Digital Transformation and Process Efficiency: Evidence from Selected Fast-Moving Consumer Goods Companies in Lagos State, Nigeria

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Abstract

Process efficiency remains a critical challenge in fast-moving consumer goods companies' (FMCG) supply chains, particularly in resource-constrained economies. This study examined the effect of digital transformation on the process efficiency of six selected FMCG food companies in Lagos State, Nigeria, focusing on four dimensions: technology adoption, digital infrastructure, digital literacy, and process automation. A cross-sectional survey research design was adopted, and a structured questionnaire was administered to 506 employees, yielding an 81.1% response rate. Data were analysed using multiple linear regression at the 5% level of significance with SPSS version 27. The findings showed that the four dimensions of digital transformation jointly explained 33.0% of the variance in process efficiency (Adj. $R^2 = 0.330$, $F(4, 405) = 51.330$, $p < 0.05$). However, only process automation had a statistically significant independent effect on process efficiency ($\beta = 0.525$, $t = 8.794$, $p < 0.05$), whereas technology adoption, digital infrastructure, and digital literacy were not statistically significant. The study concludes that although digital transformation collectively contributes to process efficiency, process automation is the principal dimension associated with measurable efficiency gains among the selected FMCG companies. FMCG managers should therefore prioritise investments in workflow and process automation to achieve measurable improvements in operational efficiency.

Keywords: Digital Transformation; FMCG Sector; Process Automation; Process Efficiency; Supply Chain Performance

Introduction

Process efficiency remains a major concern in the global Fast-Moving Consumer Goods (FMCG) industry (GhanavatiNejad et al., 2025; Liu et al., 2024; Tazvivinga & Samuels, 2024; Tebenco et al., 2024). In 2024, transportation costs accounted for about 40% of total FMCG supply chain expenditure, while raw material shortages affected 55% of firms, leading to production delays (Mitchell, 2026). Rising transportation costs and logistics delays continue to reduce delivery speed and process efficiency (Oyeyemi et al., 2024). In addition, climate volatility and geopolitical tensions disrupted 44% of consumer goods supply chains worldwide,

increasing costs through regulatory and customs delays (Gitnux, 2025). These challenges, coupled with inadequate infrastructure in developing regions, continue to weaken process efficiency across the industry.

Similar challenges exist across regions. In North America, rising costs, labour shortages, and growing e-commerce competition continue to strain FMCG operations (Tibokbe & Shankar, 2025). In the United Kingdom, labour shortages and post-Brexit border checks have caused further delays, costing the sector about £1 billion in lost output (Food and Drink Federation, 2024). In Asia, China's FMCG sector continues to experience uneven digital integration across omnichannel operations, limiting process efficiency despite significant technology investments (Ning & Yao, 2023). Across Africa, weak infrastructure and macroeconomic instability continue to undermine operational efficiency. Poor road networks increase logistics costs to as much as 40% of total product costs, while fragmented retail networks and limited access to affordable digital technologies hinder process optimisation (Nair et al., 2025).
The Nigerian FMCG sector experienced significant disruptions in 2024 due to inconsistent government policies and economic reforms. The removal of the fuel subsidy and the adoption of a free-floating exchange rate increased inflationary pressures and sharply depreciated the Naira, disrupting operations and prompting some multinational firms to exit the market (Mondaq, 2025). Long-standing challenges, including poor road networks, unreliable electricity, and inadequate logistics infrastructure, have further extended delivery times and increased production and distribution costs. Although many firms rely on third-party logistics providers to address these challenges, such arrangements often reduce coordination and weaken process efficiency (Theophilus, 2024).

