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Assessment of entrepreneurial innovation on sustainability of industrial leather clusters in Kano State

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Abstract
Purpose: Entrepreneurial innovation is a major contributor to growth and sustainability of business enterprises which in turn boosts the economy. It has also been acknowledged by scholars and professionals that entrepreneurial innovation is a driver of business survival and sustainability. Thus, the study examined the effect of entrepreneurial innovation on sustainability of industrial leather clusters in Kofar Wambai, Kano state.
Methodology: A cross–sectional survey design using primary data was adopted using a structured questionnaire. The unit of analysis is the artisans of industrial leather clusters in Kofar Wambai, Kano state. A simple random sampling technique was employed to select the sample size of eighty-six (86). To test the proposed hypothesis, multiple regression analytical tool was employed.
Results and conclusion: The result of analysis revealed positive and significant effect of the independent variable; entrepreneurial innovation (process and product innovativeness) on sustainability of industrial leather clusters in Kofar Wambai, Kano State.
Implication of findings: The study recommends artisans in Kofar Wambai to adopt pursuing a concurrent, dual-focus innovation (process and product) strategy to maximize sustainability gain in Kofar Wambai industrial leather clusters of Kano state.

Keywords: Entrepreneurial innovation, Process innovation, Product innovation, Sustainability.

1. Introduction

The Nigeria economy is over reliant on oil sector and there is need to boost the growth of the non- oil sector. The leather industry is an alternative which offers a huge potential for growth and marketing activities. Leather industry contributes to the growth of the economy through job creation and generation of revenue and overall poverty reduction (Udennaka &Ezechukwu 2025; Christopher et al., 2025). Nigeria is the largest producers of hides and skins in Africa, these hides and skins are gotten from varieties of animals which includes, ram, goats, sheep and cows with the biggest leather market in Nigeria is situated in Kano (Ernest 2023), Kano, leather industry is known for number of industrial leather clusters. Nwodo et al (2024) stated that leather and leather product such as bags, footwear, belt and other accessories adds value to Nigeria economy growth and business development. Despite their significant contributions, industrial leather clusters face persistent challenges and threats which impede their growth and sustainability (Kapipi 2024; Said 2021; Ernest 2023). However, Nigeria leather market presents a myriad of opportunities that needs closer examination which include quality control, skills shortage, sustainable practices, technological innovation and e commerce growth (Tukur & Shehu 2025). Especially as availability of capital is not enough for survival and sustainability but entrepreneurial innovation improves business survival (Amusat et al., 2024; Talwar et al., 2024). Innovation needed to sustain most business enterprises includes product and process innovation (Naimova 2025; Vikovic et al., 2025) and Kofar Wambai Leather Clusters are not left out.

Several leather production clusters across Kano metropolis include Wambai leather clusters, Kofar Ruwa tannery lane, Kofar Mazugal and GTB leather market. These industrial leather clusters have been facing chahavenges with seventy (70) factories and industries has stopped production and few others working

at half capacity, Kofar Wambai industrial leather is among the surviving indigenous hides and skin factory (Clockwise Report, 2025).

Kofar Wambai operates informally and has limited access to capacity development (Trust TV, 2023; Clockwise Report 2025, Tukur & Shehu 2025). It is challenged with lack of modern waste management systems, poor preservation practices, chemical exposure risk and absence of structured training for processors (Clockwise Report 2025). The artisans relied on locally available materials and skills required in processing leather which passed down through generations from master artisans to apprentices, with the continuity of traditional techniques and craftsmanship which cannot meet the demand of large-scale economies. In order to meet the rising demand and sustain this business in leather and leather product in Nigeria and international markets, adoption of product and process innovation is the best strategy for survival. SMEs that implement sustainability concepts such as mechanization, revolutionized tanning process, advanced equipment, mechanical drums for softening hides and skin would likely avoid market extinct (Ismail., 2022).

