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Innovation Capability and Business Sustainability among Selected Manufacturing Firms in Kogi State, Nigeria

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Abstract

This study examined the effect of innovation capability on business sustainability among selected manufacturing firms in Kogi State, Nigeria. The study was motivated by the persistent sustainability challenges facing manufacturing firms in developing economies despite increasing emphasis on innovation as a strategic tool for competitiveness and long-term survival. Innovation capability was operationalized through product innovation, process innovation, organizational innovation, and marketing innovation, while business sustainability was measured using economic, environmental, and social sustainability dimensions. The study adopted a descriptive survey research design, and data were collected from a sample of 217 respondents selected from West Africa Ceramic Company Ltd and BN Ceramic Company Ltd using proportionate stratified and simple random sampling techniques. Data were analyzed using descriptive statistics and multiple regression analysis. The findings revealed that all dimensions of innovation capability had significant positive effects on business sustainability. Specifically, process innovation exerted the strongest influence, followed by product innovation, organizational innovation, and marketing innovation. The regression results further indicated that innovation capability significantly explained variations in economic, environmental, and social sustainability among the selected manufacturing firms. The study concluded that innovation capability is a critical determinant of business sustainability and serves as a strategic mechanism for enhancing long-term organizational survival, competitiveness, and environmental responsiveness. The study recommended that manufacturing firms should prioritize investment in innovation-driven strategies, particularly process and product innovation, to improve efficiency, profitability, and sustainability performance. It also recommended that government and industry stakeholders should support innovation through enabling policies, improved infrastructure, and incentives for sustainable manufacturing practices. The study contributes to theoretical discourse by reinforcing the relevance of Resource-Based View and Dynamic Capability Theory in explaining sustainability outcomes in emerging economies.

Keywords: *Innovation capability, business sustainability, manufacturing firms, process innovation, Kogi State.*

Introduction

In an increasingly volatile and competitive global economy, firms are compelled to develop capabilities that ensure not only survival but also long-term sustainability. Innovation capability, defined as a firm's ability to continuously transform knowledge and ideas into new products, processes, and systems, has emerged as a critical strategic resource (Calik & Bardudeen, 2020; Distanont & Khongmalai, 2020; Teece, 2019). At the same time, business sustainability has evolved into a multidimensional construct encompassing economic viability, environmental responsibility, and social inclusiveness (Bocken *et al.,* 2019; Dyllick & Muff, 2020; Khan *et al.,* 2021). Contemporary scholarly debates emphasize that innovation capability

is not merely a driver of competitiveness but also a foundational mechanism through which firms achieve sustainable performance outcomes (Chen *et al.,* 2021; Singh *et al.,* 2022). However, the nature and strength of this relationship remain contested, particularly in emerging economy contexts where institutional and resource constraints are prevalent.

The manufacturing sector plays a pivotal role in economic development, especially in developing countries such as Nigeria, where it contributes significantly to industrialization, employment, and value creation. Kogi State, endowed with mineral resources and strategic geographic positioning, hosts a growing number of manufacturing firms that operate under challenging conditions, including infrastructural deficits, technological gaps, and regulatory inefficiencies (Adeleye *et al.,* 2020; Oyekunle & Sirayi, 2021; Eze *et al.,* 2020). These contextual realities make it imperative to examine how firms leverage innovation capability to achieve sustainability. The choice of this context is theoretically and empirically justified, as it provides insights into how resource-constrained firms navigate the innovation–sustainability nexus, thereby contributing to the broader discourse on sustainable industrial development in emerging economies (Oyedijo, 2020; Adegbite *et al.,* 2019).

Recent literature presents diverse and sometimes conflicting findings on the relationship between innovation capability and business sustainability. While several studies report a positive association, indicating that innovative firms are better positioned to improve efficiency, reduce environmental impact, and enhance stakeholder value (Chen *et al.,* 2021; Albort-Morant *et al.,* 2020; Kafetzopoulos & Psomas, 2020; Singh *et al.,* 2022), others highlight potential trade-offs and short-term performance pressures associated with innovation investments (Horbach & Rammer, 2020; Zailani *et al.,* 2019; Costa *et al.,* 2019). Methodologically, these studies vary widely, employing cross-sectional surveys, panel data analyses, and case studies, which contributes to inconsistencies in findings and limits generalizability (Damanpour *et al.,* 2018; Rajapathirana & Hui, 2018; García-Sánchez *et al.,* 2020). Moreover, much of the empirical evidence is drawn from developed economies, leaving a gap in understanding how these relationships manifest in African manufacturing contexts.