Against this backdrop, digital transformation has emerged as a strategic approach to improving process efficiency. Amaugo (2024) found that AI-driven process automation in Nigerian manufacturing significantly reduced costs while improving efficiency and competitiveness. However, limited empirical evidence exists on how digital transformation improves process efficiency within Nigeria's unique socio-economic and infrastructural context.
Previous studies have linked digital transformation to sustainability, operational efficiency, and employee performance (Li & Zhao, 2024; Ji et al., 2023; Marino-Romero et al., 2023; Shwedeh et al., 2023). Li and Zhao (2024) examined internal and external efficiency, while Ji et al. (2023) focused on sustainability in Chinese firms. Marino-Romero et al. (2023) and Shwedeh et al. (2023) highlighted performance gains from digital tools and governance. However, these studies provide limited evidence on how digital transformation directly improves process efficiency through process automation, AI-enabled workflows, and real-time analytics.
In Nigeria's FMCG sector, process efficiency continues to be constrained by poor infrastructure, weak digital integration, and fragmented supply chains (Adebayo & Ayodele, 2022; Ibe & Nwokoye, 2021). Many firms have yet to adopt technologies that support real-time analytics, automation, and integrated workflows, resulting in production delays and higher operating costs (Oluwajoba, 2023). According to Adeoye et al. (2023), limited process digitisation reduces productivity and competitiveness, particularly in a market characterised by rising consumer expectations and tightening margins. These challenges highlight the need to examine digital transformation as a strategic tool for improving process efficiency in Nigeria's FMCG sector.

Therefore, the study evaluated the effect of digital transformation on the process efficiency of selected FMCG companies in Lagos State, Nigeria. Specifically, the study examined the joint effect of digital transformation on process efficiency, as well as the individual effects of digital transformation dimensions (technology adoption, digital infrastructure, digital literacy, and process automation) on process efficiency. Examining these dimensions individually, rather than treating digital transformation as a single aggregate construct, enabled the study to identify which specific aspects of digital transformation contribute most to process efficiency and provided clearer evidence on the digital investments that are most relevant to firms operating within a cash-constrained African FMCG environment. The findings provide managers and policymakers with an evidence-based basis for prioritising scarce digital transformation resources towards process automation, which demonstrated the strongest independent contribution to process efficiency. Investments in technology adoption, digital infrastructure, and digital literacy should be strategically aligned as enabling conditions for automation rather than treated as standalone drivers of efficiency.

Literature Review

Digital Transformation

Digital transformation is the process of embedding digital technologies into core business processes to fundamentally change how value is created and delivered, rather than simply automating existing tasks (Ning & Yao, 2023). Digital transformation is the integration of digital technologies wholly into aspects of business operations and fundamentally changing how firms function and deliver value (Bindeeba et al., 2024). In supply chain settings, digital transformation embodies four critical dimensions: technology adoption refers to the decision to implement digital tools (Venkatesh et al., 2020); digital infrastructure consists of the hardware, networks, and data systems that support their use; digital literacy is the ability of employees to use these tools effectively; and process automation involves replacing manual tasks with rule-based or intelligent systems (Kim et al., 2024). Digital transformation has attracted considerable attention because of its potential to improve speed, accuracy, and cost efficiency. Garafonova et al. (2025) presented process automation as an important practical dimension of digitalisation and connected digital technologies with the transformation of traditional business processes, rather than simply replacing paper-based processes with digital versions. This shows that process automation represents a key way in which digitalisation translates technological capabilities into operational improvements. When organisations integrate technologies into business processes, they can reduce manual involvement, advance efficiency and quality, and make for more responsive and data-driven processes. Kidschun et al. (2023) and Gaizer-Bertram et al. (2024) positioned that digital transformation is rather a broad organisational change process and not simply the adoption of digital technologies. This shows that successful transformation of business processes depends on a combination of strategic, technological, organisational, human, and environmental factors. In addition, efficiency gains are presented to be dependent on organisational change and leadership capability, indicating that technology alone is insufficient. These findings support evaluating each dimension of digital transformation against specific organisational outcomes rather than treating digital transformation as a single construct. This is the approach adopted in the present study.

Process Efficiency

Process efficiency is the ratio of useful output to the input required to produce it. It is best understood in contrast to effectiveness. While effectiveness is measured by external outcomes such as customer satisfaction, efficiency is assessed through internal measures, including cost per unit, cycle time, and resource utilisation (Wang & Ye, 2023). Similarly, Lee et al. (2015) conceptualise process efficiency as the enhancement of operations through reductions in process variation, setup and throughput times, inventory requirements, and defects, thereby enabling organisations to utilise their operational resources more effectively and maximise capacity. Because process efficiency can be measured more objectively, it has become a key metric in workflow improvement initiatives aimed at eliminating waste from repeatable processes (Kim et al., 2024). Largely, process efficiency is presented as connected to reducing waste, process variation, time, inventory, defects, and the resources required to operate manufacturing processes (Dunzer et al., 2025; Ivanov, 2018; Lee et al., 2015). However, its measurability can also be a limitation. An excessive focus on minimising inputs may reduce product quality or customer experience if downstream effects are overlooked. Likewise, an overemphasis on efficiency can limit the flexibility organisations need to respond to unexpected disruptions. This trade-off is particularly important in a volatile market such as Nigeria, where the same automation that reduces waste today may also reduce the operational flexibility needed to respond to future uncertainties.