This shift from labor intensive manual to mechanized method will significantly increase the industry production capacity; create more market that leads to business sustainability. In a bid to meet the growing demands of customers, adoption of process innovation will lead to tackling environment challenge of traditional tanning methods, the use of chemicals leading to water and soil pollution and transitioning to cleaner technologies. This will also lead to the need for skilled workforce that can operate modern technologies as younger generations are less inclined to adopt traditional tanning skills. Product innovation also involves adhering to international quality standards, which involves struggling to maintain export competitiveness. Combating the leather industrial challenges include conforming to changes in the marketing environment which may give Nigeria a more sustainable and competitive advantage in the global market.

Nigeria leather industry holds potential for growth and opportunities and capitalizing on these opportunities will require more effort by embracing emerging trends which boils down to innovation to sustain competitive dominance. Kano state industrial leather sector continues to provide qualitative leather for the global market, but local artisans are seeking assistance to scale up operations and prevent the business from extinction (Daily trust 2023; Trust TV news 2023; Daily trust 2024; Tukur & Shehu 2025).

Prior studies on entrepreneurial innovation and SMEs success focused on different sectors such as tourism, agriculture and manufacturing (Badiru 2023, Latifannissa et al., 2025; George Will 2024; Heekenda et al., 2022; Gimin et al., 2024) but there is a dearth literature on entrepreneurial innovations and sustainability in leather industry specifically leather clusters less attention is paid on survival and sustainability. Innovations lead to markets share and profitability which in turn results to sustainability (Ismail.2022). The study is aimed at investigating the effect of entrepreneurial innovation on the sustainability of industrial leather clusters in Kofar Wambai in Kano State. The study specifically focusses on product and process innovation, because of their strategic importance in the industrial leather sector.

2. Literature review

Sustainability

Sustainability is the core of a business (Octasylva et al., 2022). Sustainability refers to 'Keeping the business going'. It also refers to achieving success today without compromising the needs of the future (Nwagbala et al., 2022). According to Latifannisa et al., (2025), with the increasing competition in the

market only economic profit cannot ensure long-term success but also requires entrepreneurial innovation. Business is considered sustainable when they can overcome the challenges that stand in their way in the internal and external business environment (Octasysylva et al., 2022). Sustainability in the industrial leather sector refers to the ability of firms and value chain actors to operate profitably, efficiently, and competitively over the long term while adapting to changing market, technological, and institutional conditions. The concept is rooted in the broader sustainability discourse, particularly the economic dimension of the Triple Bottom Line (Elkington, 1997), which emphasizes long-term value creation, resource efficiency, and stable economic growth. Within the leather industry, economic sustainability encompasses productivity enhancement, market competitiveness, value chain upgrading, and institutional stability. Firms with greater innovative skills will be able to tackle responding to a changing environment and also be able to develop new strategies that allow them to achieve sustainable business.

Entrepreneurial innovation

Innovation is the ability to create and support new ideas, novelty, experimentation and creative processes that can produce new products, services or technological processes (Latifannissa et al., 2025). Innovation may also relate to the creation or improvement of ideas, concepts, products, procedures or technology (George et al., 2019). It is also described as a process of turning opportunity into new ideas and putting these into widely used practice (Taneja & Malik 2023). It is vital for business survival, long term growth and competitive business advantage. Innovation is the ability to create and support new ideas, novelty, experimentation and creative processes that can produce new products, services or technological processes (Latifannissa et al., 2025).

Entrepreneurial innovation is the ability to create and implement new ideas, products, services, and processes for fostering business growth, turning opportunity into new ideas and putting these into widely used practice (Taneja & Malik 2023). It plays a major role in improving business sustainability through knowledge, skills and attitude incorporated into the business. Entrepreneurial innovations is a combination of five innovation which include introduction of new or significantly improved products or services, the introduction of new methods of processing, opening new markets, developing new sources of supply and creation of a new competitive organization (Schumpter 1934). It can play a crucial role in the sustainability of leather clusters through the combination of ideas and creativity.

Prior studies on entrepreneurial innovation have proven that product and process innovation has positive and significant effect on sustainable business performance (Yodhai, & Tran,2022; Ognjanovic et al., 2024). Kofar Wambai industrial leather clusters can continue to advance through innovation while meeting the growing demand for sustainable and high-quality leather products.

