

The Digital Transformation Imperative: How Service Automation, Internet of Things, and Digital Marketing Adoption Drive Performance in Small and Medium Enterprises

Akinbo T.M., Al'Hassan-Ewuoso H.O.

Crescent University, Abeokuta, Nigeria

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Abstract: Small and Medium Enterprises are not merely components of the business world, but rather the fundamental engines of economic development, growth, job creation, and innovation. Consequently, their performance has become increasingly critical and timely, particularly in the context of developing nations. This study examines how contemporary service automation, Internet of Things technology, and digital marketing influence the performance of small and medium-sized enterprises (SMEs) in Ogun State, Nigeria. It emphasises the vital role SMEs play in economic development. We employed a quantitative research design and collected data from 107 supermarket firms. The study identified associations between four types of technology and SME performance. Positive associations were found for service automation ($\beta = 0.966$, $p < 0.001$) and digital marketing ($\beta = 0.440$, $p < 0.001$), whilst one negative and significant association concerning IoT was discovered ($\beta = -0.577$, $p < 0.001$). The combined model explains 71.1% of the variation in SME performance. The study serves the dual purpose of enriching existing insights within the framework of the current body of knowledge and helping inform SME sector industries on how they should consider the use of available technology for performance improvement.

Keywords: SME performance, emerging technology adoption, service automation, Internet of Things, digital marketing, Nigeria

I. Introduction

The performance of Small and Medium Enterprises (SMEs) constitutes a fundamental pillar of economic development as the primary engine for employment, innovation, and sustainable development in both developed and developing economies. Indeed, the impact of SME performance extends beyond individual businesses to broader economic implications such as GDP contribution, job creation, and market dynamism. Recent studies define SME performance in multidimensional terms, comprising both financial indicators (e.g., revenue growth, profitability) and non-financial indicators (e.g., efficiency, customer satisfaction, and market positioning), which makes navigation challenging for management.

SME performance faces unprecedented challenges and opportunities in the contemporary business environment. Changalima (2025) demonstrates that an increase in technological absorptive capacity of SMEs will enhance business performance more significantly than other absorptive capacities, emphasising the essential role of technology adoption in mediating enterprise performance. Moreover, statistics indicate that nearly one in three SMEs fails during the first two years of operation; more than half do not survive for five years. This highlights under-performance in stark terms and calls for immediate action.

The Fourth Industrial Revolution (4IR) has significantly altered the performance landscape for SMEs, providing both opportunities and imperatives for digital transformation. Understanding this transformation is crucial. According to recent studies, SMEs with complete digital adoption experience 15% revenue growth, significant operational efficiencies, and enhanced customer satisfaction compared to those with partial or no digital adoption (Changalima, 2025). This digital performance dividend illustrates the specific benefits that emerging technologies can offer for SME performance.

Nevertheless, the model recognises that SMEs in emerging economies, particularly in Nigeria, are unique and therefore face distinctive contextual challenges to performance. Performance differences are attributable to technological limitations, shortage of appropriately skilled labour, lack of entrepreneurship, ineffective management systems, weak information availability, and absence of strategic long-term perspectives. Such uncertainties render performance and achievement of companies in such challenging environments quite difficult, and focus on traditional measures may not be sufficient for long-term survival and prosperity.

Advanced technologies, such as service automation, IoT, and digital marketing, are paving the way for improved SME performance. Such technologies have the potential to transform SME operations. Service automation empowers organisations to streamline processes, improve customer satisfaction, and scale their business whilst innovating (Kumar et al., 2023). IoT technologies enable real-time data collection, process optimisation, and enhanced decision-making capabilities (Muridzi, 2023). Digital marketing platforms democratise market access for SMEs by enabling them to reach wider markets and compete with large enterprises (Mushi, 2024).

Ogun State, Nigeria, provides a timely and specific setting to explore technology-driven performance for SMEs. It is amongst the most industrialised states in Nigeria with numerous SMEs across various sectors, though most continue operating with limited

technology that may not unlock their performance potential. The supermarket industry, being service-oriented and requiring customer interaction, provides an excellent environment to study how emerging technology affects SME performance.

Research Objectives

The primary objective of this research is to examine the influence of service automation, IoT, and digital marketing adoption on the performance of SMEs in Ogun State, Nigeria. Specifically, the study seeks to:

1. Assess the effect of service automation on SME performance
2. Evaluate the impact of Internet of Things (IoT) on SME performance
3. Determine the influence of digital marketing on SME performance

Research Hypotheses

Based on the theoretical foundations and empirical evidence reviewed, the following hypotheses are proposed:

H1: Service automation has a significant positive effect on SME performance.

