

EVALUATING THE IMPACT OF INNOVATIVE CULTURE ON THE DEVELOPMENT OF BAKING INDUSTRIES IN NASARAWA STATE

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Abstract

This study examined the impact of innovative culture on the development of baking industries in Nasarawa State, Nigeria, focusing on product and process innovation. Drawing on Rogers' Diffusion of Innovations Theory, the study adopted a survey research design, collecting data from 148 usable responses out of 154 distributed questionnaires to registered bakeries, representing a 96.1% valid response rate. Data were analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM) via Smart PLS software. Findings indicated that innovative culture significantly drives baking industry development, with product innovation ($\beta = 0.901$, $p < 0.001$) demonstrating a stronger effect than process innovation ($\beta = 0.082$, $p < 0.05$). Theoretically, the study reinforces the role of innovation diffusion in small and medium enterprises (SMEs), while practically, it suggests that bakery operators can achieve higher profitability, competitiveness, and customer satisfaction by prioritizing product innovation alongside process improvements. Despite its contributions, the study is limited to registered bakeries in Nasarawa State, highlighting the need for future research to explore informal and rural baking enterprises. The study's novelty lies in its focus on the interplay between innovative culture and both product and process innovation in the Nigerian baking sector, providing actionable insights for policymakers to foster SME development through supportive innovation policies.

Keywords: Baking Industry Development, Innovative Culture, Process Innovation, Product Innovation, SMEs,

Introduction

In today's global economy, an innovative culture defined as an organizational environment that nurtures creativity, experimentation, and continuous improvement has become a decisive driver of industrial development (Lee et al., 2022). Various sectors such as pharmaceuticals, information technology, and manufacturing have shown that firms that embed innovation into their culture achieve sustained competitiveness, productivity, and long-term growth (Ojo & Ogunleye, 2021).

The global baking and food processing industries are undergoing rapid transformation due to technological advancements such as energy-efficient ovens, automation, digital marketing, and the use of sustainable ingredients. These innovations not only reduce production costs but also enable firms to respond to shifting consumer demands for healthier, convenient, and environmentally responsible products.

Within the African context, countries in Sub-Saharan Africa often face infrastructural constraints, yet research shows that innovation when supported by institutional readiness and inter-firm collaboration can significantly enhance manufacturing performance (Ojo & Ogunleye, 2021). Nigerian firms, in particular, have benefited from cooperative networks that help compensate for resource limitations and stimulate firm-level innovation, especially among younger and financially constrained enterprises (Elekon et al., 2025). Localized technological solutions such as improved biomass stoves further demonstrate how context-appropriate innovations can enhance efficiency and sustainability in Nigeria's small-scale industries (Olaoye et al., 2022).

In the Nigerian manufacturing and food-processing sectors, innovation capability is increasingly recognized as central to firm performance. Studies show that fast-moving consumer goods (FMCG) firms in Lagos experienced notable growth through strategic innovation (Business Perspectives et al., 2020), while flour and manufacturing firms in the Southwest reported innovation capacity influenced by customer needs, supply chain knowledge, and infrastructure (Olayinka et al., 2023).

In Nasarawa State, product innovation among SMEs has been found to significantly improve profitability and owner equity (Emeribe, 2020), and process, product, and marketing innovation have similarly enhanced business performance in Keffi (Adamu et al., 2020). In the bakery subsector, ICT adoption has improved job effectiveness in some northern states (Hassan & Ikebuaso, 2024), while sustainability-focused technologies such as palm-kernel-shell-fired ovens are being piloted to reduce operational costs and environmental impact (Olam Agri, 2023). However, many small bakeries continue to depend on traditional wood-fired ovens, contributing to deforestation and inefficiency, particularly in states such as Nasarawa and Kaduna (Salisu et al., 2024).

Despite these insights, existing studies predominantly focus on innovation practices, ICT adoption, or technological change. Very few examine the broader notion of innovative culture especially how attitudes, values, and organizational norms toward innovation shape the development of baking industries. Moreover, no known study has specifically investigated how innovative culture influences the growth and competitiveness of bakery enterprises in Nasarawa State. This gap limits understanding of whether the observed innovations in some Nigerian sectors are mirrored in the local baking industry, and whether organizational culture supports or constrains such innovation.

