
Innovation Intensity and Sustainability Growth of MSMEs in Port Harcourt: Moderating Role of Accounting Practices

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Abstract

This study investigates the relationship between innovation intensity and the sustainability growth of micro, small, and medium enterprises (MSMEs) in Port Harcourt, Nigeria, while examining the moderating role of accounting practices. The study adopts a mixed-methods approach, employing descriptive and inferential statistical tools to analyze data collected from 400 MSMEs. Innovation intensity was evaluated across three dimensions: input, process, and output innovation. Sustainability growth was measured regarding revenue growth, profitability, environmental practices, employee welfare, and market stability. The findings reveal a significant positive relationship between innovation intensity and sustainability growth, with accounting practices playing a moderating role in enhancing this relationship. Specifically, input and output innovations showed the strongest impact on sustainability growth, while process innovation had a weaker influence. The moderating effect of accounting practices was found to strengthen the link between innovation dimensions and sustainability growth, highlighting the critical role of robust financial management in fostering sustainable business performance. The study underscores the importance of strategic innovation and sound accounting practices in enhancing MSME sustainability and offers actionable recommendations for MSME owners, policymakers, and stakeholders. This research contributes to the growing literature on innovation management and financial practices, providing a practical framework for driving sustainable growth in the MSME sector.

Keywords: Innovation Intensity, Sustainability Growth, Accounting Practices, MSMEs, Port Harcourt, Nigeria

1.1 Introduction

In the contemporary business environment, the dynamics of micro, small, and medium-sized enterprises (MSMEs) have evolved significantly (Tajpour et al. 2025), particularly in urban areas such as Port Harcourt, Nigeria. The increasing emphasis on innovation intensity and sustainability growth largely drives this evolution (Kalathingal & Ambrammal, 2025; Rosário, Varum & Botelho, 2024). Innovation intensity refers to the degree to which firms engage in innovative activities, from product development to process improvement and organizational changes. On the other hand, sustainability growth emphasizes these enterprises' capacity to achieve long-term economic performance while considering environmental and social factors (Luo et al., 2024).

Port Harcourt, the capital city of Rivers State, is a hub of industrial and commercial activities in Nigeria. The city hosts a diverse range of MSMEs that contribute substantially to local and national economies. Despite their pivotal role, many of these enterprises struggle with sustainability due to limited resources, lack of strategic innovation, and inadequate accounting practices (Edori & Igweagbara, 2023; Adu, Lampitey-Puddicombe, & Opawole, 2020). Standard and quality accounting practices can provide critical financial insights that help MSMEs manage their resources efficiently, plan for the future, and attract investment (Asongu & Odhiambo, 2019; Gamba, 2023; Abanis, et al., 2013). Therefore, it is imperative to understand the interplay between innovation intensity, sustainability growth, and the moderating role of accounting practices is essential for the development of robust MSMEs in Port Harcourt.

Despite the recognized importance of MSMEs in economic development, many enterprises in Port Harcourt face sustainability challenges. These challenges are often attributed to a lack of innovation and ineffective accounting practices. While innovation can drive competitive advantage and growth, many MSMEs lack the necessary support systems and financial management skills to implement innovative strategies effectively (Olawale & Garwe, 2010). Inadequate accounting practices further exacerbate this issue by impeding accurate financial reporting and decision-making (Armstrong, Guay & Weber, 2010). Consequently, these gaps hinder the ability of MSMEs to achieve sustainable growth and long-term success.

While there is substantial literature on the general challenges faced by MSMEs (Sharma & Sharma, 2024; Amado Mateus et al., 2024; Okwurume, 2024; Sompolgrunk et al., 2023; Harrison. 2022; Banki & Ismail, 2015), there is a paucity of research focusing specifically on the role of innovation intensity and sustainability growth within the context of Port Harcourt. Furthermore, the moderating effect of accounting practices on the relationship between innovation intensity and sustainability growth has not been adequately explored. This study aims to fill this gap by providing empirical evidence on how effective accounting practices can enhance the impact of innovation on the sustainability of MSMEs in Port Harcourt.

The findings from this study will have several important implications. For policymakers, the insights will help in designing targeted interventions to support MSMEs, particularly in fostering innovation and improving accounting practices (OECD, 2018). For business owners and managers, the study will provide practical strategies for integrating innovation into their operations while maintaining sound financial practices. Additionally, for academics and researchers, this study will contribute to the existing body of knowledge on MSME development, offering a foundation for future research in similar contexts.

2. Literature Review

2.1 Theoretical Framework

The theoretical foundation of this study is built on the Resource-Based View (RBV) and Dynamic Capabilities Theory.

2.1.1 Resource-Based View (RBV)

The RBV posits that firms achieve sustainable competitive advantage through the acquisition and management of valuable, rare, inimitable, and non-substitutable resources (Barney, 1991). Innovation intensity can be seen as a crucial resource that enables firms to develop unique products and processes, thereby enhancing their competitive position (Kalathingal & Ambrammal, 2025).

2.1.2 Dynamic Capabilities Theory

Dynamic Capabilities Theory extends RBV by emphasizing the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece et al., 1997; Muneeb et al., 2023). This theory is particularly relevant for MSMEs in Port Harcourt, where the business environment is often volatile and uncertain. By continuously innovating and adapting, these enterprises can sustain growth and resilience (Upadhayay et al., 2024).

2.2 Development of Hypotheses

Based on the theoretical framework, several hypotheses are proposed to examine the relationships among innovation intensity, sustainability growth, and accounting practices in MSMEs.

2.2.1 Input Innovation Intensity (III) and Sustainability Growth (SG)

Input innovation refers to the investments in resources such as R&D, technology, and human capital aimed at fostering innovation. Studies have shown that such investments significantly contribute to the growth and competitiveness of MSMEs (Acs et al., 2017).

Hypothesis 1 (H1): There is a positive relationship between input innovation intensity and sustainability growth of MSMEs in Port Harcourt.

2.2.2 Process Innovation Intensity and Sustainability Growth

Process innovation involves improvements in production methods and operational processes. Efficient processes can reduce costs, improve quality, and enhance customer satisfaction, thereby contributing to sustainable growth (OECD, 2018).

