

Disruptive Technology Adoption and Organizational Performance of SMES In South-South Nigeria

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Abstract

The study investigated the effect of the relationship between Disruptive Technology Adoption and Organizational Performance of Small and Medium Enterprises in South-South Nigeria. The research used a cross-sectional survey design and comprised a target population of 60 small and medium enterprise owners. The census sampling technique was adopted, and data was collected through questionnaires and Cronbach alpha, which tested the validity and reliability. Multiple regression analysis was adopted with the aid of a statistical package for social sciences (spss version 0-29) to ascertain the effect of Disruptive Technology on the Organizational Performance of SMEs. The findings reveal a strong and positive relationship between the variables. The study recommended, among others, that owners of small and medium enterprises should always encourage and update the outdated production processes to significantly add market value and even eventually displace established markets, leading firms, products, and alliances.

Keywords: *Disruptive, Technology, Adoption, Organizational Performance, Small and Medium Enterprises*

INTRODUCTION

Today's dynamic and competitive business environment necessitates technological innovation in modern machinery and new techniques by small and medium enterprises to remain competitive and resilient in the global market. Small and medium firms need technological innovation to compete favorably with their counterparts worldwide. Technological innovation remains a strategy for stimulating the economic efficiency of SMEs and sustainable development (Bak-Subrahmanya et al., 2014); small and medium enterprises (SMEs) are leveraging more on technological innovation to attain competitiveness, growth, and breakthroughs. Research on disruptive technology and organizational performance of small and medium enterprises in south-south Nigeria has highlighted how adopting such technologies can significantly influence business

outcomes. In general, SMEs have faced challenges, including resource constraints that make technology adoption more complex, especially in emerging economies. Studies have shown that disruptive technologies such as mobile applications, digital marketing tools, and e-commerce platforms play an essential role in enhancing the competitiveness of SMEs by improving efficiency. SMEs that adopt digital transformation strategies tend to perform better in revenue growth, market expansion, and resilience, particularly during the COVID-19 pandemic. Following these assertions, the need for technological innovation can never be underestimated. Innovation has become a tool for small and medium enterprises to cope with today's highly competitive environment (Al-Battaineh, 2018). Penrose (2020) noted that business growth is an increase in profitability, market share, and competitive advantage through various means, such as developing new products, entering new markets, expanding existing operations, or improving operational efficiency. The essence of growing business could be identifiable in economic activities, strategic policy implementation, organizational development, and customer-centric expansion (Mio, Panfilo & Blundo, 2020). Technological innovation, according to Schumpeter (1939), is a new means of combining factors of production resulting from a change in inputs to produce outputs. Technological innovation means inventing modern production methods, new techniques, processes, and procedures that add value to small and medium enterprises' product/service delivery. As embedded in this study, technological innovations are disruptive and incremental. Disruptive innovation refers to any enhanced or entirely new technology that replaces and disrupts existing technology (Techopedi, 2019). It involves an innovation that brings a complete or total change to the product/service with value addition. At the same time, incremental innovation brings about step-by-step or gradual changes to SMEs' products or services with bit-by-bit value addition.

Olugbor (2015) further emphasized that innovation through technology adoption is crucial to organizational performance. Innovation is often highlighted as a critical success factor for SMEs adopting disruptive technologies; Enagi and Van Belle (2019) noted that technological competitiveness is increasing in globalized markets by leveraging disruptive technologies such as mobile payment systems, digital marketing platforms, and e-commerce tools. Similarly, Manyika et al. (2013) argued that technological innovation allows SMEs to achieve differentiation in the market. The ability to innovate through technology adoption improves operational efficiencies and creates unique propositions that attract and retain customers. Moreover, Olubiyi (2021) highlighted the role of government policies in supporting or hindering the adoption of disruptive technologies, such as the absence of incentives for technology adoption like broadband, which often slows down the digital transformation process for many SMEs in Nigeria. In another development, Olubiyi (2021) suggested that further government intervention is necessary to address the financial and infrastructural challenges that prevent SMEs from embracing technology. From the researcher's observation, there has been a lack of research efforts considering the predictive role of Disruptive Technology on Organizational Performance; hence, a knowledge gap exists. As its point of departure, this study examines the relationship between disruptive technology adoption and the organizational performance of SMEs in south-south Nigeria.