Process innovation

Process innovation captures the new technology, new management processes, new or improved production method; it involves changes and improvement in production method which leads to increase productivity (Hilmi et al., 2010). Introduction of new production methods, new management approaches, and new technology which can be used to improve production and management processes. The ability or potential to generate new ideas, think creatively and adopt innovative approaches, the capacity, mindset or culture to generate and adopt new ideas. (Kefale et al., 2025; NG 2020). Introducing technological innovation and environmentally friendly processing methods which include chromium free tanning agents (Kefale et al., 2025).

Process innovation in Nigeria's industrial leather sector refers to the introduction of improved production methods, modern technologies, and cleaner processes that enhance efficiency, reduce waste, and improve product quality across the tanning and finishing value chain. Global literature defines process innovation as the systematic modification of production activities to achieve cost reduction, higher productivity, and better-quality outputs (OECD, 2018; Schumpeter, 1934).

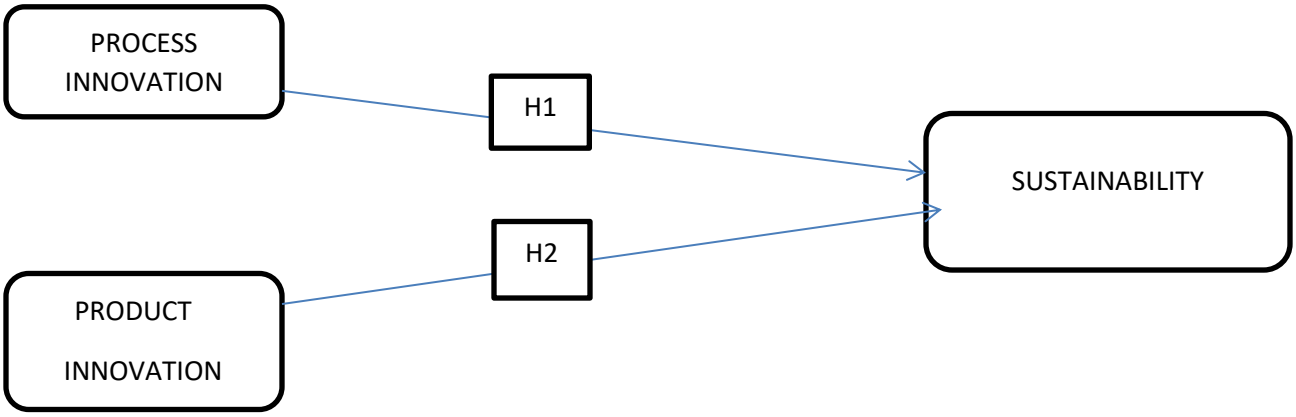
In Nigeria, the need for process innovation stems from persistent reliance on outdated equipment, poor raw material handling, high chemical wastage, and difficulties in meeting global standards, which limit competitiveness in export markets (Nwosu & Okoro, 2021; FAO, 2020). Modern innovations—such as enzymatic unhairing, chrome-reduced tanning, computerized drum control, and automated cutting systems—improve consistency, reduce environmental impact, and align Nigerian tanneries with international best practices (UNIDO, 2019; Gereffi & Fernandez-Stark, 2016). Process innovation remains central to strengthening economic sustainability, as it enhances productivity, reduces production costs, and supports Nigeria's integration into higher-value segments of the global leather chain (Schaltegger & Wagner, 2011; Adewuyi & Ogunleye, 2020). Improved processes also contribute to environmental sustainability by minimizing pollution and facilitating waste-to-resource recovery. Thus, process innovation provides a strategic pathway for transforming Nigeria's leather industry into a more competitive, efficient, and future-ready sector.

Product innovation

Product innovation as the novelty and meaningfulness of new products introduced to the market in a timely fashion (Olawore et al.,2024; Kiguru 2025). Product innovation includes introduction and creation of new products, services or improvement in specifications of existing products or services. Businesses which generally strive on an ongoing basis to come up with a new product concept that can satisfy their target customers' needs in order to attain their goals and maintain themselves over time rarely get extinguished (Ismail, 2022).

