TECHNOLOGICAL INFRASTRUCTURE AND ECONOMIC PERFORMANCE OF SMALL and MEDIUM MANUFACTURING ENTERPRISES IN SOUTHEAST NIGERIA

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ABSTRACT

This study examined technological infrastructure and economic performance of Small and Medium Manufacturing Enterprises (SMEs) in South-East, Nigeria. The specific objectives of the study were to determine the effect of social media on productivity, and assess the effect of customer relationship management (CRM) on market share. The study opted for survey design. The findings revealed that social media had a positive effect on productivity, and customer relationship management had a positive effect on market share. The study affirmed that digital transformation provides a critical pathway to achieving sustainable economic growth, enhancing resilience, and securing a competitive edge in the global business landscape. However, the study proposed that firms need to adopt social media platforms and CRM system so as to increase productivity, expand market share, and enable sustainable business growth.

Keywords: Technological Infrastructure, Social Media, Customer Relationship Management, Productivity, Market Share, Economic Performance.

1. Introduction

Technological infrastructure is the framework of software, hardware, networks and data in which the delivery of digital services hinges on. It acts as a shared resource that drives digital transformation, enables users to set up and run complex business applications. Technological infrastructure encompasses the integrated system of information and communication technologies (ICT), digital networks, software applications, and data management systems that have become a critical enabler of organizational efficiency, innovation capability, and market competitiveness (Aboelmaged, 2018).

Technological infrastructure refers to the software and hardware components that support the applications and information management requirements of an organisation (https://www.sciencedirect.com). Information technology infrastructure are the components required to manage a firm's IT environment, such as software, hardware, networking components, an operating system, and data storage, which is used to deliver IT services and solutions (https://popp.undp.org).

The increasing diffusion of digital technologies since the 1990s has significantly altered the operational landscape of businesses worldwide. Earlier economic perspectives often treated technology as an external factor influencing productivity, but contemporary scholarship recognizes technological infrastructure as an endogenous driver of economic growth capable of improving efficiency, innovation capacity, and market reach (Çaliskan, 2015).

The emergence of the digital economy and the Fourth Industrial Revolution has further reinforced the strategic importance of technology in enhancing business processes, enabling data-driven decision making, and facilitating access to global markets (Brynjolfsson & McAfee, 2014). Empirical studies have shown that firms that effectively integrate digital infrastructure into their operations tend to demonstrate improved operational efficiency, higher productivity, and stronger financial performance (OECD, 2021).

Technological infrastructure provides opportunities to overcome traditional resource limitations by enabling digital communication, automated business processes, and efficient customer relationship management. The relevance of digital infrastructure became even more evident during the COVID-19 pandemic when firms increasingly relied on digital tools such as cloud computing, online marketplaces, and social media platforms to sustain operations in the absence of physical interactions (Roman & Rusu, 2022). These technologies have helped SMEs expand their market reach, improve customer engagement, and enhance operational efficiency. Consequently, the integration of technological infrastructure has become increasingly recognized as a strategic resource that enhances business resilience and long-term economic performance (Eze, Chinedu-Eze, Awa, & Diarah, 2023).

In Nigeria, SMEs represent a substantial proportion of business establishments and contribute significantly to national economic development. Despite their importance, the adoption and diffusion of technological infrastructure remain uneven across different regions of the country (World Bank, 2021). However, persistent challenges such as unreliable electricity supply, limited broadband connectivity, low digital literacy, and high costs associated with ICT adoption continue to constrain the ability of SMEs to fully leverage technological infrastructure for improved economic outcomes (Okeke, Ezenwafor & Azih, 2022. Ndukwe, 2020).

However, the study seeks to determine the effect of social media on productivity and assess the effect of customer relationship management on market share.