Statement of the Problem

The rapid advancement of disruptive technologies such as artificial intelligence (AI), blockchain, cloud computing, and automation is reshaping global industries. Small and Medium-sized Enterprises (SMEs) in the South-South region of Nigeria, like their counterparts worldwide, are not immune to this transformation. While disruptive technologies promise increased efficiency, market expansion, and competitive advantage, SMEs in this region face unique challenges, such as limited access to technological infrastructure, inadequate funding, and a lack of skilled labor to leverage these innovations effectively. One of the most significant challenges today confronting small and medium enterprises (SMEs) in Nigeria, particularly in the south-south, is how to sustain business operations and survive the stiff, highly competitive, dynamic business environment. This is because of the proliferation of many more small and medium enterprises in the operational environment. Their presence creates more competition, resulting in a drop in productivity market share/market leadership due to low customer patronage.

Consequently, some SMEs that do not withstand the competition are faced out of the market despite their contributions to economic growth in terms of job creation, increase in per capita income, increase in GDP, and improved standard of living. Given this, these SMEs will better understand how critical disruptive technology affects their organizational performance. The study focused on disruptive technology adoption and organizational performance of SMEs in south-south Nigeria.

Aims and Objectives of the Study

This study investigates the relationship between disruptive technology adoption and the organisational performance of small and medium enterprises in south-south Nigeria. Specially, the study shall seek to;

- i. Ascertain the nature of relationships between incremental innovation and organizational performance of SMEs in south-south Nigeria.
- ii. Evaluate how much Disruptive Innovation and Organizational Performance of Small and Medium Enterprises in south-south Nigeria are related.
- iii. Examine the magnitude of the relationship between cost-effectiveness and organizational performance of Small and Medium Enterprises in south-south Nigeria.

Research Questions

- i. What is the relationship between Incremental Innovation and Organizational Performance of Small and Medium Enterprises in south-south Nigeria?
- ii. Is there any relationship between Disruptive Innovation and Organizational Performance of Small and Medium Enterprises in the south-south of Nigeria?
- iii. What is the magnitude of the relationship between cost-effectiveness and organizational performance of Small and Medium Enterprises in south-south Nigeria?

Research Hypotheses

The following hypotheses were stated in a null form.

- i. There is no significant relationship between incremental innovation and the productivity of SME businesses in south-south Nigeria.
- ii. There is no significant relationship between disruptive technology performance and market shares of SME businesses in south-south Nigeria.
- iii. There is no significant relationship between the cost-effectiveness and efficiency of SMEs in south-south Nigeria.

1.6 Literature Review

This section explores the theoretical and conceptual frameworks and reviews related empirical studies.

Theoretical Framework

Clayton Christensen proposed the Disruptive Innovation Theory in 1997. This theory explains how new technologies can disrupt existing markets and create new growth opportunities. In the study context, this theory can help analyze how artificial intelligence enables innovations to disrupt traditional business models and industries, leading to new growth opportunities. It highlights the importance of recognizing and capitalizing on disruptive technologies to stay competitive and achieve business growth. However, this theory has been criticized for simplifying the innovation process and the challenges associated with successfully implementing disruptive technologies.

Diffusion of innovation (DOI) Theory: Rogers propounded this theory in 2003. It explains how, why, and at what rate new technologies spread within a population. In this study context, this theory explains how adopting disruptive technologies in SMEs can be examined through this lens, focusing on perceived benefits, complexity, compatibility, and observability factors.

Demand-Pull Theory and Technological Push Theory (Schmookier, 1966)

This theory explains the drivers of innovation and growth in different industries. Demand-pull theory suggests that innovation and development are driven by market demand, where market demand shocks pull innovation, and innovation pushes market growth. On the other hand, the technology push theory suggests market growth, and technology pushes innovation (Kerstin, 2023). According to researchers, these theories have been helpful in application by SMEs, such as the renewable energy industry in the European Union, the equipment manufacturing industry in China, and the Korean military's weapon acquisition (Kerstin, 2023). In Nigeria, research has shown that the theories have benefited SME businesses. The theories are relevant to this study because it has all the qualifications to improve the market share and productivity of small and medium enterprises in south-south Nigeria, making them resilient and more competitive. However, the theories did not state clearly how technological innovation, whether demand-pull or technology, pushes productivity.