Product innovation in Nigeria's industrial leather sector involves the creation of new or upgraded leather goods, improved designs, enhanced finishing techniques, and the development of higher-value product categories that meet international standards and evolving consumer preferences. As global markets demand higher-quality and ethically produced leather goods, Nigerian firms are increasingly investing in design capabilities, branding, and the use of modern finishing technologies to differentiate their products (Adebayo & Ayeni, 2021). This includes shifting from low-value exports of raw hides and semi-processed leather to value-added items such as footwear, bags, accessories, and fashion products (Eze & Okoli, 2020). Product innovation also facilitates access to niche markets—such as luxury, eco-friendly, and handcrafted leather segments—helping firms achieve higher margins and stronger competitive positioning (Olawale & Garba, 2022). Additionally, collaborations with fashion designers, adoption of global style trends, and quality certification schemes are accelerating product diversification and brand development in the sector (Nwosu & Ibrahim, 2019). Overall, product innovation enhances competitiveness, drives economic upgrading, and reduces over reliance on traditional, low-earning leather exports in Nigeria's industrial leather value chain.

2.3 Conceptual framework



The conceptual framework illustrates how entrepreneurial innovation—through process innovation and product innovation—drives sustainability in Nigeria's industrial leather sector. Process innovation, such as improved tanning technologies, cleaner production methods, and efficient workflow systems, enhances sustainability by increasing productivity, reducing waste, lowering costs, and meeting environmental and international quality standards. Product innovation, involving new or upgraded leather goods, better designs, and higher-value product lines, boosts competitiveness and market access, enabling firms to create more value and reduce reliance on low-value raw hides and skins. Together, these innovation pathways show that sustainability in the leather sector is achieved when firms continuously upgrade their production processes and develop market-responsive products that enhance economic, environmental, and competitive performance.

Entrepreneurship innovation theory

The theory underpinning this study is the Entrepreneurship Innovation Theory. The theory initially introduced by Joseph Schumpter (1934) suggests that entrepreneur as innovative and creative individuals with foresight in an economy who help the economy through creation of goods and services. Schumpter emphasized the nature of entrepreneurs who have the culture or foresight of innovation, the art of introducing new products, new production systems, discovering new markets or creation of new markets.

This theory refers to the culture of been innovative which leads to business survival and sustainability. It is particularly relevant in today's tech driven environment, making it ideal for analyzing how local entrepreneurs like Kofar Wambai artisans enhance their business survival and sustainability. Embracing innovation in order to stay abreast of new technology for sustainability of business.

Review of empirical studies

Ismail (2022) assessed the effect of entrepreneurs' competencies and sustainability of small and medium enterprises in Tanzania by examining the mediating effect on entrepreneurial innovations. The study applied a cross- sectional design and a structured questionnaire was adopted to capture 342 sampled SMEs with the aid of Structural equation Modelling (SEM) for analysis, the findings showed entrepreneur competencies and entrepreneurial innovation has both positive and significant effect on sustainability of SMEs.

Georgewill (2024) examined the relationship between entrepreneurial innovation and business success of small and medium enterprises in River State; he administered a structured questionnaire to ninety-nine respondents. The data was analyzed using Spearsman's Rank Order Correlation Coefficient, he found entrepreneurial innovativeness significantly correlated with SMEs in rivers state.

Olawore et al (2024), investigated entrepreneurial innovation and market share of small and medium enterprises in Lagos State, Nigeria, using a structured questionnaire on sample size of 495 and he employed Multiple linear regression statistics and the result presented that entrepreneurial innovation had significant effect on market share.

Badiru (2023), assessed the Impact of Entrepreneurial Activities on Organizational Innovativeness Of Small and Medium Enterprises (SMEs) In Osun State, Nigeria, used three hundred and fifty –three as sample size, he administered a structured questionnaire using two dimensions (creativity and organizational innovativeness), the result revealed that both creativity and organizational innovativeness have significant impact on SMEs in Osun State.

Samuel et al (2025) investigated the influence of innovativeness on the performance of textile- based manufacturing small enterprises in Kenya, quantitative data was analyzed using SPSS and employing descriptive and inferential statistics with a sample sized of 292 respondents. The findings revealed a substantial positive relationship between innovativeness (product, process and market innovation) in enhancing performance and competitiveness.