Theoretical Review

The Technology Acceptance Model (TAM), developed by Davis (1989), explains technology use through perceived usefulness and perceived ease of use. However, Legris et al. (2003) argued that the model says little about what happens after a technology has already been adopted, which is the stage of interest in the present

study.

This study is therefore anchored in TAM but applies it differently. The model is used to explain why acceptance-stage dimensions, such as technology adoption and digital literacy, and infrastructure-related factors do not independently improve process efficiency, whereas process automation, which reduces the need for ongoing human decision-making once implemented, does. This extends the application of TAM beyond the technology adoption stage by suggesting that once processes are automated, the human perceptions central to the model become less influential in determining process efficiency. This interpretation is consistent with the findings reported in Section 4, where process automation emerged as the only significant predictor of process efficiency.

Empirical Review

Empirical studies examining the nexus between digital transformation and process efficiency have evolved from emphasising strategic alignment to identifying automation and broader digital capabilities as key mechanisms. Tabrizi et al. (2019) argued that many digital transformation initiatives fail not because of poor technology choices, but because of weak strategic alignment, highlighting the importance of organisational strategy in determining digital transformation outcomes. This early finding suggests that the adoption of digital technologies alone may not necessarily translate into improved organisational efficiency.

Subsequent studies increasingly examined the specific mechanisms through which digital transformation enhances operational performance. Alharthi et al. (2023) found that automating administrative and data-handling tasks accelerates organisational processes, providing empirical support for automation as an important pathway through which digital transformation improves efficiency. Similarly, Wang and Ye (2023) examined automation and process reengineering in relation to supply chain efficiency and concluded that automation, rather than infrastructure alone, constitutes the primary operating mechanism. Their findings provide a particularly close empirical precedent for the present study. However, Ning and Yao (2023) offered a broader interpretation, attributing improvements in supply chain performance to a combination of digital capabilities rather than automation alone. This suggests that while automation may be an important driver of efficiency, its effects may also depend on the wider set of digital capabilities available within an organisation.

More recent evidence further supports the role of automation and organisational capabilities in shaping the outcomes of digital transformation. Liu et al. (2024) found that efficiency gains from digital transformation in Chinese manufacturing were strongest among large, state-owned firms with the institutional capacity to coordinate organisational change. This finding is particularly relevant to the present study because mid-sized Nigerian FMCG firms are unlikely to possess comparable institutional and organisational capacities. Al-Harthy and Al-Busaidi (2025) similarly found that automating administrative and data-handling activities accelerates organisational processes, reinforcing the argument that automation is an important mechanism through which digital transformation contributes to process efficiency. Most recently, Zhang et al. (2025) found that digital transformation improves corporate resource allocation by reducing waste and streamlining workflows, providing further evidence that digital technologies can enhance organisational efficiency through more effective processes and resource utilisation.

Taken together, the empirical evidence indicates a gradual shift from viewing digital transformation primarily as a strategic and organisational challenge to recognising automation, process reengineering, and broader digital capabilities as important mechanisms for improving efficiency. Nevertheless, the literature remains inconclusive regarding whether automation is the decisive mechanism or merely one component of a wider set of digital capabilities. The findings of Wang and Ye (2023) and Alharthi et al. (2023), which emphasise automation, contrast with the broader capability-based explanation offered by Ning and Yao (2023), while Tabrizi et al. (2019) demonstrate that strategic alignment can also determine the success or failure of digital transformation initiatives. Furthermore, Liu et al. (2024) highlight the importance of organisational capacity in determining the extent to which efficiency gains are realised. This unresolved debate provides a basis for the present study, which examines the digital transformation–process efficiency nexus within the context of mid-

sized Nigerian FMCG firms, an empirical setting that remains insufficiently represented in the existing literature.