Hypothesis 2 (H2): There is a positive relationship between process innovation intensity and sustainability growth of MSMEs in Port Harcourt.

2.2.3 Output Innovation Intensity and Sustainability Growth

Output innovation pertains to new or significantly improved products and services. Offering innovative products can differentiate a firm from its competitors and attract new customers, leading to growth and sustainability (Schumpeter, 1934).

Hypothesis 3 (H3): There is a positive relationship between output innovation intensity and sustainability growth of MSMEs in Port Harcourt.

2.2.4 Accounting Practices as Moderator

Effective accounting practices provide critical financial insights and support strategic decision-making. They ensure accurate financial reporting, which can enhance the impact of innovation activities on firm performance. Prior research indicates that robust accounting practices can improve financial management and resource allocation, thereby supporting sustainable growth (Gamba, 2017).

Hypothesis 4 (H4): Accounting practices moderate the relationship between innovation intensity and sustainability growth of MSMEs in Port Harcourt.

The conceptual framework for this study is illustrated in the Figure 1:

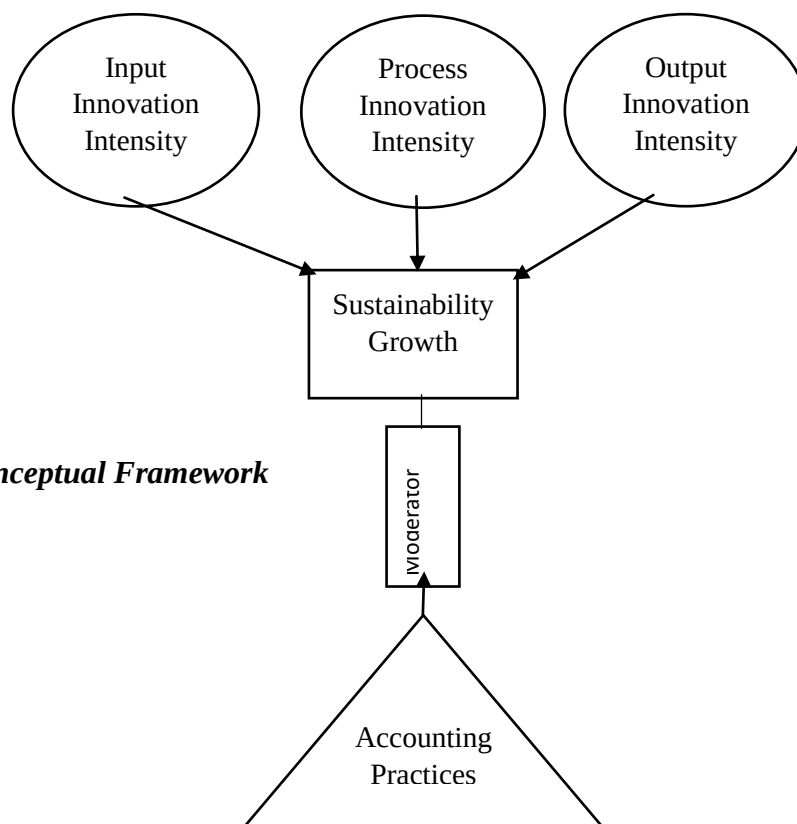


Figure 1: Conceptual Framework

2.3 Empirical Review

2.3.1 Input Innovation Intensity and Sustainability Growth

Recent empirical studies have highlighted the positive impact of input innovation on MSME sustainability. For instance, Acs et al. (2017) found that firms investing heavily in R&D and human capital exhibited higher growth rates and better adaptability to market changes. Similarly, investments in technology have been shown to facilitate innovation and improve competitive positioning (Lehenchuk et al., 2023).

2.3.2 Process Innovation Intensity and Sustainability Growth

Empirical evidence supports the assertion that process innovation leads to sustainable growth. The OECD (2018) reported that MSMEs that implement efficient production processes tend to achieve higher productivity and cost savings, which are crucial for long-term sustainability. Process innovations also contribute to better quality control and customer satisfaction (Olawale & Garwe, 2010).

2.3.3 Output Innovation Intensity and Sustainability Growth

Previous studies have consistently shown that output innovation is a key driver of business success. For example, Drucker (1985) noted that firms introducing new or improved products and services often experience increased market share and profitability. This is corroborated by Idonije et al. (2022), who found that MSMEs in South-South Nigeria with high output innovation intensity demonstrated superior performance and sustainability.

2.3.4 Accounting Practices as Moderator

The moderating role of accounting practices on the relationship between innovation intensity and sustainability growth is well-documented. Gamba (2017) highlighted that effective accounting information systems improve decision-making and resource management, thereby amplifying the benefits of innovation. Adegbite et al. (2007) also noted that MSMEs with strong accounting practices were better positioned to leverage their innovative capabilities for growth.

3. Methodology

3.1 Research Design

This study employs a quantitative research design to examine the relationships among innovation intensity, sustainability growth, and accounting practices in MSMEs in Port Harcourt. A cross-sectional survey design will be used to collect data from MSMEs, allowing for the assessment of the hypothesized relationships at a single point in time. The quantitative approach is suitable for testing the proposed hypotheses and for statistical analysis of the data.

3.2 Population and Sample

The population for this study consists of MSMEs operating in Port Harcourt, Nigeria. Given the diversity and large number of MSMEs in the area, a stratified random sampling technique will be used to ensure representation across different sectors (e.g., manufacturing, services, trade). The sample size will be determined using Cochran's formula for sample size determination in survey research, which ensures a representative sample with a desired level of precision and confidence.