Conceptual Framework

Concept of Technological Innovation

Technological innovation means different things to different authors. For Nick (2023), it is the creation and application of new or improved technologies, tools, systems, and processes that bring significant advancements or breakthroughs in various fields. It involves harnessing knowledge, expertise, and material resources to develop innovative solutions that solve problems, improve efficiency, drive progress, and deliver value (Nick, 2023). According to Schumpeter (1939), it is a new means of combining factors of production resulting from a change in inputs to produce outputs.

Dimensions of Disruptive Technology

i. Disruptive Innovation

Disruptive innovation is a form of technological innovation introduced by Clayton M. Christensen. It is the process in which a new product, service, or technology disrupts an existing market or significantly alters one (Nick, 2013). It is a type of technology innovation that creates a new market and value network or enters at the bottom of an existing market and eventually displaces established market-leading SMEs, products, and alliances.

Disruptive Innovation continues to influence various industries, such as healthcare, where AI-driven tools improve efficiency and personalized care. The technology sector, especially with generative AI (Gen AI), also remains at the forefront of disruption, as organizations increasingly rely on AI to transform processes and decision-making.

ii. Incremental Innovation

In a globalized economy where consumer demands evolve quickly, companies that engage in frequent small innovations can stay ahead of competitors. Incremental innovation is crucial for SMEs, especially in south-south Nigeria, where resource constraints and market conditions necessitate cautious innovation strategies. However, companies must be mindful of complimenting incremental innovation with more transformative initiatives to stay relevant in fast-evolving markets. Incremental innovation refers to minor improvements to a company's products or services. It helps the firm to build fide competition (Samantha, 2019) and (Ayman, 201). It is a gradual or step-by-step continuous improvement in an organization's existing concepts, products, or services that brings bit by bit value addition. Incremental Innovation contributes to sustaining competitive advantage by continuously refining a company's offerings, enabling businesses to adapt to changes in the market environment.

Concept of Organizational Performance of SMEs

Organizational performance can also be divided into two sub-constructs: financial and nonfinancial. Common indicators of organizational performance include profitability, market share, customer satisfaction, innovation capacity, and efficiency (Neely, 2007).

The measure of organizational performance:

The performance of SMEs is typically measured through a combination of financial and non-financial metrics and common indicators such as profitability, market share, and efficiency, as opined by (Neely, 2007)

Productivity

Syverson (2011) sees productivity as the efficiency with which inputs (labor, capital, materials) are converted into outputs (goods or services). Adopting new technologies significantly improves productivity by enabling firms to produce more efficiently. Effective management is crucial for improving productivity. Competitive markets push SMEs to improve efficiency. Larger firms tend to have higher productivity due to economies of scale. In another development, productivity can be seen as a measure of performance that compares the output of a firm's product with the input or resources required to produce it. The input may be labor, equipment, or money. It is the quantity of products a manufacturing firm produces within a given resource. Technological innovations can improve it to meet the customers' competitiveness requirements.

Market Share

It refers to the total sales or revenue percentage in a particular period. It represents the company's proportion of the overall market for its products and services. Market share indicates a firm's competitiveness relative to others in the same market. Market share is a crucial metric to compare a company's performance against its competitors in the same industry. Market share is the percentage of the total market for industry and sales made by a firm (Gale, 2013). It is the percentage of the total revenue or sales in a market that a business makes up or the percentage of the market that a company controls. It is a measure of competitiveness and can be improved by technological innovation.

Review of Related Empirical Studies

Gudetu et al. (2024) investigated the effect of innovation capability on competitiveness—in a study on manufacturing firms in Ethiopia. The study used an exploratory research design. Primary data was collected using structured questionnaires from manufacturing firms. A stratified random sampling technique was employed, and a sample of 20 manufacturing companies was used. Amos V 23 and SPSS V 26 software were used to analyze. A multiple regression approach was adopted for the test of hypotheses. The study found that product, process, market, and organizational innovation positively impact the competitiveness of manufacturing firms in Ethiopia. Product innovation ($\beta = 0.355$, $p < 0.01$, $t = 8.25$), organizational innovation ($\beta = 333$, $p < 0.01$, $t = 9.00$). The study was conducted in Ethiopia, and the market exists. The study was conducted in Ethiopia and considered product, process, and organizational innovation as incremental and destructive innovations and their effectiveness in the competitiveness of manufacturing SMEs in south-south Nigeria.