Methodology

This study is grounded in the positivist research philosophy, which assumes that reality is objective, observable, and measurable (Saunders et al., 2019). It adopts objectivism, assuming that digital transformation and process efficiency exist independently of individual perceptions. Consistent with this philosophical stance, the study employs a quantitative approach underpinned by the hypothetico-deductive model in which hypotheses are formulated a priori and tested empirically rather than generated from the data.

A cross-sectional survey design was adopted because it enables the systematic collection of structured, first-hand data from a defined population without researcher interference. It is also appropriate for generalising findings from a sample to a wider population. The study was conducted in Lagos State, Nigeria, the country's commercial hub and a major center for manufacturing, logistics, and distribution. It focused on the FMCG food and beverage sub-sector because firms in this industry operate under high demand volatility and strict delivery timelines, making process efficiency essential for competitiveness and survival.

The study population comprised 13,550 management employees across six selected FMCG food companies in Lagos State, Nigeria, as of December 2024. These companies were selected because they collectively accounted for about 84% of the food and beverage market in Lagos State (Optimetriks, 2024), making them representative of the wider FMCG food sector. The sample size was determined using Taro Yamane's (1967) formula, $n = N / [1 + N(e^2)]$, with a 5% margin of error. Based on a population of 13,550, the calculated sample size was 389. To compensate for potential non-response and incomplete questionnaires, a 30% attrition allowance was applied, resulting in a final sample size of 506 respondents. Simple random sampling was used to select respondents from each company, while proportional allocation ensured that larger companies contributed more respondents than smaller ones.

Research Instrument, Validity, and Reliability

A structured questionnaire, adapted from established scales (Kim et al., 2024; Venkatesh et al., 2020), was used to collect the data. The questionnaire comprised three sections. Part A collected respondents' demographic information, Part B measured the four dimensions of digital transformation, and Part C measured process efficiency. All items were rated on a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). A pilot study involving 51 respondents was conducted at Sweet Nutrition Ltd., an FMCG company in Ogun State that was not part of the study population but shared similar characteristics. The Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity were assessed to determine sampling adequacy. Construct validity was assessed using the Average Variance Extracted (AVE), which was valid at 0.5, while reliability was assessed using Cronbach's alpha and Composite Reliability (CR). Table 1 presents the results for the constructs examined in this study. The AVE values were above 0.50, while the Cronbach's alpha and CR values were above 0.70, generally considered acceptable, thus confirming the validity and reliability of the research instrument from the study (Hair et al., 2019).

Table 1. Validity and Reliability of the Process Efficiency and Digital Transformation Constructs

Construct	Items	AVE	Cronbach's α	CR
Technology Adoption	5	0.643	0.809	0.892
Digital Infrastructure	5	0.657	0.773	0.831
Digital Literacy	5	0.762	0.813	0.773
Process Automation	5	0.526	0.871	0.872
Process Efficiency (DV)	5	0.624	0.836	0.702

Source: SPSS output (2026). All constructs met the acceptable thresholds for validity and reliability.

The validated instrument was used for primary data collection, administered in person by the researcher. Respondents were given a minimum of five working days to complete the questionnaire before it was

retrieved. To ensure the retrieved data was suitable for parametric testing, they were screened for normality, using skewness and kurtosis; linearity, using Pearson Product Moment Correlation; and multicollinearity, using tolerance and variance inflation factor (VIF), as consistent with the assumptions of ordinary least squares regression (Hair et al., 2019). Multiple linear regression was employed to test the study's hypothesis at the 5% level of significance using IBM SPSS Statistics version 27.

Ho: Digital transformation has no significant effect on the process efficiency of selected FMCG companies in Lagos State, Nigeria.

The regression model tested is stated as

$PE = \alpha 0 + \beta 1TA + \beta 2DI + \beta 3DL + \beta 4PA + \mu i$

Where PE is process efficiency, TA is technology adoption, DI is digital infrastructure, DL is digital literacy, PA is process automation, $\alpha 0$ is the constant, $\beta 1$ to $\beta 4$ are the coefficients, and μi is the error term. The null hypothesis was rejected where the model was significant at $p \leq 0.05$.

Ethical Considerations

The study complied with the ethical standards of the host institution. Participation was voluntary and anonymous, no identifying information was collected, and respondents were free to withdraw at any point.