For a large population, Cochran's formula is given by:

$$n_o = \frac{Z^2 pq}{e^2}$$

Where:

n_o = sample size

Z = Z-value (e.g., 1.96 for 95% confidence level)

p = estimated proportion of the population (assumed to be 0.5 for maximum variability)

$q = 1 - p$

e = margin of error (e.g., 0.05 for $\pm 5\%$)

Plugging in the values:

$$n_0 = \frac{(1.96)^2 (0.5) (0.5)}{(0.05)^2} = \frac{3.8416 * 0.25}{0.0025} = 384.16$$

To achieve a 95% confidence level with a 5% margin of error, a minimum sample size of approximately 384 MSMEs was determined as necessary. However, to account for potential non-responses and incomplete surveys, the sample size was adjusted upward. Consequently, the final sample size was set at 400 MSMEs, ensuring adequate representation and reliability of the study results.

3.3 Data Collection

The primary data were collected through structured questionnaires administered to MSME owners and managers. The questionnaire was designed to capture information on innovation intensity (input, process, and output), sustainability growth, and accounting practices. The items were measured using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

3.4 Measurement of Variables

3.4.1 Innovation Intensity

Innovation intensity was measured in three dimensions: input innovation, process innovation, and output innovation. Input innovation was assessed through questions related to R&D investments, technology adoption, and human capital development. Process innovation was measured by questions on production methods and operational improvements. Output innovation was evaluated based on the introduction of new or improved products and services.

3.4.2 Sustainability Growth

Sustainability growth was measured using indicators such as financial performance (e.g., revenue growth, profitability), environmental practices (e.g., waste reduction, energy efficiency), and social practices (e.g., employee welfare, community engagement).

3.4.3 Accounting Practices

Accounting practices were assessed through questions on financial record-keeping, adherence to accounting standards, financial reporting, and using accounting information for decision-making.

3.5 Data Analysis

The data collected were analyzed using statistical techniques to test the hypotheses. The analysis includes descriptive statistics used to summarize the respondents' demographic characteristics and the study's key variables. Reliability and Validity Tests were performed using Cronbach's alpha to assess the reliability of the measurement scales. Construct validity was also tested through factor analysis to ensure that the items accurately measure the

intended constructs. Correlation analysis using Pearson correlation coefficients was computed to examine the relationships between the independent variables (input, process, and output innovation intensity) and the dependent variable (sustainability growth). Furthermore, multiple regression analysis was conducted to test the direct effects of input, process, and output innovation intensity on sustainability growth. Hierarchical regression analysis was deployed to examine the moderating effect of accounting practices on the relationship between innovation intensity and sustainability growth. The moderating effect of accounting practices was investigated and tested using interaction terms in the regression models. The significance of the interaction terms indicated whether accounting practices significantly influence the relationship between innovation intensity and sustainability growth or not.

3.6 Regression Model

To analyze the data, the following regression models (equations 1 & 2) are used:

3.6.1 Direct Effects of Innovation Intensity on Sustainability Growth

$$\text{SusG} = \beta_0 + \beta_1 \text{II}_{\text{input}} + \beta_2 \text{II}_{\text{proces}} + \beta_3 \text{II}_{\text{output}} + e \quad (1)$$

Where:

SusG = Sustainability Growth

II_{input} = Input Innovation Intensity

II_{process} = Process Innovation Intensity

II_{output} = Output Innovation Intensity

e = Error term

3.6.2 Moderating Effect of Accounting Practices

$$\text{SusG} = \beta_0 + \beta_1 \text{II}_{\text{input}} + \beta_2 \text{II}_{\text{proces}} + \beta_3 \text{II}_{\text{output}} + \beta_4 \text{APract} + \beta_5 \text{II}_{\text{input}} * \text{APract} + \beta_6 \text{II}_{\text{process}} * \text{APract} + \beta_7 \text{II}_{\text{output}} * \text{APract} + e \quad (2)$$

Where:

APract = Accounting Practices

$\beta_5 \text{II}_{\text{input}} * \text{AP}$; $\beta_6 \text{II}_{\text{process}} * \text{AP}$ and $\beta_7 \text{II}_{\text{output}} * \text{AP}$ = Interaction terms for moderation analysis

4 Results and Discussion

Table 1 presents key reliability and validity metrics for the constructs measured in the study on Innovation Intensity and Sustainability Growth of MSMEs in Port Harcourt, with accounting practices as a moderating variable. The constructs include Input Innovation Intensity (II_{input}), Process Innovation Intensity (II_{process}), Output Innovation Intensity (II_{output}), Accounting Practice (APract), and Sustainability Growth (SusG).

Factor loadings indicate the contribution of each indicator (item) to the corresponding latent variable. Loadings should typically be above 0.70 for individual indicators to be considered valid representations of their constructs. For Input Innovation Intensity, loadings range from 0.73 to 0.80, showing that the indicators for this construct contribute reasonably well. Process Innovation Intensity has even higher loadings (0.77 to 0.90), signifying a strong relationship between the indicators and the construct. Output Innovation Intensity and Accounting Practice also show strong indicator loadings ranging from 0.70 to 0.87 and 0.70 to 0.85,

respectively. Sustainability Growth shows slightly lower factor loadings, ranging from 0.61 to 0.82, with one item (SusG_4) loading below 0.70, which may suggest the need for refinement or review of this item.

Cronbach's Alpha measures internal consistency or reliability. A value above 0.70 is generally considered acceptable. All constructs in the table show Cronbach's Alpha values well above the threshold of 0.70, indicating high internal consistency. These values confirm that the items within each construct reliably measure the same concept. Composite Reliability (CR) is another measure of internal consistency, similar to Cronbach's Alpha, but is considered more accurate for constructs with fewer items. A CR value above 0.70 is also acceptable. The CR values are all above 0.80, indicating strong internal consistency across all constructs. This confirms the high reliability of the constructs used in the study.

The Average Variance Extracted (AVE) assesses the proportion of variance a construct captures to the variance attributed to measurement error. An AVE value greater than 0.50 signifies sufficient convergent validity, indicating that the construct explains more variance than the error. The AVE values for all constructs meet or exceed the 0.50 threshold, confirming that a substantial proportion of the variance is explained by the latent constructs. These AVE values indicate that the constructs are well-defined and have good convergent validity. Table 1 demonstrates that the constructs used in this study have strong reliability and validity. The factor loadings for most items are high, indicating good construct validity, and both Cronbach's Alpha and Composite Reliability values confirm high internal consistency across the variables. The AVE values show that the constructs capture a sufficient amount of variance from the indicators, supporting convergent validity. Overall, the constructs are appropriate and reliable for measuring the relationships between innovation intensity, accounting practices, and sustainability growth in the MSMEs under study.

