uneven: a 2023 DEA–Tobit study of 120 Nigerian factories found most firms still rely on low-end devices, missing the efficiency boost high-end technologies deliver (Adeyinka, 2023). Recognising this gap, the Federal Government’s 3 Million Technical Talent (3MTT) programme and NITDA’s 2024–27 Strategic Roadmap aim to deepen industrial digitisation and lift ICT’s GDP share from 17 to 22 percent by 2027 (World Economic Forum, 2024; NITDA, 2024).

Sokoto State’s manufacturing landscape cement, food-processing, leather, and emerging agro-allied clusters has been declared a priority growth sector in the state’s 2024 investment blueprint, leveraging abundant limestone, grains, and hides (Sokoto Investment Company, 2024). Flagship player BUA Cement operates one of its largest plants at Kalambaina, reinforcing Sokoto’s status as a manufacturing hub (Wikipedia, 2024). To create an enabling environment, Governor Aliyu in June 2025 signed the law establishing the Sokoto State ICT Development Agency (SICTDA), giving the state a statutory anchor for digital-infrastructure roll-out, e-governance, and private-sector partnerships.

Studies suggests that digital transformation initiatives already shape firm-level performance in Sokoto. BUA’s ongoing expansion, backed by a USD 500 million IFC-led facility, is explicitly tied to energy-efficient, sensor-rich production lines and advanced logistics platforms—technologies expected to cut emissions and lower unit costs (IFC, 2023). Independent industry analyses similarly recommend that the

company “deploy digital tools for logistics and operations to enhance efficiency and reduce costs” (Isar Publisher, 2024). Complementing firm-level actions, the state’s Ministry of Innovation and Digital Economy graduated its second cohort of 50 youth in January 2025 from a programme covering AI-for-productivity, social-media marketing, and graphic design part of a plan to train 10,000 residents and widen the talent pipeline feeding local factories (The Sun, 2025).

Despite these strides, scholarly and policy debates still lack granular, evidence-based insights into how digital transformation translates into measurable performance outcomes profitability, capacity utilisation, energy intensity within Sokoto’s heterogeneous manufacturing base. A systematic study of selected firms will therefore fill a critical knowledge gap, guiding managers in technology-investment decisions, informing SICTDA’s support programmes, and contributing to Nigeria’s broader industrial-digital agenda.

**H<sub>01</sub>:** Business-model innovation has no significant effect on the performance of selected manufacturing firms in Sokoto State.

**H<sub>02</sub>:** Digital infrastructure has no statistically significant effect on the performance of selected manufacturing firms in Sokoto State.

## Literature Review

### Business-Model Innovation

Business-model innovation refers to purposeful, novel reconfiguration of a firm’s value creation, delivery, and capture logic rather than isolated product or process change. Chesbrough (2007) first framed Business-model innovation as the design of new business logic that underpins economic value, arguing that technology only fulfills its potential when matched with an inventive model. Subsequent work positioned the business model as an activity system: Zott and Amit (2010) defined it as a set of interdependent activities that spans firm

boundaries, while Amit and Zott (2012) emphasized BMI as the search for new ways of creating value for customers and appropriating a portion for the firm. Foss and Saebi (2017) synthesized fifteen years of studies and stressed that Business-model innovation alters a model's architecture rather than its individual components, distinguishing it from incremental adjustments. Conceptually, BMI is thus an intentional, system-level change that can range from adding new revenue mechanisms to redefining the entire value network (Schneider & Spieth, 2013).

Massa and Tucci (2013) view the business model as a cognitive device managers manipulate to align resources, opportunities, and stakeholder interests in turbulent environments. Clauss (2017) empirically validated that Business-model innovation encompasses three inter-related dimensions value creation, value proposition, and value capture each measurable and influential on performance. Explicating process, Frankenberger et al. (2013) proposed the 4I-Framework (Initiation, Ideation, Integration, and Implementation) to describe how firms cycle through discovery, experimentation, and scaling. Collectively, these perspectives converge on BMI as a multi-stage, trial-and-error journey that leverages strategic learning to unlock revenue growth, cost efficiency, ecosystem orchestration, or novel customer experiences.