Results and Discussion

Response Rate

Out of the 506 copies of the questionnaire administered, 410 were correctly completed and used for analysis, amounting to a response rate of 81.1%. The remaining 96 copies (18.9%) were either not returned, wrongly filled, or duplicated and were discarded. This response rate is considered adequate for survey-based organisational research (Saunders et al., 2019).

Test of Hypothesis

Table 2 presents the multiple linear regression results for the effect of digital transformation on process efficiency.

Table 2.

Summary of Multiple Linear Regression Results for the Effect of Digital Transformation on Process Efficiency

Predictor

B

β (Beta)

t

p

Constant

8.066

-

6.791

.000

Technology Adoption

0.052

0.045

0.680

.497

Digital Infrastructure

0.058

0.053

0.859

.391

Digital Literacy

0.005

0.005

0.080

.936

Process Automation

0.525

0.506

8.794

.000

DV: Process Efficiency. N = 410; R = .580; Adj. R^2 = .330; F(4, 405) = 51.330, p = .000. Source: SPSS output (2026).

The model summary shows a correlation coefficient of R = 0.580, indicating a moderate positive relationship between the four digital transformation dimensions collectively and process efficiency. The adjusted R^2 of 0.330 shows that, after adjusting for the number of predictors, about 33.0% of the variation in process efficiency is explained by digital transformation. The remaining 67% of the variation in process efficiency is accounted for by other factors not included in this model, reflecting a moderate level of explanatory power. The regression model is thus:

PE = 8.066 + 0.052(TA) + 0.058(DI) + 0.005(DL) + 0.525(PA) + Ui (Predictive Model)

PE = 8.066 + 0.525(PA) + Ui (Prescriptive Model)

The regression model shows that, of all the dimensions of digital transformation, only process automation showed a positive and statistically significant effect on process efficiency ($\beta = 0.525$, $t = 8.794$, $p < 0.05$). Specifically, this shows that a one-unit increase in process automation is associated with a 0.525-unit increase in process efficiency, holding the other variables constant. The beta value ($\beta = 0.506$) further indicates that process automation is the strongest predictor in the model. In contrast, digital infrastructure ($\beta = 0.058$, $t = 0.859$, $p > 0.05$), technology adoption ($\beta = 0.052$, $t = 0.680$, $p > 0.05$), and digital literacy ($\beta = 0.005$, $t = 0.080$, $p > 0.05$) did not have a statistically significant effect on process efficiency. This finding indicates that, after controlling for other dimensions of digital transformation, neither technology adoption, digital infrastructure, nor digital literacy independently predicts process efficiency. The constant of 8.066 is statistically significant ($t = 6.791$, $p < 0.05$), representing the estimated baseline level of process efficiency when all predictor variables are held constant.

The ANOVA results indicate that the overall regression model is statistically significant ($F(4,105) = 51.330$, $p < 0.05$), showing that the four digital transformation dimensions jointly explain a significant proportion of the variation in process efficiency. Accordingly, the null hypothesis is rejected at the overall model level. Of all the dimensions of digital transformation, only process automation showed a significant effect on process efficiency, as summarised in Table 3.

Table 3.

Summary of Hypothesis Decision

Level	Statistical Evidence	Decision
Joint effect of digital transformation on process efficiency	Adj. $R^2 = 0.330$; $F(4,405) = 51.330$, $p < 0.05$	H0 reject
Technology Adoption → Process Efficiency	$t = 0.680$, $p > 0.05$	H0i do not reject
Digital Infrastructure → Process Efficiency	$t = 0.859$, $p > 0.05$	H0ii do not reject
Digital Literacy → Process Efficiency	$t = 0.080$, $p > 0.05$	H0iii do not reject
Process Automation → Process Efficiency	$t = 8.794$, $p < 0.05$	H0iv reject

Source: Researcher’s findings (2026).

Discussion

The empirical literature supports the present finding that digital transformation enhances process efficiency, particularly through process automation (Garafonova et al., 2025; Zhang et al., 2025). Garafonova et al. (2025) and Zhang et al. (2025) found that efficiency gains are greatest when digital technologies are integrated into organisational workflows to reduce waste and streamline operations. This is consistent with the present study, in which process automation was the only statistically significant predictor of process efficiency, whereas technology adoption, digital infrastructure, and digital literacy showed no significant independent effects. However, earlier studies differ in explaining how these improvements occur. Liu et al. (2024) and Gaizer-Bertram et al. (2024) described efficiency gains as the result of broader organisational agility and institutional collaboration, whereas the present findings suggest that the benefits of digital transformation are concentrated in execution-oriented capabilities, particularly process automation.