Table 1: Reliability and Validity of the Constructs (N=400)

Variables			Indicators	Loading/Weights	Cronbach's Alpha	Composite Reliability	AVE
Input Intensity (II _{input})	Innovation		II _{input_1}	0.74	0.86	0.86	0.58
			II _{input_2}	0.73			
			II _{input_3}	0.8			
			II _{input_4}	0.79			
			II _{input_5}	0.73			
Process Intensity (II _{process})	Innovation		II _{process_1}	0.9	0.88	0.88	0.61
			II _{process_2}	0.84			
			II _{process_3}	0.79			
			II _{process_4}	0.86			
			II _{process_5}	0.77			
Output Intensity (II _{output})	Innovation		II _{output_1}	0.87	0.90	0.90	0.63
			II _{output_2}	0.74			
			II _{output_3}	0.8			
			II _{output_4}	0.81			
			II _{output_5}	0.75			
			APract_1	0.77	0.90	0.90	0.64
			APract_2	0.85			

Accounting Practice (APract)	APract_3	0.83			
	APract_4	0.82			
	APract_5	0.7			
Sustainability Growth (SusG)	SusG_1	0.79	0.83	0.84	0.53
	SusG_2	0.82			
	SusG_3	0.69			
	SusG_4	0.61			
	SusG_5	0.79			

4.1 Descriptive Statistics

This section presents the means, standard deviations, and levels of agreement to describe the characteristics of MSMEs in terms of innovation intensity, which is measured across three dimensions: input innovation, process innovation, and output innovation. Additionally, the study examines the sustainability growth of MSMEs, which serves as the dependent variable, along with the moderating variable. Descriptive statistical analyses were conducted using SPSS 29 software. The levels of agreement for input innovation, process innovation, output innovation, and sustainability growth were assessed on a five-point scale, as illustrated in Figure 2.

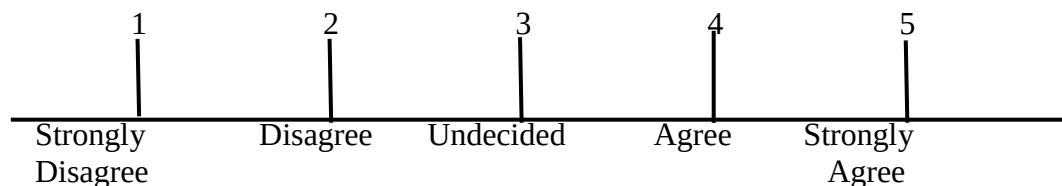


Figure 2: Scale for Level of Agreement

The agreement levels for each scale were evaluated using specific interpretation guidelines adapted from the original scale points, with endpoints adjusted to reflect the possible range (Lee, 2008). The classification is as follows: 1.00 to 1.79 (Strongly Disagree), 1.80 to 2.59 (Disagree), 2.60 to 3.39 (Undecided), 3.40 to 4.19 (Agree), and 4.20 to 5.00 (Strongly Agree). Similarly, the perceived level of sustainability growth (SusG) was assessed using an interpretation scale derived from the original points, with adjusted endpoints. The classification includes 1.00 to 1.79 (Poor), 1.80 to 2.59 (Fair), 2.60 to 3.39 (Average), 3.40 to 4.19 (Good), and 4.20 to 5.00 (Excellent). The study consists of five constructs, each comprising five items, with a detailed analysis of each construct provided below

4.1.1 Input Innovation Intensity

The results in Table 2 indicate a generally high level of agreement among respondents regarding their firm's input innovation intensity, as reflected in the mean scores ranging from 3.72 to 4.14 on a 5-point Likert scale. The highest agreement was observed for the allocation of significant portions of the budget to research and development activities (mean = 4.14, SD = 0.821), emphasizing the commitment of firms to fostering innovation through substantial R&D investment. Similarly, regular adoption of new technologies (mean = 3.93, SD = 0.871) and significant investment in employee training and development (mean = 3.78, SD = 0.898) highlight the importance placed on equipping the workforce to enhance innovative capacity. Encouragement of experimentation with new ideas and technologies (mean = 3.72, SD = 0.988) further underscores the culture of innovation in these firms, albeit with slightly higher variability in responses. These findings align with prior research emphasizing that investments in R&D, technology adoption, and employee development are critical drivers of innovation intensity in small and medium-sized enterprises (SMEs) (Saunila, 2020; Fadol&

Sandhu, 2022). Overall, the data reflect a proactive approach to input innovation intensity as a strategic pathway to sustainability and competitive advantage.

Table 2: Responses on Input Innovation Intensity

Code	Statement	Mean	Standard Deviation	Level of Agreement
II _{input_1}	Our firm invests significantly in research and development (R&D).	3.87	0.776	Agree
II _{input_2}	Our firm adopts new technologies regularly.	3.93	0.871	Agree
II _{input_3}	We allocate substantial resources to train and develop our employees.	3.78	0.898	Agree
II _{input_4}	We allocate a significant portion of our budget to research and development activities.	4.14	0.821	Agree
II _{input_5}	We encourage experimentation with new ideas and technologies within our organization	3.72	0.988	Agree

4.1.2 Process Innovation Intensity

Table 3 highlights a high level of agreement regarding process innovation intensity among respondents, with mean scores ranging from 3.75 to 3.93. The highest agreement is associated with regularly redesigning processes to enhance productivity and reduce costs (mean = 3.93, SD = 0.814), reflecting the strategic importance of process optimization for maintaining competitiveness. Similarly, continuous improvement in production methods (mean = 3.89, SD = 0.782) and regular implementation of new production techniques to improve quality (mean = 3.89, SD = 0.858) demonstrate the proactive measures firms take to ensure product and service excellence. Streamlined operational processes (mean = 3.87, SD = 0.814) and innovative quality control methods (mean = 3.75, SD = 0.878) further emphasize efficiency and quality assurance as integral components of process innovation. These findings align with existing literature, which identifies process innovation as a key driver of operational efficiency, cost reduction, and product quality improvement in firms, particularly SMEs (Miller et al., 2022; Zeng et al., 2021). By continuously enhancing their processes, firms in this study demonstrate a commitment to sustaining competitive advantage through innovation.