2. Literature Review

2.1 Conceptual Review

2.1.1 Technological Infrastructure

Technological infrastructure refers to the integrated system of digital tools, platforms, networks, and technological resources that support business operations, facilitate communication, and enable the efficient processing and management of information. It encompasses hardware components such as servers, computers, and networking equipment; software systems including enterprise applications, productivity tools, and data management platforms; and connectivity infrastructure such as broadband internet, telecommunications networks, and cloud-based services (Al-Amin, Hossain, Islam & Biwas, 2023). Collectively, these components create a technological environment that enables firms to coordinate activities, automate processes, and make informed strategic decisions. Xie, Wang, Zheng & Wang (2024) stress that digital technologies significantly contribute to business model innovation in manufacturing firms by facilitating resource orchestration and process optimization. Network infrastructure enables seamless communication, data sharing, and coordination among organizational units and external stakeholders. Pathirana et al. (2023) state that cost-effective network monitoring and management tools can significantly enhance system reliability for SMEs by allowing organizations to detect and address network challenges proactively. Cloud computing technologies and CRM platforms have expanded access to advanced technological capabilities by providing scalable, flexible, and cost-efficient digital solutions that allow SMEs to align their technological investments with evolving business needs (Yen-Ling, Ehsan-Rana & Al-Maatouk, 2022).

Thus, technological infrastructure is widely recognized as a key enabler of innovation and competitive advantage. In highly competitive markets, SMEs increasingly rely on technological capabilities to differentiate their products and services, develop innovative marketing strategies, and enhance customer engagement through digital platforms. Technological infrastructure

supports innovation by enabling firms to develop new products, adopt unique leadership strategies, and implement effective promotional approaches (Popescu, 2014).

2.1.2 Economic Performance

Economic performance generally refers to the ability of firms to effectively utilize their resources to achieve financial sustainability, operational efficiency, and long-term growth (Olumoh, 2024). Taouab & Issor (2019) state that economic performance indicates how effectively a business achieves its financial and operational objectives, often measured through indicators such as productivity, sales growth, profitability, and return on investment. Sampe (2022), affirms that economic performance refers to how well an enterprise transforms its inputs, such as capital, labour, and technology into valuable outputs that enhance profitability and competitiveness. Tavassoli and Karlsson (2016) stress that performance of SMEs is shaped by both internal and external factors. The internal factors include managerial capabilities, technological adoption, workforce skills, and innovation capacity, while the external factors are market conditions, regulatory frameworks, government policies, and access to financial resources.

Economic performance is typically evaluated through a combination of financial and non-financial indicators. Financial indicators have traditionally been the most widely used measures of firm performance because they provide objective and quantifiable information about a firm's financial health. Common financial indicators include return on investment (ROI), return on assets (ROA), profit margins, sales growth, asset returns, cash flow management, and receivables turnover (Sampe, 2022). These indicators provide insight to profitability, liquidity, and financial stability of enterprises and are often used by investors, managers, and policymakers to assess business performance. However, contemporary research increasingly recognizes that financial indicators alone may not provide a comprehensive assessment of SME performance. Consequently, scholars have advocated for inclusion of non-financial performance indicators that capture broader aspects of organizational effectiveness. Non-financial measures include factors such as customer satisfaction, market share, customer acquisition and retention rates, productivity levels, operational efficiency, employee engagement, organizational flexibility, and innovation capacity (Singh, Olugu, & Musa, 2016). These indicators provide valuable insights into the strategic and operational dimensions of firm performance, which often serve as leading indicators of long-term financial success.

2.1.3 Social Media and Productivity

Social media involves all the platforms and apps that allow people, creators and businesses communicate and create online communities, share content and exchange ideas. Social media is a two-way style of communication rather than a one-way communication style that is built to deliver information without a way to reply, such as newspapers, radio, and television. In as much as, social

media is mostly used by individuals; brands, and creators can use social media marketing to connect with their audience, introduce their brand, and sell their products and services (https://buffer.com). The personal benefit of social media are building relationships: it enables people to connect with one another, thereby, making it a tool that fosters new relationships and maintain existing ones. Developing a personal voice: Social media accounts can be used to express oneself, share one's interest and talents. Encourages discovery and education: Social media platforms provide many educational resources. Social media provides businesses and creators with benefits, such as increased brand exposure, content, updates, and event sharing, targeted marketing, and customer engagement (https://buffer.com).

Social media is an internet- based form of communication. Social media platforms, such as facebook, instagram, X(formerly Twitter), WhatsApp, YouTube, Tiktok, Snapchat, Linkedln can allow users to share information, create web content and have conversation (www.usf.edu).