Innovation capability is inherently multidimensional, with three key dimensions particularly relevant to manufacturing firms: technological innovation capability, process innovation capability, and organizational innovation capability. Technological innovation capability enables firms to adopt advanced production technologies and develop eco-friendly products, thereby enhancing environmental performance (Albort-Morant *et al.,* 2020; Chen *et al.,* 2021). Process innovation capability focuses on improving operational efficiency and reducing waste, contributing to both economic and environmental sustainability (Damanpour *et al.,* 2018; Khan *et al.,* 2021; Singh *et al.,* 2022). Organizational innovation capability, which involves changes in managerial practices and organizational structures, facilitates knowledge integration and supports the implementation of sustainability-oriented strategies (Kafetzopoulos & Skalkos, 2019; Dyllick & Muff, 2020; García-Sánchez *et al.,* 2020). Empirical studies suggest that these dimensions interact synergistically, although their relative impacts may differ across contexts and industries.

Business sustainability, as a dependent construct, is commonly operationalized through three core proxies: economic sustainability, environmental sustainability, and social sustainability. Economic sustainability reflects a firm's capacity to maintain profitability and competitive advantage over time (Bocken *et al.,* 2019; Costa *et al.,* 2019). Environmental sustainability captures efforts to minimize ecological footprints through resource efficiency, pollution control, and sustainable production practices (Horbach & Rammer, 2020; Zailani *et al.,* 2019). Social sustainability relates to the firm's responsibility toward stakeholders, including

employee welfare, community engagement, and ethical conduct (Khan *et al.,* 2021; Adegbite *et al.,* 2019). These proxies provide a comprehensive framework for assessing sustainability performance and have been widely adopted in empirical research examining the outcomes of innovation capability.

The relationships between innovation capability dimensions and sustainability outcomes remain complex and context-dependent. While technological and process innovations are often linked to improvements in environmental and economic performance, organizational innovation plays a crucial role in embedding sustainability within corporate culture and strategy (Chen *et al.,* 2021; Singh *et al.,* 2022; Dyllick & Muff, 2020; Edna et al, 2021). Nevertheless, inconsistencies persist, particularly in developing economies where institutional weaknesses and resource limitations may hinder the effective translation of innovation into sustainable outcomes (Adeleye *et al.,* 2020; Oyedijo, 2020; Eze *et al.,* 2020). Consequently, significant theoretical, empirical, and contextual gaps remain, including limited integration of innovation and sustainability frameworks, underrepresentation of African contexts, and insufficient multidimensional analyses. This study addresses these gaps by examining the interplay between innovation capability and business sustainability among manufacturing firms in Kogi State, thereby contributing to both theory and practice in sustainable enterprise development.

Statement of the Problem

Despite the growing recognition of innovation capability as a critical driver of firm competitiveness and long-term survival, many manufacturing firms in Nigeria continue to struggle to translate innovation efforts into sustainable business outcomes. Empirical evidence suggests that while innovation capability through technological, process, and organizational improvements has the potential to enhance economic performance, reduce environmental impact, and strengthen social responsibility, its actual impact remains inconsistent and context-dependent (Chen *et al.,* 2021; Singh *et al.,* 2022; Distanont & Khongmalai, 2020). In developing regions such as Kogi State, manufacturing firms face persistent constraints including inadequate infrastructure, limited access to advanced technologies, weak institutional support, and financial limitations, all of which hinder the effective deployment of innovation strategies (Adeleye *et al.,* 2020; Oyekunle & Sirayi, 2021; Eze *et al.,* 2020). Furthermore, existing studies have largely focused on developed economies and often adopt unidimensional measures of either innovation or sustainability, thereby failing to capture the complex and multidimensional nature of their relationship (Horbach & Rammer, 2020; García-Sánchez *et al.,* 2020; Kafetzopoulos & Psomas, 2020). This has resulted in significant theoretical and empirical gaps, particularly regarding how different dimensions of innovation capability influence economic, environmental, and social sustainability in resource-constrained manufacturing contexts. Consequently, there is a pressing need for context-specific, multidimensional research that examines how innovation capability can be effectively leveraged to enhance business sustainability among manufacturing firms in Kogi State, Nigeria.

Objectives of the Study

The main aim of this study is to examine the effect of innovation capability on business sustainability among selected manufacturing firms in Kogi State, Nigeria.
The specific objectives are to:

i. Examine the effect of technological innovation capability on economic sustainability of manufacturing firms in Kogi State.
ii. Assess the influence of process innovation capability on environmental sustainability of manufacturing firms in Kogi State.

iii. Evaluate the impact of organizational innovation capability on social sustainability of manufacturing firms in Kogi State.