H2: Internet of Things (IoT) has a significant positive effect on SME performance.

H3: Digital marketing has a significant positive effect on SME performance.

II. Literature Review and Theoretical Framework

SME Performance: Conceptual Foundations

SME performance is a complex construct that reflects the ability of SMEs to accomplish major business objectives, such as profitability, growth and market share, innovation, and sustainability. Recent studies classify the determinants of SME performance into internal factors (leadership, financial capabilities, and innovation level) and external factors (market conditions and government policies) based on their characteristics (Yahaya, 2023). In practice, SME performance is measured using both financial (e.g., revenue growth and profitability) and non-financial (e.g., customer satisfaction and employee engagement) indicators.

This occurs in a context where recent empirical data reveals that the economic and social benefits of successful SMEs are substantial at both company and broader economic levels. Higher-performing SMEs not only create employment but contribute to GDP growth and disrupt established norms through their inherently challenging innovation potential driven by agility and ability to serve niche markets. Moreover, they provide greater resilience to economic cycles, thus contributing to economic stability (Changalima, 2025).

Service Automation as Drivers of SME Performance

According to Service-Dominant Logic (SDL) (Vargo & Lusch, 2004), service automation is not merely advanced technology that produces value—it revolutionises the entire realm of SME operations. According to SDL, service automation provides the means for platform-based automation which helps reduce manual effort, minimise service errors, and improve service quality, allowing customers and service providers to co-create value. According to this framework, service represents the fundamental unit of exchange in modern economies, and technology serves as a resource that enriches the value creation process, consequently enhancing SME performance.

Findings from recent research indicate that service automation's contribution to SME performance across various sectors is considerable overall. According to Yoo et al. (2023), artificial intelligence facilitates improvements in intelligent content creation, redefining business models, predictive modelling, automating decision-making processes, providing real-time customer insights, and innovating products and services for SMEs. All these developments in service automation improve SME efficiency and performance whilst promising a bright future for adopters of these technologies.

Internet of Things (IoT) to Improve SME Performance

IoT, an abbreviation for Internet of Things, is a system of interconnected devices that enables data collection, communication, and analysis. This technology has the potential to advance SMEs in performance and efficiency, leading to enhanced operational capabilities and decision-making. Based on a systematic review of five major articles conducted by Muridzi (2023), IoT solutions also provided significant contributions to improving SME performance in facing challenges, at least in emerging economy contexts. Moreover, research indicated higher IoT adoption rates amongst SMEs when adoption patterns were compared before and after 2020, which provides promising signs for SME technology adoption.

Numerous opportunities exist for SMEs to enhance performance through IoT technologies. For example, they can offer quick logistics, efficient resource deployment, reduced uncertainty, and decreased processing costs (Wasim, 2024). Applications include real-time goods tracking and tracing, security through artificial intelligence-enabled video surveillance, and warehouse management and supply chain visibility through sensor systems. Additionally, IoT facilitates data-driven decision-making, providing extensive details concerning company activities and customer behaviour trends.

Nevertheless, the correlation between IoT/Industry 4.0 technology adoption and SME performance is not without complications. Innovation costs, obtaining adequate technology, and overcoming operational obstacles are challenges faced by SMEs adopting IoT technologies (Efendi et al., 2022), particularly in emerging economies (Muridzi, 2023). However, the performance advantages of IoT may take time to materialise because implementation hurdles must be overcome before the technology's benefits become effective. Understanding these potential roadblocks is essential for SMEs considering IoT adoption.

Digital Marketing and SME Performance Outcomes

Digital marketing serves as a crucial vehicle for SME performance, particularly in providing cost-effective approaches for customer acquisition, engagement, and retention. Recent studies have consistently highlighted positive relationships between digital marketing strategies and SME performance across most contexts. For example, Mushi (2024), using Tanzanian data, confirms a positive impact of digital marketing strategies on SME commercial performance, noting that social media marketing demonstrated the highest positive influence.

The performance benefits of digital marketing for SMEs are well established, offering a potential pathway for growth and success. Digital marketing strategies help SMEs reach wider markets through online platforms, increase productivity through automation, and provide better customer satisfaction through personalised service and faster response capabilities (Deku, 2024). Digital marketing also plays a vital role in understanding and achieving SME performance, evidenced by its attribution to as much as 38.8% of total performance variables in previous research.