3. Methodology

The aim of this study is to assess the effect of entrepreneurial innovation on sustainability of Kofar Wambai industrial leather cluster among artisans operating in Kofar Wambai, leather clusters in Kano state Nigeria. A cross- sectional approach was used in collecting data through primary sources using structured questionnaire rated on a 5-point Likert scale with the use of survey method. The instrument used was adapted from validated scale. To measure entrepreneurial innovation, it was operationalized as two different variables; product innovation and process innovation. Indicators of innovation were adopted from Shi et al., (2018) while Sustainability indicators from Thi et al., (2018). A sample size of eighty-six (86) artisans was drawn using Krejcie and Morgan sampling table (1970), from a population of 120 registered artisans (Kano State SMEs Development Agency 2024) operating in Kofar Wambai industrial leather cluster. A simple random sampling technique was employed in selecting respondents.

In order to analyze the data, both descriptive and inferential statistics were employed to analyze the data collected using statistical package for social science (SPSS) for window version 21 and multiple regression analysis. Hypotheses testing was conducted at 95% confidence level, with T- statistics above 1.96 indicating statistical significance

Validity and reliability

The measurement model was assessed to ensure the reliability and validity of the constructs. The internal consistency reliability was evaluated using Cronbach's Alpha (CA) and Composite reliability (CR) with all values exceeding the thresholds of 0.7 indicating reliability. Process innovation (CA: 0.842, CR: 0.962), product innovation (CA: 0.877, CR: 0.888) Sustainability (CA: 0.872, CR: 0.922).

4. Results and discussion

Response rate

In order to minimize the low response rate from uncooperative respondents, the present study follows Hair, Bush and Ortinaus (2008) recommendation by increasing the determined size to 100%, therefore the increased determined sample yielded 172. Overall, 172 questionnaire was administered to the artisans operating in Kofar Wambai, Kano State. After several follow up with the aid of a research assistant115 questionnaire was received, response rate 67%. Out of 115 returned, 29 were unusable due to incomplete questionnaire and 86 useable questionnaire with an adjusted response rate of 50%. The response rate of 50% is acceptable (Sekaran 2003).

Demographic response rate

The demographic variables examined in the study include gender, age, education, years in business, registration status.

Table 1: Demography

Variables	Category	Frequency (86)	Percentage (%)
Gender	Male	86	100
Total		86	
Age	18-25	9	10
	26-40	11	14
	41 and above	66	76
Total		86	100
Level of Education	FSLC	15	17
	SSCE	5	6
	Never been to school	66	77
Total		86	100
Years in Business	Less than one	4	5
	More than one less than three	6	8
	More than three less than five	15	17
	More than five years	61	70
Total		86	100
Registration status	Registered with	86	
Total		86	100

Source: The researcher 2025.

Descriptive analysis

The questionnaire administered was rated on five-point Likert scale ranging from 1= Strongly Disagree, 2= Disagree, 3= Neutral 4= Agree, 5= Strongly Agree. Table 1 below shows the descriptive statistics analysis.

Table 2: Descriptive statistics

Variables	N	MEAN	Std. deviation
Sustainability	86	2.148	1.432
Process innovation	86	2.689	1.685
Product Innovation	86	1.988	0.611

Source: The researcher 2025.

The descriptive statistics for the sample of 86 firms reveal varying levels of perceived engagement across the variables. Process Innovation has the highest average score (Mean = 2.689), suggesting firms, on average, focus more on improving their internal operations. Conversely, Product Innovation has the lowest average score (Mean = 1.988), indicating less frequent engagement in developing new, sustainable products. Overall Sustainability (Mean = 2.148) falls between the two innovation variables.