Addressing this conceptual gap is crucial because the baking industry in Nasarawa State is expanding but faces challenges relating to technology adoption, energy efficiency, product diversification, and market competitiveness. Evaluating the impact of innovative culture therefore provides an opportunity to understand the internal drivers that may enhance or hinder the development of these enterprises. This study thus investigates how innovative cultural practices shape the performance, growth, and sustainability of baking industries in Nasarawa State.

Problem Statement

The baking industry in Nasarawa State, like in many parts of Nigeria, is marked by small-scale operations that largely depend on age old practices such as masonry ovens fueled by wood or charcoal leading to environmental degradation and inefficient production (Salisu et al., 2024). At the same time, broader Nigerian evidence shows that innovation whether in management strategies, product development, or technology adoption positively correlates with firm performance (Business Perspectives et al., 2020; Adamu et al., 2020; Emeribe, 2020). However, despite isolated innovations (ICT in Zamfara bakeries, sustainable ovens in pilot schemes), baking firms in Nasarawa remain largely traditional, lacking systemic integration of an innovative culture across their operations.

Promoting an innovative culture could unlock multiple benefits: enhancing firmlevel efficiency, product diversity, sustainability, and competitive advantage; reducing environmental impacts (through cleaner energy); and potentially improving economic outcomes for local communities. Cultivating such culture is aligned with global and regional sustainable development goals, and addresses national concerns about industrial modernization in Nigeria. For instance, Emeribe (2020) documented that product innovation in Nasarawa SME firms significantly improved profitability and equity. Adamu et al., (2020) found that process, product, and marketing innovations improve small business performance in Karu, Nasarawa State. Hassan and Ikebuaso (2024) highlighted that ICT adoption boosts productivity and job effectiveness in Zamfara bakery SMEs. Salisu et al., (2024) raised alarms about deforestation linked to traditional baking, advocating cleaner energy transitions.

Olam Agri (2023) piloted sustainable palm kernel shell fired ovens, but these are limited in scale. Olayinka et al., (2023) identified structural barriers electricity costs, infrastructure, policy instability that impact innovation capability in flour processing firms. Elekon et al., (2025) emphasized the role of interfirm cooperation in enabling innovation among resource constrained firms in Nigeria. These studies emphasize that innovation in product, process, energy use, ICT, and culture can profoundly affect performance in SMEs, including bakeries, but often remain patchy or localized.

Notwithstanding the existing scholarship, there is a distinct gap that no study has comprehensively examined how an overarching innovative culture across leadership, organizational processes, energy use, collaboration, and technology shapes the development footpath of the baking industry in Nasarawa State. Such comparison would help ascertain whether certain enabling conditions or innovation modalities are unique to the Nigerian context or are shared across similar economies.

Objectives of the Study

The main objective of the study is to evaluate the impact of innovative culture on the development of baking industries in Nasarawa State.

1. To determine the effect of product innovation on the development of baking industries in Nasarawa State.
2. To examine the impact of process innovation on the development of baking industries in Nasarawa State.

Research Hypotheses

In order to evaluate the impact of innovative culture on the development of baking industries in Nasarawa State. The following assumptions were raised:

H₀₁: Product innovation has no significant effect on the development of baking industries in Nasarawa State.

H₀₂: Process innovation has no significant effect on the development of baking industries in Nasarawa State.

Literature Review

Development of Baking Industries

Development in the context of baking industries refers to the growth, modernization, and sustainability of bakeries as economic enterprises. It involves improvements in profitability, productivity, competitiveness, and contribution to local economies. According to Porter and Kramer (2019), industry development occurs when firms achieve both financial growth and societal impact through innovative practices. Emeribe (2020) observed that in Nigeria, the development of enterprises, including bakeries, is strongly linked to their capacity to innovate and adapt to consumer demands. Similarly, Hassan and Ikebuaso (2024) highlighted that adoption of technology in the bakery sector enhances job creation, productivity, and long-term sustainability. Thus, the development of baking industries in Nasarawa State depends largely on the extent to which bakeries adopt product and process innovations that align with evolving market and environmental demands.