Lacka, Wong, and Haddoud (2021), state that productivity refers to the ratio of outputs produced relative to the inputs required for production, which include labour, capital, and technology. Productivity serves as an essential statistical measure for evaluating economic performance and comparing growth across industries and nations (OECD, 2017). Scholars have observed that digital technological infrastructure opens up new opportunities for developing better products and services while simultaneously improving operational efficiency (Kumar & Ayedee, 2021).
Productivity is the measure of efficiency in converting inputs, such as effort, time, and resources into useful outputs, like goods and services. Thus, productivity is a measure of economic performance that compares the quantity of goods and services produced with the inputs used to produce those goods and services (www.bls.gov).
Thus, we propose that Social media has a positive effect on productivity.

2.1.4 Customer Relationship Management System (CRM) and Market Share

Customer relationship management (CRM) is a set of integrated technologies used to record, track and manage firms' interactions with existing and potential customers. CRM promotes the sales process and enhances enterprise resource planning (ERP) initiatives. It helps companies measure and have access to their lead generation and sales pipelines beyond traditional spreadsheets. To remain competitive and obtain customer satisfaction, firms need to adopt innovative CRM tools (www.ibm.com).

Customer Relationship Management (CRM) system represent an important component of digital technological infrastructure that supports market-oriented strategies within organizations. CRM refers to a set of technologies, processes, and strategies designed to manage and analyze interactions between a firm and its current and potential customers. Through centralized data management and integrated communication systems, CRM platforms enable firms to collect, organize, and analyze customer information in order to enhance relationship management and improve marketing effectiveness (Lavadia, 2024).

Market share represents the proportion of total sales within a specific market that is controlled by a particular firm over a given period. It reflects the extent to which a company dominates its market relative to its competitors and serves as a critical indicator of market performance and competitiveness. Margret, Roseline, Valene & Abel (2020) state that market share is the percentage of the market captured by a firm in terms of revenue generation within a defined timeframe. Vitari and Raguseo (2020) and Dong and Yang (2020) describe market performance as the ability of organizations to expand their market presence, sustain competitive advantage, and effectively penetrate emerging markets. Akintokunbo (2018) stresses that increased technological capability allows firms to expand their market footprint by improving customer engagement and identifying emerging market opportunities. Magret et al. (2020) posit that evaluating a firm's market share relative to competitors enables organizational leaders to understand consumer demand patterns and monitor shifts in market preferences. Such insights are essential for developing effective competitive strategies and sustaining market growth. Das, Kundu, and Bhattacharya (2020) state that technological innovation intensifies competition for market share by enabling firms to introduce new products, improve service delivery, and enhance customer satisfaction. Fadahunsi (2012) stresses that technological advancements often strengthen the financial performance of leading firms while simultaneously encouraging smaller enterprises to pursue innovative entrepreneurial strategies. Thus, organizations that effectively utilize CRM technologies can identify profitable customer segments, optimize marketing campaigns, and respond more effectively to changing market conditions. Thus, we propose that customer relationship management system has a positive effect on market share.

2.2 Theoretical Framework

Sociotechnical System Theory: This theory states that technology and people are deeply interconnected. The theory stresses that technical systems require specific social structures, organisational cultures, and human behaviours to function properly. The success of any technological infrastructure depends on its reliability, performance, and user experience when it is actively in operations.

2.3 Previous Works

Ananga, Nyang'au, & Mwalili, (2024) conducted a study on technological infrastructure and business performance of commercial banks in Kenya. The specific objective of the study was to assess the effect of technological infrastructure on business performance. The study adopted the correlational research design. A purposive sampling technique was used to select 138 top managers of 42 commercial Banks in Kenya. The finding revealed that hardware/Software, networks and databases had positive effects on business performance of Commercial Banks in Kenya. This implies that improvement in information Technological infrastructure (hardware/Software, network and database) would lead to improvement in business performance of Commercial Banks. The study recommended that commercial banks should ensure they have

up-to-date hardware, software and data components to enable their employees enhance productivity.