Table 3: Responses on Process Innovation Intensity

Code	Statement	Mean	Standard Deviation	Level of Agreement
II _{process_1}	Our firm continuously improves production methods.	3.89	0.782	Agree
II _{process_2}	We have streamlined our operational processes for efficiency.	3.87	0.814	Agree
II _{process_3}	We regularly implement new production techniques to improve quality.	3.89	0.858	Agree
II _{process_4}	We regularly redesign our processes to enhance productivity and reduce costs.	3.93	0.814	Agree
II _{process_5}	We implement innovative methods for quality control and assurance	3.75	0.878	Agree

4.1.3 Output Innovation Intensity

Table 4 indicates a high level of agreement among respondents regarding their firms' output innovation intensity, with mean scores ranging from 3.76 to 4.14. The highest agreement was observed for the statement that new products or services are often first in the market (mean = 4.14, SD = 0.768), highlighting a strong emphasis on market leadership through innovation. Regular improvement of existing products or services (mean = 3.93, SD = 0.862) also demonstrates a commitment to maintaining product relevance and quality. Frequent introduction of new products or services (mean = 3.84, SD = 0.831) and regular expansion of product/service lines to target new market segments (mean = 3.85, SD = 0.815) further underline the proactive strategies firms employ to sustain growth and competitiveness. Innovative marketing approaches (mean = 3.76, SD = 0.840) emphasize the role of creative promotions in maximizing the impact of output innovations. These findings align with prior studies, which highlight that firms with high output innovation intensity tend to outperform competitors by catering to evolving customer needs and exploiting new market opportunities (Qu & Mardani, 2023). Overall, the data affirm that sustained efforts in output innovation are crucial for achieving market differentiation and long-term sustainability.

Table 4: Responses on Output Innovation Intensity

Code	Statement	Mean	Standard Deviation	Level of Agreement
II _{output_1}	Our firm frequently introduces new products or services.	3.84	0.831	Agree
II _{output_2}	We improve our existing products or services regularly.	3.93	0.862	Agree
II _{output_3}	Our new products/services are often first in the market.	4.14	0.768	Agree
II _{output_4}	We use innovative marketing approaches to promote our products/services	3.76	0.840	Agree
II _{output_5}	We regularly expand our product/service lines to capture new market segments	3.85	0.815	Agree

4.1.4 Accounting Practices

Table 5 reflects the respondents' perspectives on the accounting practices of their firms, with mean scores ranging from 3.14 to 4.82. The strongest agreement is observed for the use of accounting information in decision-making (mean = 4.82, SD = 0.532), underscoring the critical role of financial data in guiding strategic and operational decisions. Similarly, adherence to standard accounting practices (mean = 4.46, SD = 0.613) and maintaining accurate financial records (mean = 4.01, SD = 0.374) highlight a strong commitment to transparency and compliance. Regular reviews and audits of financial reports (mean = 4.02, SD = 0.989) further demonstrate the emphasis placed on accountability and financial reporting quality. However, the relatively lower score for having a robust financial management system (mean = 3.14, SD = 1.498) indicates variability in responses, suggesting that not all firms have fully implemented strong financial management structures. These findings align with prior research that identifies accounting practices as crucial for effective decision-making, operational efficiency, and compliance in small and medium-sized enterprises (SMEs) (Nartey & van der Poll, 2021; Zada, Yukun & Zada, 2021). Robust accounting practices can therefore act as enablers for improved financial performance and sustainability.

Table 5: Responses on Accounting Practices

Code	Statement	Mean	Standard Deviation	Level of Agreement
APract_1	Our firm maintains accurate financial records.	4.01	0.374	Agree
APract_2	We adhere to standard accounting practices.	4.46	0.613	Strongly Agree
APract_3	Our financial reports are regularly reviewed and audited.	4.02	0.989	Agree
APract_4	Accounting information is used extensively in decision-making.	4.82	0.532	Strongly agree
APract_5	We have a robust financial management system in place.	3.14	1.498	Undecided

4.1.5 Sustainability Growth (SusG)

Table 5 highlights the perceived sustainability growth performance of firms, with mean scores reflecting varied levels of achievement across different dimensions. The highest scores were observed for employee welfare and community engagement initiatives (mean = 4.84, SD = 0.575) and environmental impact reduction practices (mean = 4.52, SD = 0.500), indicating an excellent commitment to social and environmental sustainability. In contrast, financial metrics, such as revenue growth (mean = 3.48, SD = 1.488), profitability maintenance (mean = 3.54, SD = 1.487), and market share stability (mean = 3.58, SD = 1.498), scored moderately, reflecting a "good" performance level but with noticeable variability in responses. These results suggest that while firms are excelling in non-financial aspects of sustainability, there is room for improvement in achieving consistent financial growth and stability. These findings align with studies emphasizing that sustainability encompasses not only environmental and social dimensions but also financial resilience, which is critical for long-term growth (Venturelli & Mio, 2024). Firms that balance these dimensions are better positioned to achieve sustainable competitive advantages.