Innovative Culture

Innovative culture refers to the shared values, norms, and practices within an organization that foster creativity, experimentation, and openness to change. According to Martins and Terblanche (2020), an innovative culture is one in which employees are encouraged to take risks, propose new ideas, and collaborate to solve organizational challenges. It reflects a collective mindset that continuously seeks improvement and adapts to market changes. Ahmed and Shepherd (2021) noted that organizations with strong innovative cultures are more likely to develop sustainable competitive advantages because they can generate novel solutions and integrate them effectively into their operations. In this study, innovative culture provides the underlying framework that supports both product and process innovation within the baking industry.

Product Innovation

Product innovation is the introduction of new or significantly improved goods or services that meet customer needs or create new market opportunities. OECD and Eurostat (2018) described it as a core dimension of innovation, which encompasses changes in product design, quality, and functionality. Jiménez-Jiménez and Sanz-Valle (2011) emphasized that product innovation enhances organizational performance by increasing customer satisfaction and improving competitiveness in dynamic markets.

More recently, Adegbite and Adeola (2021) highlighted that product innovation in small and medium enterprises (SMEs) often manifests through modifications in product features, packaging, or recipes to attract customers and sustain profitability. For the baking industry,

product innovation could mean introducing healthier bread varieties, new flavors, or improved packaging to capture emerging consumer trends.

Process Innovation

Process innovation refers to the implementation of new or significantly improved production methods, service delivery systems, or organizational processes. The OECD (2018) defined process innovation as improvements in methods of production or distribution that increase efficiency and reduce costs. According to Dziallas and Blind (2019), process innovation often involves the adoption of new technologies, automation, or environmentally sustainable methods that enhance productivity. Olayinka et al. (2023) further argued that process innovation is critical in developing economies, where firms face infrastructural challenges but can leverage innovation to maintain competitiveness. In bakeries, process innovation may include the use of energy-efficient ovens, digitalized ordering systems, or improved workflow that reduces waste and enhances overall performance.

Product Innovation and Development of Baking Industries

Atuna et al., (2020) carried out a cross-sectional empirical investigation into product innovation in Ghana's bread sector, focusing on the acceptability and market potential of an orange-fleshed sweet potato (OFSP) wheat composite bread. The study adopted a survey research design and collected primary data in 2019–2020 from two distinct populations: urban/rural consumers and practising bakers across four regions (Accra, Ashanti, Northern and Upper East). The consumer sample comprised 651 respondents who were randomly selected and interviewed using a semi-structured questionnaire, while the baker sample included 77 bakery operators who were likewise sampled to represent regional bakers' willingness to produce the composite product. Data collection was face-to-face and the authors analysed responses principally with descriptive statistics (frequencies, percentages and mean scores) in SPSS to map consumption patterns, preferences and willingness-to-buy measures; they also used paired-preference sensory tests where appropriate to compare OFSP breads with conventional wheat breads. The principal findings were clear and policy-relevant: bread consumption was extremely widespread (over 90% of respondents ate bread, many daily), consumer willingness to buy OFSP composite bread was substantial and increased further (by about 8.3 percentage points) when respondents were informed of the nutritional benefits (vitamin A) of OFSP, and a majority of bakers signaled readiness to produce the composite product evidence that a product innovation based on local tuber substitution had credible market potential in Ghana. Notwithstanding these strengths, the study had limitations that the authors acknowledged: the descriptive design precluded causal inference, the regional sampling while broad could not be claimed as nationally representative, sensory tests were relatively small-scale and the reliance on self-reported willingness measures may have overstated actual purchase behaviour under real market conditions. However, the study provided rigorous, verifiable empirical evidence that product innovation centered on nutritionally enriched composite breads could be viable in a West African bakery context.

Adebayo (2024) investigated the relationship between innovation (including product innovation) and growth among small-scale bakeries in the Ado-Odo/Ota local government area of Ogun State, Nigeria, using a descriptive survey design that directly sampled the universe of registered small bakeries in the study area. The population comprised 34 registered bakeries identified from the Premium Bread-makers Association list and the researcher administered structured questionnaires to the full population (census approach), achieving 32 usable