As Ajede (2025) demonstrates in his work on Nigerian SMEs, digital marketing serves as an equaliser, showing significant correlation between digital marketing strategy dimensions and performance outcomes for SMEs. Digital marketing, being a cost-effective and readily available platform, offers a powerful catalyst for enhancing SME performance by increasing visibility, customer access, and operational capabilities across SMEs.

III. Methodology

Research Design and Approach

The study methodically employed a quantitative research paradigm using a cross-sectional survey design to investigate the relationships between emerging technology adoption and SME performance. Selecting a quantitative approach ensured that statistical testing of the proposed hypotheses could be conducted using straightforward models, generating valid, generalisable, and robust findings about technology-performance relationships in the Nigerian SME context.

Population and Sampling

The target population consisted of SMEs in the supermarket sector, deliberately chosen in Ogun State, Nigeria. Supermarket enterprises were selected based on their characterisation as service-based micro, small, and medium enterprises (SMEs) and how integrating technology into their operational environment could enhance performance. The study sample comprised 107 supermarket enterprises selected using convenience sampling technique.

Data Collection Instrument

A structured questionnaire was used to collect data for all key constructs in the study. Specifically, the instrument included sections pertaining to service automation, IoT adoption, digital marketing use, and SME performance. All items were measured on five-point Likert scales ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was founded on published scales from the literature, ensuring the study was rooted in prior knowledge, and was adapted to the Nigerian SME context.

Reliability and Validity

The instrument demonstrated acceptable reliability characteristics (Cronbach's alpha coefficient of 0.858 for the 20-item scale) exceeding the 0.7 threshold. Factor analyses confirmed construct validity, generating a cumulative variance explanation of 99%. This indicated that the factors derived in the analysis explained 99% of the total variance within the data, far exceeding the threshold requirement of 50%.

Data Analysis Techniques

Data were analysed using SPSS through descriptive, correlation, and multiple regression analyses. The analytical approach allowed examination of both individual independent variable relationships with SME performance and the combined effect of all independent variables on SME performance.

IV. Results and Analysis

Reliability Statistics

The reliability analysis confirms the internal consistency of the research instrument, as presented in Table 4.1.

Table 4.1: Reliability Statistics

Cronbach's Alpha	N of Items
.858	20

Source: Author's Computation, 2025

The Cronbach's alpha value of 0.858 exceeds the acceptable threshold of 0.7, indicating strong internal consistency amongst the scale items.

Descriptive Statistics

Table 4.2 presents the descriptive statistics for all study variables, providing insights into the central tendencies and variability of responses.

Table 4.2: Descriptive Statistics

Variable	Mean	Std. Deviation	N
SME Performance	17.1215	2.32586	107
Service Automation	17.1589	1.74912	107
Internet of Things	17.1776	1.94652	107
Digital Marketing	17.4673	2.08461	107

Source: Author's Computation, 2025

The descriptive analysis revealed relatively consistent mean scores across all variables, ranging from 17.12 to 17.47. The standard deviation values are relatively low (1.75 to 2.33), indicating minimal variability in responses and suggesting consistent perceptions amongst respondents regarding technology adoption and performance outcomes.

Model Summary

Table 4.3 presents the model summary for the multiple regression analysis, indicating the explanatory power of the independent variables.

Table 4.3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.843	.711	.703	1.26784

Source: Author's Computation, 2025

The model demonstrates strong explanatory power with an R^2 value of 0.711, indicating that the three independent variables (service automation, IoT, and digital marketing) collectively explain 71.1% of the variance in SME performance.

ANOVA Results

The ANOVA results confirm the overall significance of the regression model, as shown in Table 4.4.

Table 4.4: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	407.857	3	135.952	84.579	.000
Residual	165.563	103	1.607		
Total	573.421	106			

Note: Dependent Variable: SME Performance; Predictors: (Constant), Digital Marketing, Service Automation, Internet of Things

Source: Author's Computation, 2025

The F-statistic of 84.579 with a significance level of $p < 0.001$ confirms that the overall regression model is statistically significant, validating the collective influence of the independent variables on SME performance.

Regression Coefficients

Table 4.5 presents the detailed regression coefficients, providing insights into individual variable effects on SME performance.

Table 4.5: Coefficients

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-1.649	1.231		-1.340	.183
Service Automation	1.285	.160	.966	8.037	.000
Internet of Things	-.690	.148	-.577	-4.658	.000
Digital Marketing	.491	.094	.440	5.243	.000

Source: Author's Computation, 2025

The regression coefficients reveal significant relationships between all three independent variables and SME performance. Service automation demonstrates the strongest positive effect ($\beta = 0.966$, $p < 0.001$), followed by digital marketing ($\beta = 0.440$, $p < 0.001$). Notably, IoT shows a significant negative relationship ($\beta = -0.577$, $p < 0.001$), which requires careful interpretation.