Table 6: Responses on Sustainability Growth (SusG)

Code	Statement	Mean	Standard Deviation	Level of Perceived Performance
SusG_1	Our firm has experienced steady revenue growth over the past three years.	3.48	1.488	Good
SusG_2	Our firm has maintained or improved profitability in recent years.	3.54	1.487	Good
SusG_3	Our firm implements practices to reduce environmental impact.	4.52	0.500	Excellent
SusG_4	We have initiatives in place for employee welfare and community engagement.	4.84	0.575	Excellent
SusG_5	Our firm has a stable market share in our industry.	3.58	1.498	Good

Table 7 presents descriptive statistics for the variables under study, showing the mean, standard deviation, and range for 400 observations. Sustainability growth (SusG) had a mean score of 4.00 (SD = 0.25033), indicating a high level of perceived sustainability performance across the firms. Input innovation intensity (mean = 4.125, SD = 0.12516) and output innovation intensity (mean = 4.3923, SD = 0.15747) also scored high, highlighting strong investments in innovation and market differentiation efforts. Process innovation intensity had a slightly lower mean (4.0283) with a larger standard deviation (SD = 0.90860), suggesting greater variability in how firms innovate operational processes. Accounting practices scored a mean of 4.2263 (SD = 0.40742), reflecting consistent adherence to financial management standards. These results demonstrate that innovation intensity and robust accounting practices contribute to sustainability growth, aligning with prior studies that emphasize the critical role of innovation and accounting systems in achieving competitive and sustainable performance (Broccardo et al., 2024). The lower variability in input and output innovation suggests consistency across firms, while the greater variability in process innovation points to differences in operational strategies.

Table 7: Descriptive Statistics

	N	Min	Max	Mean	Std. Dev.
Sustainability Growth (SusG)	400	3.75	4.25	4.0000	.25033
Input Innovation Intensity (II _{input})	400	4.00	4.25	4.1250	.12516
Process Innovation Intensity (II _{process})	400	2.00	5.00	4.0283	.90860
Output Innovation Intensity (II _{output})	400	3.06	4.50	4.3923	.15747
Accounting Practice (APract)	400	2.25	4.75	4.2263	.40742
Valid N (listwise)	400				

4.2 Correlations

The correlation analysis shows significant relationships among the variables, particularly highlighting the moderating role of accounting practices (APract) in innovation intensity (Table 8). Input innovation intensity (II_{input}) has a weak positive correlation with accounting practices ($r = 0.244$, $p < 0.01$), suggesting that firms investing in research and development and new technologies tend to maintain better financial management practices. Process innovation intensity (II_{process}) exhibits a moderate positive correlation with accounting practices ($r = 0.380$, $p < 0.01$) and output innovation intensity (II_{output}) ($r = 0.389$, $p < 0.01$), indicating that operational improvements align with both robust accounting systems and innovative market offerings. Output innovation intensity is also positively correlated with accounting practices ($r = 0.275$, $p < 0.01$), further emphasizing that firms adopting innovative product strategies often leverage structured financial management. However, input and process innovation intensities show no significant correlation ($r = -0.090$, $p = 0.072$), pointing to the independence of R&D efforts from operational changes. These findings align with prior studies, which demonstrate that innovation strategies are strengthened by sound accounting practices, enhancing financial transparency and long-term sustainability (Sooriyakumaran et al., 2022; Zada, Yukun & Zada, 2021).

Table 8: Correlations

		II _{input}	II _{process}	II _{output}	APract
II _{input}	Pearson Correlation	1	-.090	.026	.244 ^{**}
	Sig. (2-tailed)		.072	.598	.000
	N	400	400	400	400
II _{process}	Pearson Correlation	-.090	1	.389 ^{**}	.380 ^{**}
	Sig. (2-tailed)	.072		.000	.000
	N	400	400	400	400
II _{output}	Pearson Correlation	.026	.389 ^{**}	1	.275 ^{**}
	Sig. (2-tailed)	.598	.000		.000
	N	400	400	400	400
APract	Pearson Correlation	.244 ^{**}	.380 ^{**}	.275 ^{**}	1
	Sig. (2-tailed)	.000	.000	.000	
	N	400	400	400	400

^{**}. Correlation is significant at the 0.01 level (2-tailed).

4.3 Regression Analysis

4.3.1 Direct Effects of Innovation Intensity on Sustainability Growth

Table 9, the model summary indicates that the independent variables—input innovation intensity (II_{input}), process innovation intensity (II_{process}), and output innovation intensity (II_{output})—explain 48.8% of the variance in sustainability growth (SusG), as reflected by the R Square value of 0.488. The Adjusted R Square value of 0.484 suggests that the model's explanatory power remains robust, even when accounting for potential biases due to the number of predictors. The standard error of the estimate (0.52533) indicates the average deviation of the observed values from the predicted values, suggesting a moderate level of prediction accuracy. Additionally, the Durbin-Watson statistic of 0.960 points to potential positive autocorrelation in the residuals, which may warrant further diagnostic checks. These results highlight the significant role of innovation intensity in driving sustainability growth, corroborating prior studies that emphasize the critical impact of innovation strategies on firm performance and long-term viability (Abdullahi et al., 2023). Enhancing innovation processes and outputs, alongside robust input investments, can significantly improve sustainability outcomes.

Table 9: Model Summary
Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.699 ^a	.488	.484	.52533	.960

a. Predictors: (Constant), II_{input}, II_{process}, II_{output}

b. Dependent Variable: SusG

The ANOVA Table 10 indicates that the regression model is statistically significant ($F = 125.898$, $p < 0.001$), demonstrating that the independent variables—input innovation intensity (II_{input}), process innovation intensity (II_{process}), and output innovation intensity (II_{output})—jointly explain a significant portion of the variation in sustainability growth (SusG). The regression sum of squares (104.233) represents the explained variation, while the residual sum of squares (109.285) indicates the unexplained variation. Together, these sum to the total variation (213.517). The large F-statistic suggests a strong model fit, confirming the relevance of innovation intensity dimensions in predicting sustainability outcomes. These

findings align with prior studies emphasizing that firms leveraging innovation across input, process, and output dimensions achieve enhanced performance and sustainability (Adams et al., 2016). The significant result underscores the need for SMEs to prioritize innovation as a strategic driver of long-term growth and sustainability.