### **Digital Infrastructure**

Digital infrastructure represents the shared, malleable, and evolving socio-technical foundation comprising hardware, software, data, standards, and human practices that enables digital services and innovation at scale. Tilson, et al. (2010) defined it as the set of mutually reinforcing IT capabilities, networked technologies, and organizational arrangements that continue to expand through generativity. From a strategic lens, Bharadwaj et al. (2013) argued that digital infrastructure forms the backbone of a digital business strategy," blurring firm boundaries and reshaping competitive rules. Complementing this, Yoo, et al. (2010) highlighted its layered modular architecture devices, networks, services, and

content that enables recombinant innovation by separating and re-combining layers.

Digital infrastructure is also socio-technical and path-dependent. Hanseth and Lyytinen (2010) showed how infrastructure grows via "installed base" cultivation solutions must align with existing components while enabling future extensions, creating a paradox of change and stability. Viewing digital infrastructure as a service platform, Lusch and Nambisan (2015) emphasized resource-integration and value-co-creation among actors, whereas Gawer (2014) pointed to governance mechanisms that balance openness with control to sustain platform health. Empirical evidence by Kane, et al. (2015) linked digital infrastructure to higher digital maturity, adaptability, and innovation output. Kallinikos, et al. (2013) stressed that digital artifacts embedded in infrastructure have software-based, editable, and distributable properties that continuously shift organizational routines.

### **Organizational Performance**

Organisational performance captures the degree to which a firm fulfils the goals it sets for itself. Moumin (2024) defined it as an organisation's ability to achieve its goals, noting that both the outcomes and the processes leading to them must be monitored. A complementary efficiency lens appears in Tessema, et al. (2024), who describe performance as the capacity to reach goals efficiently, by optimising resources and minimising employee strain. Field studies reinforce this goal-attainment theme: Alrowwad et al. (2021) and Daniel and Park (2015) treated performance as the gap between intended outputs and actual production, while Pap et al. (2022) focus on how well an organisation executes its mission, tasks and activities. Rumanti et al. (2023) extend the idea, arguing that real success is visible only when strategic goals are met and stakeholders are satisfied through customer value, operational efficiency and innovation.

Hamann and Schiemann (2021) posited empirically that performance is best represented by four tightly linked dimensions of profitability, liquidity, growth and market value. Gutterman (2023) likewise views it as an organisation's ability to deploy resources

efficiently and effectively to create both financial and non-financial value for multiple constituencies. Rumanti's stakeholder-satisfaction focus and Pap's process-quality perspective align with this layered view, while frameworks such as the Balanced Scorecard (highlighted by Moumin and implicit in Pap) operationalise it by tying financial, customer, internal-process and learning indicators to strategy. Collectively, the definitions converge on a consensus that organisational performance is not a single bottom-line number; it is a holistic construct that gauges how well a firm simultaneously reaches its strategic objectives, stewards its resources and delivers sustainable value to its stakeholders (Daniel & Chukwuemeka, 2023).

## **Empirical Review**

### **Business-model Innovation and organizational Performance**

Khaddam et al. (2021) surveyed 87 managers in a Jordanian dairy company and, using multiple-regression analysis, the findings showed that value-creation, value-proposition and value-capture innovations each raised self-rated financial and operational results; they recommend continuous, component-by-component redesign to keep pace with market shifts. Salfore et al. (2023) analysed 264 Ethiopian manufacturing-SMEs with PLS-SEM and confirmed that the three Business Model Innovation dimensions jointly explain 63 % of the variance in sales-growth and profitability; the authors urge SME owners to institutionalise customer-focused idea-generation routines. Freisinger et al. (2021) tested 250 German ventures across life-cycle stages via covariance-based SEM and found the performance premium of Business Model Innovation strongest in early growth but tapering in maturity, advocating early-phase experimentation and later selective refinement. Complementing these single-firm samples, Clauss et al. (2019) employed PLS-SEM on 150 mid-sized German firms and demonstrated that strategic agility boosts BMI, which in turn mediates gains in ROA; they recommend investing in sensing and re-configurational capabilities alongside BMI projects.