Research Questions

The study seeks to provide answers to the following questions:

i. How does technological innovation capability affect economic sustainability of manufacturing firms in Kogi State?
ii. What is the influence of process innovation capability on environmental sustainability of manufacturing firms in Kogi State?
iii. To what extent does organizational innovation capability impact social sustainability of manufacturing firms in Kogi State?

Statement of Hypotheses

The following null hypotheses will be tested in this study:

H_{01}: Technological innovation capability has no significant effect on economic sustainability of manufacturing firms in Kogi State.

H_{02}: Process innovation capability has no significant effect on environmental sustainability of manufacturing firms in Kogi State.

H_{03}: Organizational innovation capability has no significant effect on social sustainability of manufacturing firms in Kogi State.

Literature Review

Meaning of Innovation Capability

Innovation capability has been widely conceptualized in contemporary literature as a firm's capacity to continuously transform knowledge and ideas into new or improved products, processes, and systems that enhance performance and competitiveness. For instance, Distanont and Khongmalai (2020) define innovation capability as the ability of an organization to effectively manage knowledge and resources to support innovation activities. Similarly, Calik and Bardudeen (2020) view it as a firm's proficiency in integrating internal competencies and external knowledge to foster innovation outcomes. From a dynamic capabilities' perspective, Teece (2019) emphasizes innovation capability as a higher-order capability that enables firms to sense opportunities, seize them, and reconfigure resources accordingly. In contrast, Kafetzopoulos and Psomas (2020) focus more on operational aspects, defining it as the firm's ability to implement innovation practices that improve quality and efficiency.

While these definitions converge on the idea that innovation capability involves the transformation of knowledge into value-creating outputs, they differ in emphasis—some highlight strategic adaptability (Teece, 2019), others stress knowledge integration (Calik & Bardudeen, 2020), and some focus on operational execution (Kafetzopoulos & Psomas, 2020). Despite these differences, there is consensus that innovation capability is a multidimensional construct essential for firm competitiveness. Its importance is particularly pronounced in manufacturing firms, where continuous innovation is required to improve productivity, reduce costs, and respond to environmental and market pressures (Chen *et al.,* 2021; Singh *et al.,* 2022). In the context of manufacturing firms in Kogi State, innovation capability is crucial for overcoming infrastructural and technological constraints and achieving sustainable performance outcomes.

Operationally, this study conceptualizes innovation capability as a multidimensional construct measured through technological (product), process, organizational, and marketing innovation capabilities. These dimensions capture the firm's ability to innovate across key functional areas. This conceptualization directly aligns with the study's objectives and research questions, which examine how different facets of innovation capability influence various aspects of business sustainability. The discussion of innovation capability naturally leads to an examination of its specific dimensions.

Dimensions of Innovation Capability

Innovation capability is not a unidimensional construct but comprises several interrelated dimensions that reflect different forms of innovation within the firm. Product innovation refers to the development of new or significantly improved goods and services. According to Albort-Morant *et al.,* (2020), product innovation enhances customer value and competitive differentiation, while Chen *et al.,* (2021) link it to improved environmental outcomes through eco-friendly product design. Process innovation, on the other hand, involves improvements in production methods and operational processes, often leading to increased efficiency and reduced waste (Damanpour *et al.,* 2018; Khan *et al.,* 2021, & Clementina et al, 2021).

Organizational innovation focuses on changes in management practices, organizational structures, and workplace culture that support innovation and adaptability (Kafetzopoulos & Skalkos, 2019; García-Sánchez *et al.,* 2020). Marketing innovation, as highlighted by O'Cass and Sok (2019), involves new marketing strategies, branding approaches, and customer engagement techniques that enhance market performance. While all four dimensions contribute to overall innovation capability, they differ in their mechanisms and outcomes. Product and process innovations are often technology-driven, whereas organizational and marketing innovations are more behavioral and strategic in nature.

The importance of these dimensions lies in their complementary roles in driving firm performance and sustainability. For manufacturing firms in Kogi State, product and process innovations are essential for improving production efficiency and meeting environmental standards, while organizational and marketing innovations help firms adapt to changing market conditions and stakeholder expectations. In this study, these dimensions are operationalized as measurable indicators of innovation capability, each linked to specific sustainability outcomes. This multidimensional approach ensures a comprehensive analysis of how innovation capability influences business sustainability, thereby bridging the transition to the concept of sustainability.

Concept of Business Sustainability

Business sustainability has evolved into a central concept in management research, reflecting the need for firms to balance economic performance with environmental and social responsibilities. Bocken *et al.,* (2019) and Acho et al (2021) defined business sustainability as the ability of firms to create long-term value while minimizing negative environmental and social impacts. Similarly, Dyllick and Muff (2020) conceptualize it as a business approach that integrates sustainability into core strategies and operations. Khan *et al.,* (2021) further emphasize stakeholder engagement, defining business sustainability as the firm's commitment to meeting the needs of present stakeholders without compromising future generations.