Analysis of the dispersion highlights a key difference in consensus: Process Innovation shows the highest variability (Std. deviation = 1.685), meaning there is a wide gap between firms highly engaged in process change and those that are not. In contrast, Product Innovation exhibits the lowest variability (Std. deviation = 0.611), indicating a strong consensus among the respondents, clustered around the low mean score, suggesting that product-focused innovation efforts are generally low across the entire sample

Regression results

The regression results assessing the relationship between process innovation and sustainability on one hand and that of product innovation and sustainability is presented in Table III

Table 3: Regression results

Metric	**Model 1**	**Model 2**
Independent Variable	**Process Innovation**	**Product Innovation**
Model Fit		
R	0.815	0.767
R2	0.625	0.67
Adjusted R2	0.611	0.635
Std. Error of the Estimate	0.0251732	0.32556
ANOVA		
F-statistic	376.666	322.356
Sig. (p-value)	0.000	0.000
Coefficients		
Unstandardized β	0.282	0.278
Std. Error	0.785	0.834
Standardized β	0.142	0.134
t-statistic	**16.555**	**13.9**
Sig. (p-value)	**0.000**	**0.000**

Source: The researcher 2025.

Model 1: Process innovation and sustainability

Model 1 strongly suggests that Process Innovation is a significant, positive predictor of Sustainability. The model exhibits a strong positive correlation (R = 0.815$) and is highly statistically significant overall (F = 376.666, p = 0.000). Process Innovation successfully accounts for 62.5% of the variability observed in Sustainability (R^2 = 0.625). The positive unstandardized coefficient (β = 0.282$) confirms that a one-unit increase in Process Innovation leads to a 0.282$ unit increase in Sustainability, indicating that efforts

focused on improving operational efficiency, internal resource management, and cleaner production methods are highly effective strategies for enhancing overall sustainability performance.

Model 2: Product innovation and sustainability

Model 2 similarly establishes that Product Innovation is a highly significant and positive driver of Sustainability. This model is also strongly correlated (R = 0.767$) and highly significant overall (F = 322.356, p = 0.000) Product Innovation marginally outperforms the first model in explanatory power, accounting for 67.0% of the variance in Sustainability (R^2 = 0.670$). The unstandardized coefficient (β = 0.278) is positive and statistically significant, revealing that a one-unit increase in Product Innovation results in a 0.278 unit increase in Sustainability, underscoring the critical role of developing sustainable materials, product designs, and circular business models in achieving sustainability goals.

Discussion of findings

The empirical findings from the regression analysis clearly support the theoretical framework, establishing a positive and statistically significant relationship between both Process Innovation and Product Innovation and the dependent variable, Sustainability. The models were highly significant overall and consistent with prior studies like those by Hilmi et al. (2010) and Vukovic et al. (2025). Specifically, the coefficients confirmed the positive impact of both process innovation and product innovation. This indicates that efforts in both operational efficiency (process) and sustainable product development are equally powerful and statistically valid pathways for firms aiming to improve their sustainability performance.

The models demonstrated strong explanatory power, though they differed slightly in their capacity to account for the variance in sustainability. This marginal difference suggests that while both types of innovation are crucial, the development of new, sustainable products or services may have a slightly broader impact on a firm's overall sustainability metrics. This result contrasts with some prior research, such as NG (2020), which, when studying the impact on financial performance, found that product innovation had no significant effect, highlighting a key difference in how these innovation types of influence sustainability outcomes versus purely financial outcomes.

5. Conclusion

In conclusion, the results unequivocally support the notion that innovation is a core element of sustainable business practice. The strong significance and high R-squared values across both models provide robust evidence that firms cannot achieve superior sustainability without strategic investment in both improving their internal processes (e.g., cleaner production) and redesigning their offerings (e.g., circular economy products). The findings reinforce the consensus within current literature that continuous process and product innovation are not merely complementary but are equally indispensable levers for achieving long-term sustainable competitive advantage in the contemporary business environment.

The core recommendation is that firms must pursue a concurrent, dual-focus innovation strategy to maximize sustainability gains, as both Process Innovation and Product Innovation were found to have an equally powerful and statistically valid positive impact on sustainability. This means firms must avoid allocating resources to one another, instead mandating strategic investment in both improving internal operations through process innovation and Product Innovation. Furthermore, while both are necessary, the recommendation suggests that firms should strategically leverage Product Innovation for broader, market-facing sustainability impact.

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