**Table 10: AVOVA
ANOVA^a**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	104.233	3	34.744	125.898	.000 ^b
	Residual	109.285	396	.276		
	Total	213.517	399			

a. Dependent Variable: SusG

b. Predictors: (Constant), II_{input} , $II_{process}$, II_{output}

The coefficients in Table 11 demonstrate the individual contributions of the predictors—input innovation intensity (II_{input}), process innovation intensity ($II_{process}$), and output innovation intensity (II_{output})—to sustainability growth (SusG). The constant ($B = 1.324$, $p < 0.001$) represents the baseline level of sustainability growth when all predictors are held constant. Input innovation intensity has the largest standardized coefficient ($Beta = 0.648$, $p < 0.001$), indicating it is the most significant predictor of sustainability growth. This suggests that investments in R&D, technology adoption, and employee training strongly influence sustainable outcomes. Process innovation intensity ($Beta = 0.108$, $p = 0.003$) and output innovation intensity ($Beta = 0.112$, $p = 0.004$) also significantly contribute to sustainability growth, albeit to a lesser extent. These results align with a previous study by Lee et al. (2023) that highlights the critical role of both operational efficiency and innovative product offerings in driving sustainable development. Collectively, the findings underscore that innovation efforts, particularly at the input stage, are pivotal for fostering long-term organizational sustainability.

**Table 11
Coefficients^a**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.324	.217		6.096	.000
	II_{input}	.609	.037	.648	16.496	.000
	$II_{process}$	.082	.027	.108	2.977	.003
	II_{output}	.126	.044	.112	2.871	.004

a. Dependent Variable: SusG

4.3.2 Moderating Effect of Accounting Practices

The results in Table 12 indicate that accounting practices significantly moderate the relationship between innovation intensity (input, process, and output) and sustainability growth (SusG), as evidenced by the model's R^2 value of 0.648, which explains 64.8% of the variance in sustainability growth. The adjusted R^2 of 0.641 suggests the model remains robust even after adjusting for the number of predictors. The ANOVA Table 13 confirms the overall model's statistical significance ($F = 102.951$, $p < 0.001$), validating the combined influence of innovation intensity and accounting practices on sustainability growth. From the coefficients

in Table 14, the main effects of input innovation intensity ($B = 1.305$, $p < 0.001$), output innovation intensity ($B = 1.001$, $p = 0.007$), and accounting practices ($B = 2.296$, $p < 0.001$) significantly contribute to sustainability growth, consistent with a study by Marfo et al. (2022). These results emphasize that effective accounting practices amplify the positive impact of innovation efforts on organizational sustainability. However, the interaction effects show mixed results. The interaction between output innovation intensity and accounting practices ($B = -0.199$, $p < 0.001$) and between process innovation intensity and accounting practices ($B = -0.212$, $p = 0.011$) negatively moderates sustainability growth. These findings suggest that while accounting practices enhance innovation efforts generally, complexities or inefficiencies may arise when these practices are combined with specific innovation types, potentially diluting their impact. Similar observations were made by Amankwah-Amoah et al. (2021), who argued that overly stringent accounting systems might restrict creative flexibility in certain innovation processes.

The results highlight the nuanced role of accounting practices as a moderator, reinforcing the need for tailored approaches to align financial practices with different dimensions of innovation intensity for optimal sustainability outcomes.

Table 12:
Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.805 ^a	.648	.641	.43806	.917

a. Predictors: (Constant), II_{input} , $II_{process}$, II_{output} , $APract$, $II_{input} * APract$, $II_{process} * APract$, $II_{output} * APract$

b. Dependent Variable: SusG

Table 13:
ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	138.293	7	19.756	102.951	.000 ^b
	Residual	75.224	392	.192		
	Total	213.517	399			

a. Dependent Variable: SusG

b. Predictors: (Constant), II_{input} , $II_{process}$, II_{output} , $II_{input} * APract$, $II_{input} * APract$, $II_{process} * APract$, $II_{output} * APract$

Table 14:
Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-7.394	1.178		-6.277	.000
	II _{input}	1.305	.245	1.389	5.324	.000
	II _{process}	.331	.189	.437	1.754	.080
	II _{output}	1.001	.372	.893	2.691	.007
	AP _{Pract}	2.296	.272	1.640	8.447	.000
	II _{input} *AP _{Pract}	-.076	.043	-.526	-1.790	.074
	II _{output} *AP _{Pract}	-.199	.056	-1.193	-3.519	.000
	II _{process} *AP _{Pract}	-.212	.083	-1.118	-2.547	.011

a. Dependent Variable: SusG

5. Discussion of Findings

This study investigated the moderating role of accounting practices in the relationship between innovation intensity (input, process, and output innovation) and sustainability growth (SusG) in MSMEs in Port Harcourt. The findings provide critical insights into how innovation intensity dimensions and accounting practices interact to influence sustainable growth, which aligns with and extends existing literature.

The results indicate that input innovation intensity significantly enhances sustainability growth, as evidenced by a positive and significant coefficient ($B = 1.305$, $p < 0.001$). This finding highlights the critical role of investments in research and development (R&D), adoption of new technologies, and employee development in driving sustainable growth. This aligns with prior studies by Osadume & Onyekachi (2023) and Dziallas & Blind (2019), who emphasized that R&D investments and technological advancements empower firms to adapt to changing market conditions and achieve long-term sustainability. In MSMEs, such practices build competitive advantages by fostering innovation and creating value that resonates with both customers and stakeholders.

While process innovation intensity had a positive coefficient ($B = 0.331$), it was not statistically significant ($p = 0.080$). This suggests that while continuous improvements in production methods, streamlining of operations, and redesigning processes are essential for enhancing efficiency, their direct impact on sustainability growth in MSMEs may be less pronounced. This result might stem from challenges in fully implementing process innovations due to resource constraints or technical inefficiencies often faced by MSMEs (Saunila, 2020; Singh, 2019). It may also indicate that process innovation efforts, though critical, require a longer time horizon to yield measurable results on sustainability.

The study also found that output innovation intensity significantly impacts sustainability growth ($B = 1.001$, $p = 0.007$). This result underscores the importance of introducing new products or services and improving existing offerings to meet evolving customer needs. As confirmed by prior studies (e.g., Rajapathirana & Hui, 2018), output innovation facilitates market differentiation, revenue diversification, and customer satisfaction, which are crucial

drivers of sustainable growth. Firms that regularly innovate in their product or service offerings tend to remain competitive and relevant in their industries. Accounting practices were found to have a direct positive effect on sustainability growth ($B = 2.296$, $p < 0.001$), indicating that robust financial management systems, accurate record-keeping, and adherence to standard accounting practices contribute significantly to organizational sustainability. This finding aligns with studies by Amankwah-Amoah et al. (2021), which noted that sound accounting systems provide transparency, facilitate informed decision-making, and enhance stakeholder confidence, all supporting sustainability.