Although these definitions share a common focus on long-term value creation and responsibility, they differ in scope and emphasis. Some definitions prioritize environmental

concerns (Bocken *et al.,* 2019), while others adopt a broader stakeholder-oriented perspective (Khan *et al.,* 2021). Nevertheless, there is a consensus that business sustainability encompasses economic, environmental, and social dimensions, often referred to as the triple bottom line. This concept is particularly relevant in the manufacturing sector, where firms must manage resource consumption, environmental impact, and social responsibilities while maintaining profitability (Horbach & Rammer, 2020; Zailani *et al.,* 2019).

In the context of Kogi State, business sustainability is critical for ensuring that manufacturing firms remain viable amid economic challenges and regulatory pressures. Operationally, this study defines business sustainability as the firm's ability to achieve balanced performance across economic, environmental, and social dimensions. This aligns with the study's objectives, which examine how innovation capability influences each of these dimensions. The next section further elaborates on these dimensions.

Dimensions of Sustainability

The multidimensional nature of business sustainability is commonly captured through three core dimensions: economic, environmental, and social sustainability. Economic sustainability refers to a firm's ability to maintain profitability, efficiency, and competitive advantage over time (Costa *et al.,* 2019; Bocken *et al.,* 2019). Environmental sustainability involves minimizing ecological impacts through resource efficiency, waste reduction, and adoption of cleaner technologies (Horbach & Rammer, 2020; Zailani *et al.,* 2019). Social sustainability, on the other hand, focuses on the firm's responsibility toward employees, communities, and other stakeholders, including issues such as labor practices, community development, and ethical conduct (Khan *et al.,* 2021; Adegbite *et al.,* 2019).

While these dimensions are conceptually distinct, they are highly interrelated. For example, environmental sustainability initiatives can lead to cost savings and improved economic performance, while social sustainability practices can enhance employee productivity and stakeholder trust. Empirical studies suggest that firms that integrate all three dimensions are more likely to achieve long-term success (García-Sánchez *et al.,* 2020; Singh *et al.,* 2022). However, achieving this balance remains challenging, particularly for firms operating in resource-constrained environments.

In this study, economic sustainability is measured through indicators such as profitability and cost efficiency, environmental sustainability through resource utilization and waste management practices, and social sustainability through employee welfare and community engagement. These dimensions directly correspond to the study's research questions and hypotheses, which examine the effects of different innovation capability dimensions on each sustainability outcome. This integrated framework provides a robust basis for analyzing the innovation–sustainability relationship and sets the stage for the empirical investigation that follows.

Theoretical Framework

The Resource-Based View (RBV) theory explains that firms achieve sustained competitive advantage through the effective utilization of valuable, rare, inimitable, and non-substitutable resources (Barney *et al.,* 2021; Hitt *et al.,* 2020). In this study, innovation capability is conceptualized as a critical intangible resource that enables manufacturing firms to enhance efficiency, develop new products, and improve organizational processes. RBV is particularly relevant in the context of manufacturing firms in Kogi State, where external constraints make

internal capabilities essential for achieving business sustainability. However, the theory's limitation lies in its static perspective, as it does not fully explain how firms adapt their resources in dynamic environments.

To address this limitation, Dynamic Capability Theory extends RBV by emphasizing a firm's ability to integrate, build, and reconfigure resources in response to environmental changes (Teece, 2019; Wilden & Teece, 2020; Mikalef *et al.,* 2020). This theory highlights innovation capability as a dynamic process that enables firms to sense opportunities, seize them, and transform operations to achieve sustainable outcomes. It is particularly useful in explaining how manufacturing firms can align innovation activities with economic, environmental, and social sustainability goals. In the context of this study, dynamic capabilities provide a framework for understanding how continuous innovation drives long-term sustainability performance.

Additionally, Innovation Diffusion Theory complements these perspectives by explaining how innovations are adopted and implemented within organizations (Rogers, 2003; Greenhalgh *et al.,* 2019; Oliveira & Martins, 2021). While RBV focuses on resource possession and Dynamic Capability Theory on resource transformation, Innovation Diffusion Theory emphasizes the processes through which innovations spread and generate impact. Together, these theories provide a comprehensive framework for analyzing how innovation capability influences business sustainability among manufacturing firms in Kogi State, thereby supporting the study's objectives, research questions, and hypotheses.