The findings also support earlier evidence that process integration is essential for improving operational efficiency. Alharthi et al. (2023) found that automating administrative and data-handling activities improves workflow speed and coordination, which is consistent with the dominant role of process automation observed in this study. In contrast, Ning and Yao (2023) argued that supply chain performance depends on a broader combination of digital capabilities rather than automation alone. One possible explanation for this difference is the level of digital maturity across study contexts. In more digitally advanced economies, the incremental benefits of additional infrastructure may be limited, whereas in the Nigerian FMCG sector, digital infrastructure and literacy may not yet be sufficiently developed to produce measurable independent effects. This interpretation is supported by Adebayo and Ayodele (2022) and Ibe and Nwokoye (2021), who attributed persistent inefficiencies in Nigeria's FMCG sector to fragmented infrastructure rather than limited digital skills.

The findings are also consistent with the Technology Acceptance Model (TAM), which underpins this study. TAM proposes that perceived usefulness and perceived ease of use are most influential during the adoption and early use of technology. These constructs explain why employees choose to use a technology but are less relevant once processes become automated and require minimal human intervention. This may explain why process automation emerged as the only significant predictor of process efficiency, whereas technology adoption and digital literacy did not. For managers in Nigerian FMCG firms, the findings suggest that broad digitalisation initiatives may be less effective than targeted automation programmes focused on high-rework processes such as order processing and inventory reconciliation. However, this does not diminish the importance of digital infrastructure and digital literacy. As Ossai (2024) observed, digital infrastructure remains an important foundation for supply chain efficiency in emerging economies. The non-significant findings reported in this study may therefore reflect the sequence of digital transformation, where foundational capabilities must first be established before their independent effects become evident.

Conclusion and Recommendations

Conclusion

Digital transformation has a statistically significant joint effect on the process efficiency of selected FMCG companies in Lagos State, Nigeria, explaining 33.0% of the variance in process efficiency. However, the findings indicate that this effect is driven predominantly by process automation. While process automation has a statistically significant independent effect on process efficiency, technology adoption, digital infrastructure, and digital literacy do not exert statistically significant independent effects when the four dimensions are considered simultaneously. The results therefore suggest that, within the context of the selected FMCG companies, the efficiency benefits of digital transformation are realised primarily through the automation of operational processes. The study therefore concludes that, within the Nigerian FMCG context, improvements

in process efficiency are driven primarily by process automation rather than by the overall availability or adoption of digital technologies.

Recommendations

Based on the findings of the study, the following recommendations are made:

- FMCG managers should prioritise investment in process automation, particularly for specific high-volume workflows such as order processing and integrated operations, since automation produced a measurable efficiency return. Supporting investments in infrastructure, technology adoption, and staff training should be directed towards improving employees' ability to operate and troubleshoot these automated systems effectively.

- Policymakers should develop targeted incentives that encourage process automation within the FMCG sector.

Suggestion for Further Studies

Based on the findings of this study, following suggestions for further research are suggested:

- Future studies should consider using mixed methods, combining anonymous questionnaires with interviews or focus group discussions. This could encourage more honest responses while also providing deeper insights into digital transformation practices within organisations.

- Further research should adopt a longitudinal design to examine changes in digital transformation and supply chain performance over time. This would provide a better understanding of how these relationships develop beyond a single point in time.

- Future studies should expand the scope beyond FMCG companies in Lagos State to other regions and industries such as manufacturing, banking, and logistics. This would improve the generalisability of the findings across different organisational contexts.

References

Adebayo, S. O., & Ayodele, O. P. (2022). Infrastructure and productivity in Nigeria's manufacturing sector: Evidence from fast-moving consumer goods firms. African Journal of Economic Policy, 29(1), 88-102.

Adeoye, A. O., Akinola, O. S., & Olatunji, T. E. (2023). Digital transformation and operational efficiency of FMCG firms in Nigeria. Journal of Business and Management Review, 6(2), 45-56.

Alharthi, A., Al-Busaidi, K., & Al-Balushi, H. (2023). A systematic review on digital transformation and organisational performance in higher education. International Journal of Sustainable Development and Planning, 18(4), 789-804.