Adebayo, Adesoba, & Adedotun (2024) conducted a research on digital technology adoption and performance of small and medium enterprises (SMEs) in the food, drink and beverages industry in Ondo State, Nigeria. The specific objective was to assess the effect of digital technology adoption on performance of SMEs in the food, drink and beverages industry. The study adopted the survey design. The finding revealed that digital technological infrastructure adoption had a positive effect on performance of food, drink and beverages industry. The study recommended that the three tiers of government should create an enabling environment by providing basic necessities that would facilitate expansion of ICT in the modern business world.

3. Methodology

The study adopted the survey design. Primary data were obtained through structured questionnaire, while secondary data were gathered from books, journals and the internet.

The population of the study comprised 569 staff drawn from fifteen (15) manufacturing firms purposely selected across the states in South-East Nigeria. The target population included junior and senior staff such as managers, supervisors, and operational employees. The sample size of 230 was obtained using Cochran's (1977) formula, utilizing 95% confidence level and a 5% margin of error. The hypotheses were tested using the ordinal logistic regression. A total of 230 copies of the questionnaire distributed to the respondents, 180 copies representing (78.3%) were returned while 50 copies representing (21.7%) were not returned.

This study employed face and content validity to ensure the instrument's appropriateness to measure what it is intended to measure. Reliability was assessed using test-retest and the internal consistency was tested using Cronbach's alpha, which yield a coefficient of $r = 0.83$, indicating a high level of item consistency.

Table 1. Responses on Social Media

S/N	Options	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Total
1	Our company effectively uses digital platforms for marketing and brand awareness	90 (50.0%)	85 (47.2%)	- (0%)	5 (2.8%)	- (0%)	180
2	Social media has improved customer engagement and interaction	101 (56.1%)	74 (41.1%)	- (0%)	5 (2.8%)	- (0%)	180
3	Social media platforms contribute significantly to our sales growth	69 (38.3%)	79 (43.9%)	19 (10.6%)	10 (5.6%)	3 (1.7%)	180
4	Our company regularly updates its social media strategies based on trends and analytics	59 (32.8%)	78 (43.3%)	27 (15.0%)	11 (6.1%)	5 (2.8%)	180

Sources: Field Survey 2026

Item 1 of table 4.7 indicates that 90 (50.0%) of the respondents strongly agree that their company effectively uses digital platforms for marketing and brand awareness, 85 (47.2%) agree, 5 (2.8%) disagree, while none were undecided or strongly disagree.

Item 2 of table 4.7 shows that 101 (56.1%) of the respondents strongly agree that social media has improved customer engagement and interaction, 74 (41.1%) agree, 5 (2.8%) disagree, while none were undecided or strongly disagree.

Item 3 of table 4.7 reveals that 69 (38.3%) of the respondents strongly agree that social media platforms contribute significantly to their sales growth, 79 (43.9%) agree, 19 (10.6%) were undecided, 10 (5.6%) disagree, while 3 (1.7%) strongly disagree.

Item 4 of table 4.7 indicates that 59 (32.8%) of the respondents strongly agree that their companies regularly update its social media strategies based on trends and analytics, 78 (43.3%) agree, 27 (15.0%) were undecided, 11 (6.1%) disagree, while 5 (2.8%) strongly disagree.

Table 2. Responses on Customer Relationship Management

S/N	Options	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Total
1	Our company uses cloud system to manage customer relationships effectively	53 (29.4%)	74 (41.1%)	28 (15.6%)	20 (11.1%)	5 (2.8%)	180
2	Our cloud system helps in tracking customer preferences and behaviours	58 (32.2%)	71 (39.4%)	25 (13.9%)	18 (10.0%)	8 (4.4%)	180
3	The use of cloud system has increased our overall business efficiency.	56 (31.1%)	89 (49.4%)	20 (11.1%)	10 (5.6%)	5 (2.8%)	180
4	Cloud system integration with other business functions has improved workflow management	64 (35.6%)	61 (33.9%)	22 (12.2%)	24 (13.3%)	9 (5.0%)	180

Sources: Field Survey 2026

Item 1 of table 4.8 indicates that 53 (29.4%) of the respondents strongly agree that their company uses cloud system to manage customer relationships effectively, 74 (41.1%) agree, 28 (15.6%) were undecided, 20 (11.1%) disagree, while 5 (2.8%) strongly disagree.