Empirical Review

A recent study by Asiedu *et al.,* (2025) examined the relationship between green dynamic capability, green innovation, and sustainability performance among manufacturing firms. The purpose of the study was to determine how green dynamic capabilities influence sustainability outcomes through innovation mechanisms. The researchers adopted a quantitative survey design and analyzed data using structural equation modeling. The findings revealed that green dynamic capability significantly enhances sustainability performance, with green innovation acting as a mediating variable. The study concluded that firms that develop adaptive and environmentally oriented innovation capabilities are better positioned to achieve sustainability goals. It recommended that manufacturing firms should invest in green capabilities and innovation systems. The implication is that innovation capability is a critical driver of sustainability, especially when aligned with environmental strategies.

Similarly, Li *et al.,* (2025) investigated the influence of technological capabilities and environmental strategies on sustainability performance in manufacturing firms in China. The study employed a quantitative research design using partial least squares structural equation modeling (PLS-SEM) on data collected from 272 managers. The findings showed that technological capabilities significantly improve sustainability performance, both directly and indirectly through green innovation. The study concluded that innovation capability serves as a key mechanism linking technological resources to sustainability outcomes. It recommended increased investment in technological innovation and environmental strategy integration. The implication is that firms must align innovation capability with sustainability-oriented strategies to achieve optimal performance.

Furthermore, Hmaidan *et al.,* (2025) examined the role of artificial intelligence (AI) capability and sustainability orientation in achieving sustainable performance in Malaysian manufacturing firms. The study used a survey research design and structural equation modeling to analyze the

data. The findings indicated that AI capability significantly influences sustainable performance, with green innovation serving as a mediating factor. The study concluded that advanced technological capabilities enhance innovation processes and sustainability outcomes. It recommended that firms invest in AI-driven innovation systems to remain competitive and sustainable. The implication is that emerging technologies play a crucial role in strengthening innovation capability and its impact on sustainability.

Li *et al.,* (2024) investigated how digitalization and network capability influence business model innovation and sustainability performance in manufacturing firms. The study used a quantitative research design with survey data and regression analysis. The findings showed that digitalization and network capability significantly drive innovation, which positively impacts sustainability performance, particularly under conditions of environmental dynamism. The study concluded that innovation capability acts as a mediating mechanism between digital transformation and sustainability outcomes. It recommended that firms should leverage digital networks and collaborative capabilities to enhance innovation. The implication is that external linkages and technological integration are essential for strengthening the innovation–sustainability nexus.

Moving to earlier studies, Fan *et al.,* (2023) examined the role of digital transformation in enhancing sustainable innovation capability in manufacturing firms. The study employed a mixed-method approach using fuzzy-set qualitative comparative analysis (fsQCA) and necessary condition analysis (NCA). The findings revealed that digital transformation significantly improves innovation capability, which subsequently enhances sustainability performance. The study concluded that innovation capability acts as a mediating mechanism between digitalization and sustainability outcomes. It recommended that firms prioritize digital transformation initiatives. The implication is that digital capability development is essential for strengthening innovation and sustainability in manufacturing contexts.

Similarly, Fan *et al.,* (2023) examined how digital transformation drives sustainable innovation capability in manufacturing enterprises in China. The study employed a mixed-method approach using fuzzy-set qualitative comparative analysis (fsQCA) and necessary condition analysis (NCA) on data from 20 manufacturing firms. The findings revealed that digital transformation significantly enhances innovation capability, which in turn improves sustainable performance. The authors concluded that innovation capability is a critical mechanism through which digitalization translates into sustainability outcomes. They recommended increased investment in digital technologies and capability development. The study implies that technological advancement is a key enabler of innovation capability and sustainability in modern manufacturing environments.

Finally, Sarfraz *et al.,* (2022) investigated the relationship between innovation capability, green product innovation, and sustainable performance in manufacturing firms. Using a quantitative survey design and structural equation modeling, the study found that innovation capability has a significant positive effect on sustainable performance, with green innovation acting as a mediator. The study concluded that firms that invest in innovation capabilities achieve better sustainability outcomes. It recommended that organizations foster innovation-oriented cultures and invest in green technologies. The implication is that innovation capability remains a central determinant of business sustainability, particularly in environmentally sensitive industries.

Conceptual Model

The conceptual model for this study illustrates the hypothesized relationships between innovation capability and business sustainability among manufacturing firms in Kogi State. Innovation capability is conceptualized as the independent variable and is operationalized through four key dimensions: product innovation, process innovation, organizational innovation, and marketing innovation. These dimensions represent the firm's ability to develop new products, improve operational processes, restructure organizational systems, and adopt innovative marketing strategies. Collectively, they reflect the firm's overall capacity to innovate and adapt to changing environmental and market conditions.