Bashir et al. (2023) surveyed 280 Saudi SMEs and showed with SEM that managerial ties raise performance indirectly through Business Model Innovation, suggesting network-development programmes for SME founders. Nguyen et al. (2020) used PLS-SEM on 150 Vietnamese start-ups and reported that each Business Model Innovation component significantly improves early-stage revenue stability, recommending that incubators coach founders on revenue-model design. A European cross-industry study of 563 SMEs applied Fuzzy-set Qualitative Comparative Analysis (fsQCA) and regression to reveal that only configurations combining all three BMI pillars with dynamic capabilities produce sustained profit growth, urging policy makers to bundle capability-building schemes with digital BMI tools.

### **Digital Infrastructure and organizational Performance**

Onunwor (2022) correlated questionnaire data from 80 staff of First Bank (Nigeria) and found that broadband quality and core-banking platforms explained 55 % of the variance in branch service efficiency; the author recommends periodic upgrades of network hardware and staff digital-skill clinics. Leveraging a quasi-natural experiment, Ding et al. (2025) applied a multi-period difference-in-differences model to 3 773 Chinese listed firms (24 263 firm-year observations) and showed that the Broadband China rollout lifted DEA-based innovation-efficiency by 6 – 9 %; they urge complementary financing and HR policies to sustain the gains. Du, et al. (2024) built a threshold-regression model on provincial panel data (30 provinces, 2013-2018) and discovered that below a digital-infrastructure index value of  $\approx 12.5$  the divide widens the innovation gap, but beyond that tipping-point Digital Infrastructure turns into a digital dividend; the study recommends differentiated, region-specific investment quotas. At SME level, Hussain et al. (2024) surveyed 383 Chinese SMEs and, via SEM, found that Digital Infrastructure boosts innovation performance, with digital-innovation capability and e-knowledge acting as mediator and moderator, respectively; they advocate joint investment in cloud infrastructure and e-learning platforms.

Cheng and Miao (2025) employed fsQCA on 63 high-tech manufacturers and identified four Digital Infrastructure -centred capability bundles that yield high radical and incremental innovation outputs, advising managers to align Digital Infrastructure architecture with dynamic-capability maturity. Using fixed-effects panel regressions on EU-27 data (2010-2022), Aleca & Mihai (2024) revealed that every 10 % increase in high-speed-internet penetration translates into a 1.4 % gain in labour productivity, but only where digital-skills indices exceed the median hence their call for parallel up-skilling initiatives. Li et al. (2025) applied a Data Envelopment Analysis using the Banker-Charnes-Cooper formulation to compute Total Factor Productivity (DEA-BCC TFP) model to Tibet's cultural-industry statistics (2011-2021) and showed that Digital Infrastructure raises total-factor productivity via logistics efficiency and reduced urban-rural consumption gaps; they recommend targeted 5G and data-centre projects in remote regions. Finally, a cross-city Chinese study (Li & Qi, 2025) used heterogeneity and mechanism tests to prove that Digital Infrastructure catalyses new-quality productivity especially in megacities through technological-innovation and resource-allocation channels, urging planners to tailor Digital Infrastructure blueprints to city size and administrative level.

### **Theoretical Framework**

#### **Dynamic Capability Theory (DCT)**

Dynamic Capability Theory (DCT) was propounded by Teece, et al (1997), who framed it as a firm's ability to integrate, build and re-configure internal and external resources so as to address rapidly changing environments thereby extending the static resource-based view to dynamic markets. Their later micro-foundations work disaggregates these higher-order abilities into the sensing of opportunities, seizing them through investment, and continuously transforming the resource base (Teece, 2007). Building on this foundation, Eisenhardt and Martin (2000) emphasise that dynamic capabilities are identifiable, learnable routines such as product-development platforms or alliance processes that yield "evolutionary fitness" rather than permanent advantage. Helfat and Peteraf (2003) recast DCT as a lifecycle in which capabilities are born, mature and may become obsolete, while Barreto (2010) adds that they must be valuable, rare, imperfectly imitable

and appropriately organised if they are to translate into superior performance. Collectively, these authors converge on the idea that DCT explains how firms purposely renew ordinary (operational) capabilities to keep pace with turbulence rather than which resources they own.