Sefeovic et al. (2022) studied the impact of technological innovation on the performance of manufacturing firms in Switzerland. The study adopted a descriptive research design. The study target a population of 658 respondents from Eastman Chemical International GmbH Zoug with a sample size of 249 determined using the Taro Yamane formula. A questionnaire instrument was used to collect data. The data collected was analyzed using inferential statistics. The study found that technological innovation had a positive and significant relationship to the performance of manufacturing firms in Switzerland ($\beta = 0.684$, $p = 0.005$). The gap exists in that the study used descriptive research design and the Yamane formula for determining the sample size of 249. The

latest study used a cross-sectional survey research design and census sampling technique for selecting 50 manufacturing SMEs in Makurdi Metropolis, Benue State.

Long (2022) examined empirical analysis of technological innovation to promote the international competitiveness of China's manufacturing industry. The study used panel data from 2012 to 2016. Based on the empirical evidence, the study found that introducing and absorbing innovative technology can significantly improve the competitiveness of manufacturing companies. This study was more empirical and qualitative, while the current study is quantitative and qualitative, which is more fieldwork.

Mary et al. (2019) investigated the effect of innovation on firms' competitiveness in the case of manufacturing SMEs in Nairobi County, Kenya. Data was collected from 284 small and medium manufacturing enterprises from 2012 to 2014. Multiple linear regression was used to analyze innovation's effect on manufacturing SMEs' competitiveness. Findings indicate incremental, process, marketing, and organizational innovation were implemented by manufacturing SMEs in Nairobi and had a positive significant effect on the competitiveness of manufacturing SMEs in Nairobi. The study used incremental, process, marketing, and organizational innovations. The current study covers incremental and destructive innovation in 2024 to still test the validity of incremental and destructive technological innovations on the competitiveness of manufacturing SMEs in the Makurdi metropolis.

Ukpabio and Oyeibisi (2017) investigated the impact of technological innovation on the performance of manufacturing firms in Nigeria. A sample of 305 SMEs was drawn from textile/leather and wood/furniture manufacturing industries. Data collected was analyzed through correlation and hierarchical regression analysis while concentrating on product and process innovation. Findings generally from his study indicate that technological innovation significantly impacted the performance of manufacturing SMEs in Nigeria. The study concentrated on product and process innovations. The variation exists in this; the current study focuses on destructive technological innovations.

Davinder Sing and Khamba (2017) researched the influence of technological innovation on the performance of small manufacturing companies in India. An in-depth survey approach was adopted, targeting 135 firms in India's Northern Region. Multiple regression analysis was employed to examine the correlation between technological innovations and manufacturing firms' performance, validated by a statistical t-test and canonical correlation analysis. Findings showed that technological innovation enhances small manufacturing companies' performance in India. This study was conducted in Northern India, targeting 135 small manufacturing companies. The difference is that the current study is conducted in Nigeria, targeting 50 manufacturing SMEs in the Makurdi metropolis, Benue State.

METHODOLOGY

The study adopted a cross-sectional survey design with the target of 60 small and medium enterprises in South-South Nigeria using a census sampling technique with a questionnaire instrument for data collection. The average validity index is 0.847, and reliability is 0.851. Multiple regression is used for specifying the model as expressed below:

$$FCPT = F(TI) \dots \dots \dots (I)$$

$$FCPT = F. (DI, INCI) \dots \dots \dots (II)$$

$$FCPT = \beta_0 + \beta_1 DI + \beta_2 INCI \dots \dots \dots (III)$$

Where

- OT = Organizational Performance (dependent variable)
- TI = Technological Innovation (Independent variable)
- DI = Disruptive Innovation
- CE = Cost Effectiveness
- INCI = Incremental Innovation
- β_0 = y intersect on regression line (constant)
- $\beta_1 - - - \beta_2$ = Is the coefficient parameter measured) of DI and INCI
- et = Error Term

RESULT AND DISCUSSION

The data collected from the participants were analyzed and presented using descriptive statistics, correlation, and regression analysis.