Al-Harthy, A., & Al-Busaidi, K. (2025). Empowering higher education through digital transformation and automation: Effects on strategic planning efficiency. International Journal of Strategic Planning, 12(1), 45-59.

Amaugo, O. (2024). Impact of AI adoption on business process automation and competitiveness in manufacturing industry in Nigeria. International Journal of Research and Innovation in Social Science, 8(3),

5321-5330. https://doi.org/10.47772/IJRISS.2024.803398S

Barney, J. B. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99-120. https://doi.org/10.1177/014920639101700108

Bindeeba, D. S., Tukamushaba, E. K., & Bakashaba, R. (2024). Digital Transformation and its Multidimensional Impact on Sustainable Business Performance: Evidence from a Meta-Analytic Review. Available at SSRN 5065162.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340. https://doi.org/10.2307/249008

Dunzer, S., Zilker, S., Weinzierl, S., Tang, W., Dieckmann, F., Stenglein, S., ... & Matzner, M. (2025). A technology-specific process mining maturity grid for manufacturing and logistics. International Journal of Production Research, 63(12), 4431-4457.

Food and Drink Federation. (2024, March 1). State of industry report Q4 2023. Food and Drink Federation.

Gaizer-Bertram, S., Schallmo, D., & Böhmann, T. (2024). Digital transformation success factors: A systematic literature review and bibliometric analysis. International Journal of Innovation Management. https://doi.org/10.1142/S1363919624400048

Garafonova, O., Dvornyk, O., Sharov, V., Zhosan, H., Yankovoi, R., & Lomachynska, I. (2025). Digitization process in a changing global environment. TEM Journal, 14(1), 251-265. https://doi.org/10.18421/TEM141-23

GhanavatiNejad, M., Tavakoli, M., Sheikhalishahi, M., Aydın, N., & Aria, S. S. (2025). An integrated smart framework for fast-moving consumer goods online market logistics: A digital twin framework. Journal of Industrial and Production Engineering, 42(5), 533-549. https://doi.org/10.1080/21681015.2025.2470244

Gitnux. (2025). Supply chain in the consumer goods industry statistics: Market data report 2025. https://gitnux.org/supply-chain-in-the-consumer-goods-industry-statistics/

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate data analysis (8th ed.). Cengage Learning.

Ibe, C. C., & Nwokoye, E. C. (2021). Supply chain challenges and operational performance in Nigeria's FMCG sector. Journal of Management and Strategy, 12(3), 65-74.

Ivanov, V. (2018). Process-oriented approach to fixture design. In Design, Simulation, Manufacturing: The Innovation Exchange (pp. 42-50). Cham: Springer International Publishing.

Ji, W., Zhang, J., & Wu, Y. (2023). Digital transformation and business performance: A study on Chinese firms. Journal of Business Research, 98, 123-132. https://doi.org/10.1016/j.jbusres.2023.06.008

Kidschun, F., Budde, F., & Soar Gomes, A. (2023). Assessing the state of corporate digital transformation: Results and implications from a global survey. In Proceedings of the 19th European Conference on Management Leadership and Governance (pp. 159-167).

Kim, J. W., Rhee, J. H., & Park, C. H. (2024). How does digital transformation improve supply chain performance: A manufacturer's perspective. Sustainability, 16, 3046. https://doi.org/10.3390/su16073046

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. Information & Management, 40(3), 191-204. https://doi.org/10.1016/S0378-7206(01)00143-4

Li, Y., & Zhao, T. (2024). How digital transformation enables corporate sustainability: Based on the internal and external efficiency improvement perspective. Sustainability, 16, 5037. https://doi.org/10.3390/su16125037

Liu, L., Lee, P. K., Yeung, A. C., Cheng, T. C. E., & Wang, T. (2024). An empirical study on digitalization's

impact on operational efficiency and the moderating role of multiple uncertainties. IEEE Transactions on Engineering Management, 71, 11463-11478. DOI: 10.1109/TEM.2024.3414831

Liu, Y., Zhang, J., & Wang, C. (2024). Research on the impact of digital transformation on the new quality productivity of enterprises. SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4990426