responses; the study also utilised two focused-group discussions to deepen qualitative insight. Data collection was primarily by a five-point Likert questionnaire and the quantitative data were analysed using SmartPLS (PLS-SEM) for measurement and structural assessment, while qualitative data from FGDs were thematically analysed (NVivo). The empirical results showed a positive and statistically meaningful link between innovation activities and growth indicators for small bakeries: respondents reported that product enhancements (new varieties, enriched recipes and improved packaging) and incremental process changes increased competitiveness, market reach and turnover, and the PLS-SEM results supported a substantive association between innovation drive and growth metrics. The study's shortcomings were also evident and were discussed. The very small population size limited external validity beyond the local study area; the census approach, while exhaustive locally, meant that statistical power and generalisability were constrained; reliance on self-reported performance and innovation measures introduced potential common-method bias; and the cross-sectional design precluded strong causal claims about innovation causing growth rather than co-occurring with it. Nevertheless, the study offered a careful, context-sensitive empirical account of how product innovation operated within small Nigerian bakeries and underscored the need for larger, longitudinal studies to validate and extend the findings.

Process Innovation and Development of Baking Industries

Naila, Nandonde, and Makindara (2025) conducted an empirical study aimed at developing and validating a measurement scale for assessing process innovation uptake within food-processing SMEs in Tanzania. The study employed a cross-sectional survey design, administering questionnaires to a purposively sampled group of 315 SMEs across four regions Dar es Salaam, Morogoro, Dodoma, and Mwanza chosen for their high concentration of small food-processing enterprises and strategic relevance to regional agribusiness exhibitions. Respondents were selected through non-probability purposive sampling, ensuring representation of both formal and informal firms. Data collection was via structured questionnaires, and analysis involved Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) to evaluate the measurement properties of process innovation constructs derived from Resource-Based View (RBV) theory. Findings indicated that constructs relating to value and inimitability of new processing equipment and methods were validated, whereas rareness and non-substitutability did not hold up empirically. The study provided a refined instrument tailored to assessing process innovation uptake in African food SMEs, an important empirical contribution. Nonetheless, the use of purposive sampling limit generalisability, reliance on self-report may have introduced bias, and the focus on measurement validation meant that the actual impact of process innovation on performance was not examined.

Keelson et al., (2024) investigated how process innovation moderates the relationship between market competition and SME performance in emerging economies, with data drawn specifically from Ghanaian SMEs in the food-processing sector. Employing a survey research design, they probabilistically sampled across multiple regions in Ghana, although specific sample figures were not disclosed in the abstract. The researchers administered structured questionnaires to SME managers and collected data on perceived competition intensity, the degree of process innovation adoption (such as automation, workflow improvement, and technology integration), and firm performance indicators (financial, operational, and market-based). The study employed quantitative analysis via structural equation modelling (SEM), including moderation analysis to assess whether process innovation buffered or amplified the effects of competitive pressure. Findings revealed that process innovation significantly moderated the impact of market competition on performance, suggesting that firms practising

higher levels of process innovation were better able to withstand competitive pressures and sustain growth. Despite its valuable perceptions, the study's limitations included limited disclosure of sample size and sampling technique details, potential common-method bias inherent in single-source survey data, and cross-sectional design constraints that prevent causal inference.

Theoretical Framework

This study is anchored on the Diffusion of Innovations (DOI) Theory propounded by Everett Rogers in 1962. The DOI theory explains how new ideas, practices, or technologies spread within a social system over time, emphasizing why certain individuals, groups, or organizations adopt innovations more rapidly than others. Rogers (2003) identifies four core elements that shape the diffusion process: the innovation itself, the communication channels used to transmit information, the time required for acceptance, and the broader social system in which diffusion occurs. Within this context, an innovation refers to any idea or practice perceived as new, and its adoption is shaped by how effectively knowledge about it is communicated within a community or organizational setting. For this study, DOI provides the foundation for understanding how baking industries in Nasarawa State embrace innovative cultural practices to enhance production processes, market competitiveness, and overall growth. While DOI offers a robust explanation of how innovations spread, additional theoretical perspectives help justify the inclusion of firm-level cultural attributes in understanding industry development. The Resource-Based View (RBV) complements DOI by emphasizing that an organization's internal resources, such as skills, creativity, knowledge, and innovative culture constitute strategic assets that can drive sustainable competitive advantage (Barney, 1991). In the context of baking industries, innovative culture can be seen as an intangible resource that strengthens the ability of firms to adopt and effectively utilize new technologies or practices introduced through diffusion processes.