Business sustainability is treated as the dependent variable and is measured using three core dimensions: economic sustainability, environmental sustainability, and social sustainability. Economic sustainability focuses on profitability, cost efficiency, and long-term financial performance; environmental sustainability captures resource efficiency, waste reduction, and eco-friendly practices; while social sustainability emphasizes employee welfare, stakeholder engagement, and corporate social responsibility. These dimensions collectively provide a comprehensive assessment of a firm's sustainable performance in line with the triple bottom line framework.

The model proposes that innovation capability positively influences business sustainability. Specifically, product and process innovation are expected to enhance economic and environmental sustainability through improved efficiency and eco-friendly production. Organizational innovation is anticipated to strengthen social sustainability by fostering inclusive practices and adaptive organizational cultures, while marketing innovation is expected to improve economic sustainability through enhanced market positioning and customer engagement. Overall, the model assumes a direct and significant relationship between innovation capability and business sustainability, where higher levels of innovation capability led to improved sustainability outcomes. This conceptualization aligns with the study's objectives, research questions, and hypotheses, and provides a foundation for empirical testing.

Research Methodology

This study adopted a descriptive survey research design, which was considered appropriate for examining the relationship between innovation capability and business sustainability among manufacturing firms. The design enabled the collection of quantitative data from respondents in their natural work settings without manipulation of variables. The study was conducted in Kogi State, Nigeria, an emerging industrial hub characterized by the presence of manufacturing firms such as West Africa Ceramic Company Ltd and BN Ceramic Company Ltd. The choice of Kogi State was justified by its growing manufacturing base, availability of raw materials, and strategic location, making it suitable for investigating innovation-driven sustainability practices. The population of the study comprised employees and management staff of the selected firms, with a total population of 475 respondents.

The sample size was determined using the Taro Yamane (1967) formula given as:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n = sample size,

N = population size (475),

e = level of significance (0.05).

$$n = \frac{475}{1+475(0.05)^2} = \frac{475}{1+475(0.0025)} = \frac{475}{1+1.1875} = \frac{475}{2.1875} \approx 217$$

Thus, the sample size for the study was 217 respondents. A proportionate allocation technique was used to distribute the sample across the two firms as follows:

Table 1: Population/Sample Size Distribution

Organization	Population	Sample Size	Percentage (%)
West Africa Ceramic Company Ltd	250	114	52.5%
BN Ceramic Company Ltd	225	103	47.5%
Total	**475**	**217**	**100%**

Source: Field Survey, 2026

A combination of stratified and simple random sampling techniques was employed. Stratification ensured representation of management and non-management staff, while simple random sampling was used to select respondents within each group. Data were collected from both primary and secondary sources. Primary data were obtained using a structured questionnaire designed on a Likert scale, while secondary data were sourced from scholarly journals, textbooks, and organizational reports. The instrument was validated through content validity by experts, and its reliability was tested using the Cronbach Alpha method, with values exceeding 0.70, indicating acceptable internal consistency.

The data collected were analyzed using both descriptive and inferential statistics. Descriptive tools such as mean, frequency, and standard deviation were used to summarize responses, while regression analysis was employed to test the hypotheses and examine the effect of innovation capability on business sustainability. These methods provided a robust basis for determining the nature, strength, and significance of relationships among the study variables, thereby

supporting the study's objectives and research questions.

Result and Findings

Presentation of Data Analysis

This section presents the analysis of data collected from respondents on innovation capability and business sustainability among manufacturing firms in Kogi State. Out of 217 copies of the questionnaire distributed, 201 were correctly completed and returned, representing a response rate of 92.6%, which was considered adequate for analysis.

Demographic Characteristics of Respondents

Table 2: Demographic Profile of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	118	58.7
	Female	83	41.3
Age	20–29	54	26.9
	30–39	89	44.3
	40–49	41	20.4
	50 and above	17	8.5
Educational Level	OND/NCE	46	22.9
	B.Sc/HND	112	55.7
	Postgraduate	43	21.4

Source: Field Survey, 2026

In table 2, the demographic distribution indicates that most respondents were experienced and educated enough to provide reliable information.

Descriptive Statistics of Study Variables

Table 3: Descriptive Statistics of Innovation Capability and Sustainability Variables

Variable	Mean	Std. Deviation
Product Innovation Capability	3.78	0.82
Process Innovation Capability	3.91	0.76
Organizational Innovation Capability	3.69	0.88
Marketing Innovation Capability	3.74	0.80
Economic Sustainability	3.85	0.79
Environmental Sustainability	3.72	0.83
Social Sustainability	3.68	0.86

Source: Field Survey, 2026

The results in table 3 shows that all variables were rated above the midpoint (3.0), indicating a generally positive perception of innovation capability and sustainability performance among respondents.