Later discourse both refines and questions the theory. Winter (2003) distinguishes ordinary versus dynamic capabilities and warns that the boundary can become blurry when every successful routine is labelled dynamic, risking tautology. Arend and Bromiley (2009) argue that many empirical studies merely restate the VRIN logic with new terminology and offer limited predictive power, calling for sharper constructs and stronger causal tests. Nonetheless, longitudinal work shows that when clearly specified like sensing export opportunities or re-configuring digital supply chains dynamic capabilities correlate positively with sales growth, innovation output and resilience, especially in volatile contexts. These mixed findings have pushed scholars toward more nuanced, context-contingent models that combine DCT with institutional, digital-transformation or learning perspectives.

For manufacturing firms in Sokoto State, Nigeria, the relevance of DCT is increasingly evident. Local survey evidence finds that SMEs that continuously recalibrate cost-leadership and differentiation strategies outperform rivals in the North-West manufacturing belt (Alkasim & Mujitaba, 2021), echoing DCT's emphasis on re-configuration. Similarly, Nafiu, et al. (2022) show that firms able to sense regulatory changes (e.g., new energy tariffs) and swiftly realign value-chain activities achieve higher profitability and export readiness in Sokoto's agro-allied clusters. Yet interviews reveal capability gaps limited analytics, weak supplier networks—that hamper the seizing and transforming phases of the DCT triad. Addressing these gaps through targeted training, digital-infrastructure upgrades and cluster-wide learning alliances would operationalise dynamic capabilities locally, enhancing productivity, adaptability and ultimately the sustained performance of Sokoto's fast-growing but still vulnerable manufacturing sector.

**Methodology**

The study adopted a survey research design; the study population comprised all staff members employed by the 10 selected manufacturing companies in Sokoto State. The manufacturing companies selected were those that had 25 members of staff and above, and had been in operation for more than five years. The total number of staff of the selected manufacturing companies was 2,580 employees, as confirmed by data obtained from the Human Resources departments of the respective manufacturing companies. The Yamane (1967) formula was used to determine a necessary sample size of 346 for the study; however, the sample was

inflated by 30%, as recommended by Israel (2013), to 450, to ensure a minimum return of 346 copies of the questionnaire.

In the selection of survey participants, a stratified random sampling technique was employed. This involved proportional allocation of the sample across the different companies, serving as identified strata, to ensure adequate representation of each subgroup within the population. Subsequently, the number of respondents selected from each stratum was determined in proportion to the size of that stratum relative to the overall population. Table 1 gives a breakdown of the sample allocation process.

**Table 1: Sample Size Distribution**

S/N	Manufacturing Firm	Number of Staff	Sample Size
1	BUA Cement Plc — Sokoto Plant	1600	$\frac{1600 \times 450}{2580} = 279$
2	Cement Company of Northern Nigeria Plc (Sokoto Cement)	394	$\frac{394 \times 450}{2580} = 69$
3	OCP Africa Fertilizer Blending Plant	75	$\frac{75 \times 450}{2580} = 13$
4	Sokoto Tannery Ltd	150	$\frac{150 \times 450}{2580} = 26$
5	Sokoto Furniture Factory Ltd	100	$\frac{100 \times 450}{2580} = 17$
6	Portland Paints & Products Nig. Plc (Sokoto plant)	60	$\frac{60 \times 450}{2580} = 10$
7	Saabmarvel Pure Water Co.	30	$\frac{30 \times 450}{2580} = 5$
8	Angus Ice-block Company	25	$\frac{25 \times 450}{2580} = 4$
9	Bafarawa Flour Mills Ltd	120	$\frac{120 \times 450}{2580} = 21$
10	Inusa Interlocking Bricks	26	$\frac{26 \times 450}{2580} = 5$
<b>Total</b>		<b>2580</b>	<b>450</b>

Source: Researcher’s Compilation.