Correlation Analysis

Table 4.6 presents the correlation matrix, illustrating the relationships between all study variables.

Table 4.6: Correlations

Variable	SME Performance	Service Automation	Internet of Things	Digital Marketing
SME Performance	1.000	.779	.620	.720
Service Automation	.779	1.000	.892	.745
Internet of Things	.620	.892	1.000	.763
Digital Marketing	.720	.745	.763	1.000

Note: All correlations are significant at $p < 0.001$ (1-tailed), $N = 107$

Source: Author's Computation, 2025

The correlation analysis reveals strong positive relationships between all variables. SME performance demonstrates particularly strong correlations with service automation ($r = 0.779$) and digital marketing ($r = 0.720$), whilst showing a moderate correlation with IoT ($r = 0.620$).

Factor Analysis

The factor analysis confirms the validity of the research instrument, as presented in Table 4.7.

Table 4.7: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.810	34.052	34.052	6.810	34.052	34.052
2	5.220	26.098	60.150	5.220	26.098	60.150
3	4.043	20.216	80.366	4.043	20.216	80.366
4	1.773	8.866	89.232	1.773	8.866	89.232
5	1.188	5.942	95.174	1.188	5.942	95.174
6	.782	3.909	99.083			

Source: Author's Computation, 2025

The factor analysis reveals a cumulative variance explained of 99.083%, significantly exceeding the benchmark requirement of 50%. This confirms that the research instrument is well-loaded and capable of measuring the intended constructs.

V. Discussion

Service Automation and SME Performance Enhancement

The strongest influence of service automation on SME performance ($\beta = 0.966$, $p < 0.001$) provides robust support for H1 and corroborates recent studies emphasising the transformative nature of automated systems in positively enhancing business performance. This finding further supports the Service-Dominant Logic Framework, wherein value co-creation and performance-enhancing capabilities are considered outcomes of technology-enabled service processes (Vargo & Lusch, 2004).

The practical implications are substantial, as service automation is found to have a considerable positive impact on SME performance ($\beta = 0.966$, $p < 0.001$). Performance gains will be substantial for SME businesses investing in automation technologies. This conclusion aligns with recent studies by Kumar et al. (2023), demonstrating that artificial intelligence-based solutions in SMEs improve cognitive content, innovative business models, and automated decision-making performance dimensions. Industrial solutions of service automation for supermarket SMEs operating in Ogun State will likely be embodied in integrated automated checkout systems, advanced inventory management, and customer service platforms, ensuring operational efficiency and customer satisfaction.

The positive and strong nature of the relationship means that higher service automation implementation leads to lower operational costs and higher service quality, ultimately resulting in enhanced overall SME performance. This is consistent with studies indicating that automation implementation enhances operational efficiency through process automation, resource optimisation, and data-driven decision-making.

Digital Marketing and SME Performance

The significant positive impact of digital marketing on SME performance ($\beta = 0.440$, $p < 0.001$) supports H3 and contributes to the growing evidence that digital marketing is an important contributor to SME performance. Our finding agrees with Mushi (2024) and Ajede (2025), who reported that digital platform usage increased visibility, customer reach, and ultimate performance of SMEs in other geographical locations.

The finding that digital marketing positively affects SME performance is not merely a confirmation but also provides reassurance for SMEs. This is because it offers SMEs an economical approach to marketing whilst enabling them to reach wider audiences and compete with larger companies. According to Deku's (2024) study, digital marketing strategies allow SMEs to reach potential customers through websites and social media to expand their market share, create more efficient internal processes by automating business operations, and build customer-centric capabilities with personalised services. Through digital marketing platforms deployed using social media channels, email marketing, and e-commerce platforms, supermarket SMEs in Ogun State can promote their products, showcase their inventory, drive customer engagement, and foster brand loyalty.

The result is highly relevant as digital marketing has demonstrated its ability to explain a substantial portion of SME performance variance, driving both revenue growth and operational efficiency improvements.

Internet of Things (IoT) and SME Performance Dynamics

H2 is partially supported and presents an intriguing finding requiring careful interpretation regarding the significant negative relationship between IoT and SME performance ($\beta = -0.577$, $p < 0.001$). This not only contradicts previous research but may also highlight the complexity of IoT and SME performance relationships, which typically involve more elaborate interactions.