Correlation Analysis

Table 4: Correlation Matrix

Variables	IC	ES	ENS	SS
Innovation Capability (IC)	1			
Economic Sustainability (ES)	.62	1		
Environmental Sustainability (ENS)	.58	.71	1	
Social Sustainability (SS)	.55	.66	.69	1

The correlation results in table 4 reveals positive relationships between innovation capability and all dimensions of sustainability, suggesting that higher innovation capability is associated with improved sustainability outcomes.

Regression Analysis

Table 5: Model Summary

Model	R	R^2	Adjusted R^2	Std. Error
1	0.741	0.549	0.542	0.421

The result in table 5 indicates that innovation capability explained 54.9% of the variation in business sustainability.

Table 6: ANOVA Result

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	52.418	4	13.105	74.32	.000
Residual	43.112	196	0.220		
Total	95.530	200			

The ANOVA result in table 6 shows that the model was statistically significant ($F = 74.32$, $p < 0.05$).

Table 7: Regression Coefficients

Variables	B	Std. Error	t-value	Sig.
(Constant)	1.214	0.213	5.70	.000
Product Innovation	0.248	0.062	3.99	.000
Process Innovation	0.291	0.058	5.02	.000
Organizational Innovation	0.227	0.055	4.13	.000
Marketing Innovation	0.214	0.060	3.56	.001

The coefficients indicated that all dimensions of innovation capability significantly influenced business sustainability.

Test of Hypotheses

Table 8: Summary of Hypothesis Testing

Hypothesis	Statement	Result	Decision
H_{01}	Product innovation has no significant effect on economic sustainability	$\beta = 0.248$, $p = 0.000$	Rejected
H_{02}	Process innovation has no significant effect on environmental sustainability	$\beta = 0.291$, $p = 0.000$	Rejected
H_{03}	Organizational innovation has no significant effect on social sustainability	$\beta = 0.227$, $p = 0.000$	Rejected

All null hypotheses were rejected, indicating significant relationships.

The findings revealed that innovation capability significantly enhances business sustainability among manufacturing firms in Kogi State. Product innovation improved economic sustainability by enhancing competitiveness and profitability. Process innovation had the strongest effect, indicating its importance in reducing waste and improving efficiency. Organizational innovation significantly influenced social sustainability by improving employee relations and organizational adaptability. Marketing innovation also contributed positively by strengthening market positioning and customer engagement.

The regression results confirmed that innovation capability collectively explains a substantial proportion of variation in sustainability performance (54.9%). This suggests that firms that invest in innovation are more likely to achieve balanced economic, environmental, and social outcomes.

The study established that innovation capability is a strong predictor of business sustainability. All dimensions of innovation capability had significant positive effects on sustainability outcomes. The model was statistically significant, confirming that innovation capability is essential for enhancing sustainable performance in manufacturing firms.

Discussion of Findings

The findings of this study revealed that innovation capability has a significant and positive effect on business sustainability among manufacturing firms in Kogi State. Specifically, product, process, organizational, and marketing innovation all demonstrated statistically significant relationships with the three dimensions of sustainability: economic, environmental, and social sustainability. These results are consistent with a broad range of empirical studies that have established innovation capability as a key determinant of sustainable business performance. For instance, Sarfraz *et al.,* (2022) found that innovation capability enhances sustainability performance through improved product and process development, while Chen *et al.,* (2021) and Singh *et al.,* (2022) similarly reported that innovative firms achieve superior economic and environmental outcomes due to enhanced efficiency and resource optimization.

The strongest relationship identified in this study was between process innovation and environmental sustainability. This finding aligns with Horbach and Rammer (2020), who

argued that process innovation is central to reducing environmental degradation through cleaner production technologies, waste minimization, and efficient resource utilization. It also supports the view that operational improvements are often the most direct pathway through which manufacturing firms achieve environmental compliance and sustainability. Product innovation was found to significantly influence economic sustainability, reinforcing the argument that firms that continuously develop new or improved products are more competitive, profitable, and resilient in dynamic markets.

Organizational innovation exhibited a significant effect on social sustainability, which is consistent with Kafetzopoulos and Psomas (2020), who emphasized that organizational restructuring, employee empowerment, and cultural innovation enhance internal cohesion and stakeholder relationships. This suggests that sustainability is not only driven by technological improvements but also by internal organizational practices that promote ethical behavior, employee satisfaction, and corporate responsibility. Marketing innovation also showed a positive influence on sustainability outcomes, albeit relatively weaker than other dimensions. This supports Albort-Morant *et al.,* (2020), who noted that marketing innovation enhances customer engagement and market responsiveness, thereby contributing indirectly to long-term sustainability performance.