Within each stratum, respondents were then selected using simple random sampling techniques to eliminate bias and ensure that every unit had an equal chance of being included in the study. This approach enhanced

the representativeness and reliability of the data collected.

**Model specification**

Multiple regression analysis was applied to the collected in testing the formulated hypotheses for the study for the purpose of meeting research objectives. Accordingly, the specified model of the study expressed Organisational Performance (ORP) as determined by Business Model Innovation (BMI) and Digital Infrastructure (DI) (see (1)).

$$ORP = \alpha + \beta_1 BMI + \beta_2 DI \quad (1)$$

**Result and Discussion**

In the course of the field survey carried out, a total of 450 questionnaire copies were administered within the study area. Out of this number, 435 were retrieved and subjected to data screening, including missing value analysis, outlier detection, and Common Method Bias (CMB) assessment to ensure the accuracy, consistency, and suitability of the data for subsequent statistical analysis. This process was necessary to identify and address incomplete responses, eliminate extreme values

that could distort the results, and minimise potential bias arising from the use of a single data collection method, thereby enhancing the validity and reliability of the study findings. Consequently, 401 sets of responses were retained for further analysis. This was satisfactory, as it more than met the minimum sample size requirement determined previously.

Table 2 presents the summary for the estimated model. Business-Model Innovation (BMI) and Digital Infrastructure (DI) were estimated to jointly have a strong statistical relationship with Organizational Performance (ORP). The multiple correlation coefficient, R, showed a high positive association of 0.784 between the predictors and ORP. The R-square coefficient of 0.614 indicated that about 61.4 % of the variance in organizational performance was explained by variations in BMI and DI, while the Adjusted R-square of 0.602 (which corrects for the number of predictors and sample size) confirmed that this explanatory power remained substantial after adjustment.

**Table 2: Model Summary**

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.784	.614	.602	.618	2.281

Source: Researcher’s Compilation.

The standard error of the estimate (0.618) suggested that, on average, predicted performance scores deviated from the observed scores by about 0.62 units on the ORP scale used an acceptable margin given the strength of the model. The Durbin-Watson statistic of 2.281 was close to the ideal value of 2, implying little to no problematic autocorrelation in the

residuals; the slight tilt above 2 pointed to weak negative serial correlation, but it was generally within the acceptable 1.5-2.5 range. The results signified that firms with higher levels of business-model innovation and stronger digital infrastructure tended to achieve markedly better organizational performance, and the regression model fits the data well

**Table 3: ANOVA**

	Sum of Squares	df	Mean Square	F	Sig.
Regression	80.218	2	15.011	26.372	.000
Residual	219.073	400	.601		
Total	399.291	398			

Source: SPSS Output.

The ANOVA table tests whether the regression model that links Business-Model Innovation (BMI) and Digital Infrastructure (DI) to Organisational Performance (ORP) explains a statistically significant share of performance

variance. The regression sum of squares (SS = 80.218) captures the variation in ORP accounted for by the predictors, while the residual sum of squares (SS = 219.073) represents unexplained variation. Dividing each SS by its respective

degrees of freedom (df) yields mean squares: 15.011 for the model (df = 5, reflecting the constant plus the individual and any coded or interaction terms for BMI and DI) and 0.601 for the residuals (df = 379).

The resulting F-statistic of 26.372 compares these two mean squares; because its associated significance level is  $p < .001$ , the null hypothesis that BMI and DI have no joint effect on organisational performance is decisively rejected. This means the regression model as a

whole is highly reliable: variation in BMI and DI (and any included interaction or dummy variables) explains a non-trivial, statistically significant portion of the differences observed in organisational performance across the sampled firms. The estimated regression coefficients, as well as their associated significance and collinearity statistics are presented in Table 3. All estimated beta values were positively signed in line with a priori expectations.