Table 1: Descriptive Statistics

Variable	Mean	Std dev.	Skewness	Kurtois	Cronbach's Alpha
Disruptive Technology	4.29	.781	1.697	2.879	0.847
Incremental Innovation	4.34	.726	1.935	3.117	0.851
Organizational Performance	4.15	.804	1.629	2.690	0.825

Source: Researcher’s Computation from SPSS Output, 2024.

Table 1 provides the means, standard deviations, skewness, and kurtosis for the dimensions of disruptive technology and organizational performance. The result shows that incremental innovation has the highest mean score (M = 4.34; SD = 0.726), followed by disruptive technology (M = 4.15; SD = 0.804). The skewness and kurtosis values ranged between 1.697 and 1.935 for skewness and 2.879 and 3.117 for kurtosis, staying within the 1 and +1 normal range recommended for these coefficients. The result also shows Cronbach’s alpha for the variables as follows: disruptive technology (a = 0.847), incremental innovation (a = 0.851), and organizational performance (a = 0.825).

Table 2: Correlations Matrix

Variable	Disruptive Technology	Incremental Innovation	Organizational Performance
Disruptive Technology	1		
Incremental Innovation	.528**	1	
Organizational Performance	.534**	.546**	1

**Correlation is significant at the 0.01 level (2-tailed)

Source: Researcher’s Computation from SPSS Output, 2024.

Table 2 shows the correlation between disruptive technology dimensions and organizational performance. The result showed that disruptive technology highly correlated with organizational performance and a positive relationship between the variables. The result found a significant correlation between disruptive technology and organizational performance (r = .534; p<.01), and

incremental innovation is significantly correlated with organizational performance ($r = .546$; $p < .01$).

Table 3: Regression Model Coefficients

Variable	B	T	Sig	Tolerance	VIF
Disruptive Technology	.253	3.092	.001	.867	1.255
Incremental Innovation	.354	4.084	.000	.875	1.212
R-Square	.614				
Adj. R-Square	.607				
F-Statistics	24.316				
Durbin-Watson	1.725				
Sig.	.000				

Source: Researcher's Computation from SPSS Output, 2024.

The study used regression analysis to ascertain the effect of the independent variables on the dependent variable. The regression model demonstrated that the variables (disruptive technology and incremental innovation) jointly explained 61.4% variation in organizational performance ($R^2 = 0.614$), while other factors outside the model contributed 38.66%. The F-statistics (24.316) and sig value (0.000) show a significant effect of the predictor variables on the dependent variable.

Test of Hypotheses

The outcome of the first hypothesis indicated that Disruptive Technology had a positive and significant effect on the Organizational Performance of SMEs in south-south Nigeria ($\beta = 0.253$; $t = 3.092$; $p = 0.001$). The hypothesis states that Disruptive Technology has no significant effect on the organizational performance of SMEs in south-south Nigeria. The test of hypothesis two reported a significant effect of incremental innovation on the organizational performance of SMEs in south-south Nigeria ($\beta = 0.354$; $t = 4.084$; $p = 0.000$). The hypothesis state that incremental innovation has no significant effect on the organizational performance of SMEs in the south-south, Nigeria.

Conclusion and Recommendations

Conclusion

This research investigates the Disruptive Technology Adoption and Organizational Performance of SMEs in south-south Nigeria. It identified a robust relationship between the Disruptive Technology and Organizational Performance of SMEs in south-south Nigeria. New technologies, such as artificial intelligence (AI), must provide businesses with competitive advantages and means of survival in various fields, such as SMEs, accounting, and human resources. By leveraging AI, businesses can improve operations through gradual process improvement and optimization within the organizational boundary.

Recommendations

Following are some suggestions and possible by the study's findings:

- i. Business owners and managers should institute policies and procedures encouraging technological innovations, propelling collective learning, and aligned values.

- ii. Policies and programs should focus on incremental innovation to encourage employees and workers to work together productively.
- iii. The purpose of well-defined Robotics efficiency and organized processes and methods is to align individual and organizational objectives.

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