Several contextual factors related to the Nigerian business environment and IoT implementation in resource-constrained SME contexts may explain this surprising finding. Firstly, the negative association could suggest that there are significant upfront costs associated with IoT adoption that greatly exceed immediate benefits. SMEs typically lack the necessary technical expertise and infrastructure deployment resources, creating pressure on key performance indicators in the short term, which management prioritises, resulting in higher upfront investments in IoT systems.

Secondly, due to their complexity, IoT systems can disrupt operations during implementation, causing temporary performance declines before long-term benefits materialise. This interpretation is consistent with Muridzi (2023), which found that financial, technological, and operational risks represent the largest barriers for SMEs adopting IoT technologies in emerging economies. However, the performance advantages of IoT may take time to become evident because implementation hurdles must be overcome before the technology's benefits become effective.

An alternative explanation is that the negative relationship results from infrastructure limitations, poor connectivity, and low skill levels that constrain effective IoT utilisation in Nigeria. Nevertheless, despite these contextual limitations, SME IoT adoption has high potential value. This lack of clear strategy and market understanding, combined with limited resources and IoT expertise, may prevent SMEs from achieving immediate performance benefits that IoT technologies can deliver. However, with careful planning and mutual support, these barriers can be overcome and much of the long-term benefits realised.

The regression analysis indicates a negative relationship whilst the correlation analysis confirms a positive correlation between IoT and SME performance ($r = 0.620$). This suggests that the adverse effect could be caused by interaction with another variable in the

model, particularly the high correlation between IoT and service automation ($r = 0.892$). This correlation pattern suggests that following IoT implementation trends will ultimately prove beneficial.

VI. Conclusions and Recommendations

The results of this study are extremely meaningful in the Nigerian context, opening important discussions about the relationship between emerging technology adoption and SME performance. Results suggest that whilst service automation and digital marketing can demonstrate dramatic performance improvements for SMEs, implementation difficulties associated with IoT adoption may initially limit performance outcomes.

Key Findings

The study identifies service automation as the most powerful driver of improved SME performance, with the strongest positive association. Digital marketing emerges as a cost-effective tool that indeed leads to significant positive effects on SME performance, thereby validating its importance in the entrepreneurial landscape. The nuanced relationship observed amongst Internet of Things (IoT) adopters indicates that common implementation challenges are not easily overcome, with the net effect for IoT being an initial impediment to value realisation in resource-constrained organisational environments. All three technologies together explain 71.1% of SME performance variance, revealing the strong explanatory power of technology adoption and its necessity for survival.

Practical Recommendations

For SME Practitioners:

- Focus service automation investments on operational efficiency and customer service, as these offer immediate and significant performance gains
- Create comprehensive digital marketing strategies utilising social media platforms to reach customers and drive engagement
- Approach IoT adoption strategically with proper planning, resources, and technical support to enable SMEs to overcome implementation challenges and achieve sustained long-term benefits

For Policymakers:

- Provide targeted support programmes for SMEs seeking to leverage emerging technologies, particularly regarding technical training and funding
- Identify and address gaps in connectivity and technical capabilities within the Nigerian business environment for IoT implementation through infrastructure initiatives
- Organise and implement comprehensive training programmes to address skill gaps that could facilitate technology adoption amongst SME operators

Theoretical Contributions

This study makes an important contribution to the technology adoption literature by demonstrating that the influence of different emerging technologies on SME performance is not uniformly similar in emerging market contexts. The results not only affirm Service-Dominant Logic as an empirical basis for understanding service automation benefits but also demonstrate the nuances involved in IoT adoption processes in resource-constrained contexts, thus contributing to the knowledge of technology adoption in SMEs.

Limitations and Future Research Directions

This study has limitations that should be considered, including its cross-sectional design, which does not allow for causal claims about the technology-performance relationship. Additionally, the concentration on supermarket SMEs in Ogun State may restrict the generalisability of findings. Enhancing the applicability of findings would depend on addressing these study limitations; therefore, additional research is required to bridge these gaps.

We recommend longitudinal studies on technology adoption and its performance impacts over time, which would provide a more complete view of the phenomenon, particularly regarding its dynamic temporal nature. Qualitative studies should provide deeper insights into how technologies affect SME performance, particularly relevant in our IoT-performance inverse relationship context. Furthermore, research on mediating factors including organisational readiness, technological infrastructure, and management capabilities would deepen our understanding of technology adoption success factors.

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