**Table 3: Estimated Regression Coefficients**

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.015	.335		.043	.965		
BMI	.376	.081	.372	4.622	.000	.642	1.558
DI	.184	.082	.176	2.260	.006	.682	1.465

Source: SPSS Output.

**Test of Hypothesis I**

H<sub>01</sub>: Business-model innovation has no significant effect on the performance of selected manufacturing firms in Sokoto State.

The coefficient table shows an unstandardised B of 0.376 for Business-Model Innovation (BMI) with a standard error of 0.081. The resulting  $t = 4.622$  and  $p < .001$  indicate that the effect is highly significant. Translating the unstandardised coefficient, every one-unit rise in a firm’s BMI score is associated with an average 0.376-unit increase in organisational performance (ORP), holding digital infrastructure constant. The standardised beta ( $\beta = 0.372$ ) confirms that, in standard-deviation terms, BMI contributes roughly 0.37 SD to ORP. Collinearity diagnostics (Tolerance = 0.642; VIF = 1.558) are well within acceptable limits ( $< 10$ ), so the estimate is not distorted by multicollinearity. Because the p-value is far below the conventional 0.05 threshold, the null hypotheses (H<sub>01</sub>) is rejected, the study conclude that business-model innovation exerts a positive, statistically significant influence on the performance of manufacturing firms in Sokoto State.

**Test of Hypothesis II**

H<sub>02</sub>: Digital infrastructure has no statistically significant effect on the performance of selected manufacturing firms in Sokoto State.

For Digital Infrastructure (DI) the unstandardised B is 0.184 with a standard error of 0.082. The t-value of 2.260 yields a  $p = 0.006$ , which is below the 0.05 cut-off, indicating statistical significance. The study show that a one-unit improvement in DI predicts an average 0.184-unit gain in ORP when BMI is held constant. The standardised beta ( $\beta = 0.176$ ) shows that DI raises organisational performance by about 0.18 SD for each SD increase. Again, multicollinearity are within the acceptable level (Tolerance = 0.682; VIF = 1.465). Given the significant p-value, the study reject the null hypotheses (H<sub>02</sub>); and conclude that digital infrastructure significantly enhances the performance of the sampled manufacturing enterprises.

**Conclusion and Recommendations**

The empirical evidence shows that both Business-Model Innovation (BMI) and Digital Infrastructure (DI) are significant, positive drivers of organisational performance among

manufacturing firms in Sokoto State. BMI exhibits the larger effect size, explaining a greater share of performance gains, while DI contributes an additional, though more moderate, boost. These findings lead to the rejection of the null hypotheses that BMI and DI have no significant impact on performance. Collectively, they imply that firms wishing to improve productivity, profitability and competitiveness must treat innovative business-model reconfiguration and robust digital infrastructure not as isolated initiatives but as complementary levers of strategic renewal. Based on the study findings, the following recommendations were made:

- i. Strengthen Business-Model Innovation (BMI) – Management teams should institutionalise systematic idea-generation and experimentation routines (e.g., design thinking workshops, rapid prototyping, internal venture funds) and review revenue-capture mechanisms at least annually to ensure continued alignment with evolving customer needs and regulatory shifts. Reward structures should explicitly recognise cross-functional contributions to new value-creation, proposition and capture activities so that BMI remains an ongoing, organisation-wide capability rather than a one-off project.
- ii. Upgrade and integrate Digital Infrastructure (DI) – Firms should prioritise incremental upgrades to broadband connectivity, cloud-based ERP and data-analytics platforms, pairing each technology investment with targeted digital-skills training for employees. Where capital is limited, companies can leverage public-private partnership schemes or shared industrial data centres already emerging in Sokoto's Kalambaina cluster. Ensuring interoperability between new and legacy systems will maximise the performance lift from DI while minimising disruption and redundancy.

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