Item 2 of table 4.8 shows that 58 (32.2%) of the respondents strongly agree that their cloud system helps in tracking customer preferences and behaviours, 71 (39.4%) agree, 25 (13.9%) were undecided, 18 (10.0%) disagree, while 8 (4.4%) strongly disagree.

Item 3 of table 4.8 reveals that 56 (31.1%) of the respondents strongly agree that the use of cloud systems has increased overall business efficiency, 89 (49.4%) agree, 20 (11.1%) were undecided, 10 (5.6%) disagree, while 5 (2.8%) strongly disagree.

Item 4 of table 4.8 indicates that 64 (35.6%) of the respondents strongly agree that cloud system integration with other business functions has improved workflow management, 61 (33.9%) agree, 22 (12.2%) were undecided, 24 (13.3%) disagree, while 9 (5.0%) strongly disagree.

Hypotheses Testing

H_o1: Social media does not have positive effect on productivity.

H_a1: Social media has a positive effect on productivity.

Table 3. Parameter Estimates

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Productivity]	21.347	2.563	21.340	1	.001	21.347	26.278
Location	Social Media	6.872	1.428	23.111	1	.000	6.872	9.671

Link function: Logit.

The result indicates that social media has a positive effect on productivity, with an increase in the in probability of productivity at an odds ratio of 6.872 (95% CI, 6.872 to 9.671), Wald χ^2 (1) = 23.111, p = 0.000 < 0.05. Therefore, the alternate hypothesis which states that social media has a positive effect on productivity is hereby accepted while the null hypothesis is rejected.

Hypothesis Two:

H_o2: Customer Relationship Management systems do not have positive effect on market share.

H_a2: CRM system has a positive effect on market share.

Table 4. Parameter Estimates

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[Market Share]	27.438	10.284	28.547	1	.032	27.438	36.211
Location	CRM	84.762	6.228	38.451	1	.012	84.762	92.419

Link function: Logit.

The result indicates that customer relationship management system positively affects market share, with an increase in the probability of market share at an odds ratio of 84.762 (95% CI, 84.762–92.419), Wald χ^2 (1) = 38.451, p = 0.012 < 0.05. Therefore, the alternate hypothesis which states that customer relationship management system has a positive effect on market share is hereby accepted while the null hypothesis is rejected.

Discussion of Results

Result of hypothesis (1) revealed that social media had positive effect on productivity (β= 6.872, p = 0.000 < 0.05). Pukon and Ekienabor (2024), established that social media use had a positive correlation with employee productivity. Gbandi and Iyamu (2022) affirmed that social media adoption by SMEs in Benin City, Nigeria, significantly increased business performance by boosting visibility, reducing marketing costs, and improving customer relationships. Bello and Hussaini (2023), posit that WhatsApp and Facebook significantly contributed to sales growth and operational efficiency among SMEs in Northern Nigeria. Nuseir (2018), established that social media marketing strategies positively affected productivity by facilitating better market insights and strengthening customer trust.

Thus, result of hypothesis (2) indicated that customer relationship management system had a positive effect on market share (β = 84.762, p = 0.000 < 0.05). Nethanani, Matlombe, Vuko, and Thango (2024) affirmed that CRM system significantly improve customer loyalty and competitive positioning of SMEs in Nigeria. Similarly, Mozaheb, Alamolhodaei, and Ardakani (2015) posit that CRM system adoption had a positive effect on performance of SMEs.

Conclusion

Digital transformation provides a critical pathway to achieving sustainable economic growth, enhancing resilience, and securing a competitive edge in the global business landscape.

Digital technologies enable businesses to minimise waste, optimise use of energy and streamline supply chains. Thus, economies will grow their output without proportional rise in environmental degradation. The digital economy creates new sectors, such as green tech, e-learning, and telehealth which generates good jobs and attract foreign direct investment.

Recommendations

The study recommended that firms need to adopt social media platforms strategically to achieve increased productivity through improved customer engagement, cost-effective marketing, and operational efficiency. Also, firms need to implement a customer relationship management system,

so as to achieve increased market share by strengthening customer loyalty, streamlining communication, and expanding their customer base.

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