Marino-Romero, J. A., Palos-Sanchez, P. R., & Velicia-Martin, F. (2023). Improving KIBS performance using digital transformation: Study based on the theory of resources and capabilities. Journal of Service Theory and Practice, 33(2), 169-197. https://doi.org/10.1108/JSTP-04-2022-0095

Mitchell, S. (2026). Supply chain in the FMCG industry statistics: Market data report 2026. https://gitnux.org/supply-chain-in-the-fmcg-industry-statistics/

Mondaq. (2025, January 27). FMCG 2024 sector round-up and 2025 forecast. https://www.mondaq.com/nigeria/consumer-law/1574870/fmcg-2024-sector-round-up-and-2025-forecast

Nair, A., Nair, S. K., Rathore, C. P., Singh, V., & Soyombo, O. (2025). Strategic vigilance and firm profitability of fast-moving consumer goods companies in Africa. International Journal of Strategic Research in Education, Technology and Humanities, 13(1), 90-105.

Ning, H., & Yao, Z. (2023). Enhancing supply chain capabilities through digital transformation. Journal of Supply Chain Management, 59(1), 91-106. https://doi.org/10.1111/jscm.12283

Oluwajoba, A. E. (2023). Barriers to technology adoption among manufacturing SMEs in Nigeria. Nigerian Journal of Technological Development, 20(1), 33-41.

Optimetriks. (2024, May 5). Africa FMCG distribution challenges: Reading the Nielsen report. Medium. https://medium.com/@optimetriks/africa-fmcg-distribution-challenges-reading-the-nielsen-report-2fac3446dd36

Ossai, A. C. (2024). Evaluating the impact of digital transformation on supply chain performance in emerging economies. International Journal of Supply Chain Management, 11(1), 45-58.

Oyeyemi, A., Anjorin, S., Ewim, D., Igwe, C., & Sam-Bulya, P. (2024). The influence of supply chain agility on FMCG SME marketing flexibility and customer satisfaction. International Journal of Applied Research in Social Sciences, 6(10), 2546-2563.

Priem, R. L., & Butler, J. E. (2001). Is the resource-based “view” a useful perspective for strategic management research? Academy of Management Review, 26(1), 22-40. https://doi.org/10.5465/amr.2001.4011928

Saunders, M., Lewis, P., & Thornhill, A. (2019). Research methods for business students (8th ed.). Pearson.

Shwedeh, F., Aburayya, A., & Mansour, M. (2023). The impact of organisational digital transformation on employee performance: A study in the UAE. Migration Letters, 20(S10), 1260-1274.

Tabrizi, B., Lam, E., Girard, K., & Irvin, V. (2019). Digital transformation is not about technology. Harvard Business Review. https://hbr.org/2019/03/digital-transformation-is-not-about-technology

Tazvivinga, K., & Samuels, A. (2024). Digital transformation and its role in FMCG supply chain resilience. International Journal of Business Ecosystem & Strategy (2687-2293), 6(5), 23-38. https://doi.org/10.36096/ijbes.v6i5.606

Tebenko, V., Kutsai, N., Shashyna, M., Omelianenko, O., & Bakushevych, I. (2024). Digital transformation in business: The impact of technology on efficiency, innovation and competitiveness. Economic Affairs, 69, 307-315. DOI: 10.46852/0424-2513.1.2024.32

Theophilus, O. (2024, September 6). How Nigeria’s supply chain affects FMCG growth. The Guardian. https://guardian.ng/business-services/how-nigerias-supply-chain-affects-fmcg-growth-olufemi-theophilus/

Tibokbe, V. P., & Shankar, S. I. (2025). The usefulness of emerging technologies in the FMCG industry: Enhancing efficiency and competitiveness. American Journal of Industrial and Business Management, 15(2), 293-312.

Tornatzky, L. G., & Fleischer, M. (1990). The processes of technological innovation. Lexington Books.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2020). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. MIS Quarterly, 36(1), 157-178.

Wang, X., & Ye, W. (2023). Digital transformation and supply chain efficiency: A study on the role of automation and process reengineering. International Journal of Production Economics, 253, 108541. https://doi.org/10.1016/j.ijpe.2023.108541

Zhang, X., Wang, Y., & Li, Y. (2025). The impact of digital transformation on the efficiency of corporate resource allocation. Technological Forecasting and Social Change, 198, 122000. https://doi.org/10.1016/j.techfore.2025.122000