However, the moderating effects of accounting practices presented mixed outcomes. While the interactions between accounting practices and input innovation intensity ($B = -0.076$, $p = 0.074$) and process innovation intensity ($B = -0.212$, $p = 0.011$) were negative, the interaction between accounting practices and output innovation intensity ($B = -0.199$, $p < 0.001$) was also negative and significant. These results suggest that rigid or overly formalized accounting systems may inadvertently constrain the flexibility required for certain innovation activities, as Amankwah-Amoah et al. (2021) noted. For instance, stringent cost controls might limit experimental investments or slow down the adoption of innovative ideas, particularly in resource-constrained MSMEs.

The inclusion of accounting practices as a moderator improved the explanatory power of the model, with R^2 increasing from 48.8% in the base model to 64.8%. This substantial increase confirms that accounting practices play a critical role in shaping the relationship between innovation intensity and sustainability growth. The ANOVA results further validate the significance of the overall model ($F = 102.951$, $p < 0.001$), underscoring the interplay between innovation and financial management practices in achieving sustainability.

The findings validate the *Dynamic Capabilities Theory* by demonstrating how firms leverage their internal capabilities, such as accounting practices, to adapt to external opportunities and enhance sustainability. They also underscore the importance of aligning innovation efforts with robust financial management systems to achieve long-term growth. Practically, MSMEs in Port Harcourt should focus on implementing flexible yet effective accounting practices that support innovation activities without stifling creativity or experimentation.

These findings are consistent with previous studies highlighting the positive relationship between innovation intensity and firm performance (Akram & Abrar Ul Haq, 2022; Dziallas & Blind, 2019) while providing new insights into the moderating role of accounting practices. Unlike some studies that view accounting as a mere administrative tool, this study positions accounting as a strategic enabler of sustainability when properly aligned with innovation processes. However, the negative interaction effects caution against over-standardization, echoing calls by Garechana et al. (2017) for a balanced approach to financial governance in innovation-driven firms.

5.1 Conclusion and Recommendations

This study examined the relationship between innovation intensity (input, process, and output), accounting practices, and sustainability growth (SusG) of MSMEs in Port Harcourt, Nigeria. It further explored the moderating effect of accounting practices on this relationship. The findings revealed that innovation intensity significantly contributes to sustainability growth, with input and output innovation demonstrating the strongest positive effects. Process innovation, while important, had a weaker direct impact, suggesting that its benefits

may accrue over time rather than immediately. Additionally, accounting practices were found to play a significant moderating role, enhancing the effectiveness of innovation activities in driving sustainability growth. However, overly rigid accounting practices could potentially stifle innovation by imposing excessive constraints on resource allocation. The study underscores the critical role of aligning financial management systems with innovation strategies, as robust accounting practices not only enhance operational transparency but also support innovative activities that lead to long-term growth and competitiveness.

5.2 Implications of the Findings

The findings contribute to the body of knowledge on innovation and sustainability by highlighting the moderating role of accounting practices. This aligns with the Resource-Based View (RBV) theory, which emphasizes the strategic value of organizational resources, including accounting systems, in achieving competitive advantage. The study further expands the theoretical understanding of how financial management systems interact with innovation to influence sustainability outcomes.

For MSMEs, the results emphasize the importance of integrating accounting practices with innovation strategies. By maintaining accurate financial records, adopting standard accounting practices, and incorporating flexibility in resource allocation, firms can maximize the benefits of innovation intensity. Managers should also prioritize investment in input and output innovation, given their strong contributions to sustainability growth.

Policymakers and industry regulators should create an enabling environment for MSMEs to adopt innovative practices. This includes providing financial incentives, such as tax breaks for research and development (R&D) investments, and facilitating access to affordable digital accounting tools. Policies promoting training programs that combine innovation management and accounting practices will further support MSMEs in achieving sustainability goals.

This study opens new research avenues by identifying the potential for industry-specific variations in the relationship between innovation intensity, accounting practices, and sustainability growth. Future research could investigate these dynamics in other industries or regions, as well as explore the long-term effects of process innovation on firm performance. Additionally, further studies could delve into how digital transformation and technology adoption influence the interaction between accounting practices and innovation. In conclusion, this study reinforces the importance of a synergistic relationship between innovation and sound financial management in driving the sustainability growth of MSMEs. By fostering this alignment, MSMEs in Port Harcourt and beyond can achieve long-term competitiveness and resilience in a dynamic business environment.

5.3 Recommendations

To guide MSMEs in Port Harcourt toward achieving sustainability growth through innovation intensity and robust accounting practices, the following recommendations are proposed:

1. **Invest in Robust Accounting Systems:** MSMEs should implement comprehensive accounting systems that ensure accurate record-keeping, adherence to standard practices, and regular audits. These systems will enhance transparency, improve decision-making, and build stakeholder confidence, all of which are essential for sustainable growth.

2. **Balance Financial Controls with Innovation Flexibility:** While sound accounting practices are vital, overly rigid financial controls may stifle innovation. MSMEs should adopt adaptive financial approaches, such as flexible budgeting, to support experimental investments and foster innovation without compromising financial stability.
3. **Prioritize Input Innovation:** Given the significant positive relationship between input innovation and sustainability growth, MSMEs should invest in research and development, employee training, and technology acquisition. These investments will strengthen their capacity to adapt to market changes and sustain long-term growth.
4. **Adopt Digital Accounting Tools:** MSMEs should leverage digital accounting tools and software to streamline financial operations, enhance data accuracy, and reduce administrative burdens. Real-time insights from these tools can support strategic decision-making and operational efficiency.

Hence, by implementing these recommendations, MSMEs in Port Harcourt can effectively balance innovation intensity with sound financial management, enhancing their sustainability, competitiveness, and long-term growth.

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