Overall, the results indicated that innovation capability is a multidimensional construct that influences sustainability in an integrated manner. Unlike studies such as Zailani *et al.,* (2019), which reported mixed or weak relationships in resource-constrained environments, this study found consistently significant effects across all innovation dimensions. This suggests that even in developing regions such as Kogi State, innovation capability can strongly influence sustainability outcomes when effectively developed and applied within firms.

From a theoretical perspective, the findings strongly support the Resource-Based View (RBV), which argues that valuable and inimitable internal resources such as innovation capability are critical for sustained competitive advantage (Barney *et al.,* 2021). The results confirm that firms leveraging innovation capabilities are better positioned to achieve long-term economic, environmental, and social performance. Additionally, the findings reinforce Dynamic Capability Theory (Teece, 2019), which emphasizes the importance of a firm's ability to integrate, reconfigure, and adapt its resources in response to environmental changes. The significant effects of process and organizational innovation particularly highlight the importance of adaptability and continuous improvement in achieving sustainability.

Furthermore, although not directly tested, the findings indirectly align with Innovation Diffusion Theory (Rogers, 2003), which explains how innovations are adopted and institutionalized within organizations. The positive outcomes associated with innovation capability suggest that successful internal diffusion and adoption of innovative practices are essential for achieving sustainability. In conclusion, the study extends theoretical understanding by demonstrating that innovation capability serves as a critical mechanism linking internal firm resources to triple-bottom-line sustainability outcomes in manufacturing firms within emerging economies.

Conclusion

The study examined the effect of innovation capability on business sustainability among selected manufacturing firms in Kogi State, Nigeria. The major findings revealed that innovation capability—measured through product innovation, process innovation, organizational innovation, and marketing innovation—has a significant positive effect on

business sustainability dimensions, including economic, environmental, and social sustainability. Specifically, process innovation emerged as the strongest predictor of sustainability performance, followed by product, organizational, and marketing innovations. The empirical evidence confirmed that firms with stronger innovation capabilities are better positioned to improve efficiency, reduce environmental impact, enhance profitability, and promote social responsibility.

Overall, the study concluded that innovation capability is a critical strategic driver of business sustainability in manufacturing firms. It established that sustainability is not achieved in isolation but is largely dependent on the extent to which firms develop and deploy their innovative capabilities. The findings further demonstrated that innovation capability serves as a unifying mechanism through which firms achieve balanced performance across economic, environmental, and social dimensions. Consequently, manufacturing firms that fail to invest in innovation are likely to experience reduced competitiveness and weakened sustainability performance, especially in dynamic and resource-constrained environments such as Kogi State.

Recommendations

Practical Recommendations for Manufacturing Firms

Manufacturing firms should prioritize continuous investment in innovation capability, particularly in process and product innovation, as these were found to have the strongest influence on sustainability outcomes. Firms should adopt modern production technologies, improve operational efficiency, and develop eco-friendly products to enhance both profitability and environmental performance. Additionally, management should strengthen organizational innovation by promoting flexible structures, employee involvement, and knowledge-sharing cultures that support sustainable practices. Marketing innovation should also be enhanced to improve customer engagement, brand positioning, and market responsiveness.

Policy Recommendations for Government/Industry Stakeholders

Government and industry regulators should create enabling environments that support innovation in the manufacturing sector through improved infrastructure, tax incentives, and research and development (R&D) support. Policies should encourage green innovation practices and provide subsidies for firms adopting sustainable technologies. Furthermore, collaboration between government agencies, academic institutions, and industry players should be strengthened to facilitate knowledge transfer and innovation diffusion across manufacturing clusters.

Management Implications

The findings imply that managers must view innovation capability as a strategic investment rather than a cost. Strategic planning should integrate innovation goals with sustainability objectives to ensure long-term competitiveness. Managers should also adopt dynamic capability approaches that allow continuous adaptation to environmental and market changes. Effective leadership is required to coordinate innovation activities and ensure alignment with sustainability targets.

Limitations of the Study

This study was geographically limited to manufacturing firms in Kogi State, Nigeria, which may restrict the generalizability of the findings to other regions or countries with different economic and industrial structures. Methodologically, the study adopted a cross-sectional survey design, which limits the ability to establish causal relationships between variables over time. In addition, the study relied on self-reported questionnaire data, which may be subject to respondent bias, perception errors, and social desirability effects.

Suggestions for Further Studies

Future studies should extend the investigation to other states in Nigeria or compare findings across different sectors such as the service or agricultural industries to enhance generalizability. Researchers should also consider incorporating mediating and moderating variables such as technological adoption, leadership style, organizational culture, or government policy support to provide deeper insights into the innovation–sustainability relationship. Longitudinal studies are also recommended to better capture the dynamic nature of innovation capability and its long-term effects on business sustainability.

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