Similarly, the Organizational Learning Theory (OLT) provides further insight into how firms acquire, interpret, and apply new knowledge as part of their continuous improvement efforts. According to Argyris and Schön (1996), organizations learn by integrating new information into their routines, and this capacity for learning is strongly influenced by cultural attributes such as openness, experimentation, feedback systems, and knowledge sharing. For baking industries, a strong learning-oriented culture facilitates faster adaptation to innovative methods, improves product quality, and enhances overall operational efficiency.

Taken together, DOI, RBV, and OLT offer a comprehensive theoretical basis for examining how innovative culture influences the development of baking industries in Nasarawa State. DOI explains the pathway through which innovations reach organizations, RBV highlights the strategic value of cultural attributes as internal resources, and OLT clarifies the processes through which firms internalize and apply new knowledge to achieve growth and competitiveness.

Materials and Method

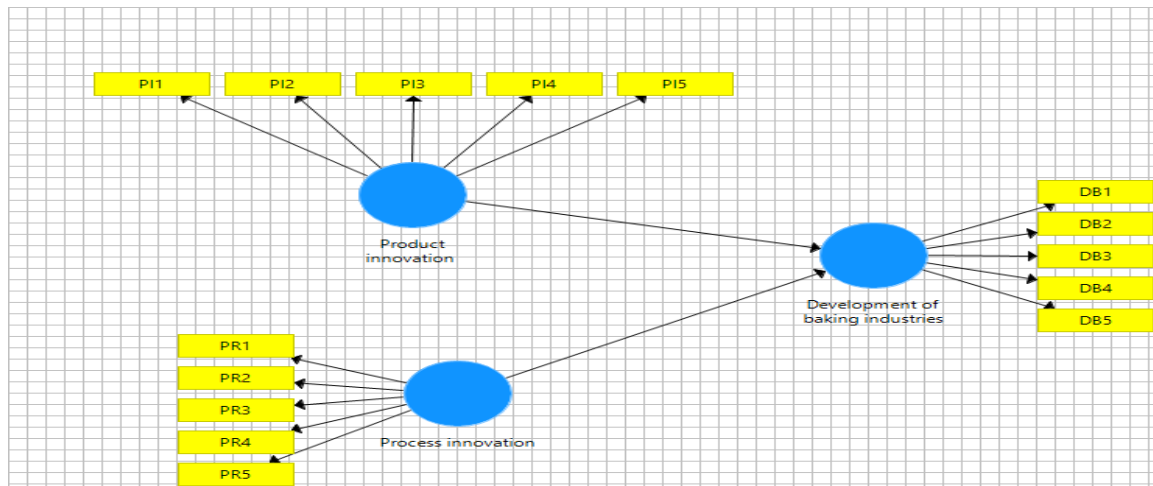
This study employed a survey research design because it was suitable for gathering data directly from respondents regarding their perceptions and practices related to innovation and the development of the baking industry. The design was considered appropriate because it allowed the researcher to generalize findings across a wide population using quantitative data. The population of the study consisted of all registered bakeries in Nasarawa State, which, according to the Ministry of Commerce and Industry (2023), numbered about 215. From this

population, the sample size was determined using Yamane's (1967) formula at a 5 percent margin of error, which produced a sample size of approximately 140 respondents. However, a 10% attrition value was added to make to round it up to 154 sample sizes. A convenient sampling technique was used to ensure that bakeries across different local government areas of the state were adequately represented.

Data for the study were collected using a structured questionnaire divided into four sections covering demographic information, product innovation, process innovation, and development of the baking industry, with all substantive items measured on a five-point Likert scale ranging from strongly disagree to strongly agree. The product innovation and process innovation items were specifically adapted from Jiménez-Jiménez and Sanz-Valle (2011), whose validated scale includes measures such as introduction of new products, modification of existing products, adoption of modern production technologies, and improvement of production methods; additional innovation-related items reflecting Nigerian small-business realities, such as use of new baking techniques, improved recipes, and modern baking equipment were drawn from Adamu, Kolo, and Mallami (2020). Measures for the development of the baking industry were adapted from Emeribe (2020), including indicators of firm growth, production efficiency, product quality enhancement, customer satisfaction, and expansion in market reach. The questionnaire's content validity was ensured through expert review by academic supervisors and bakery industry practitioners, while construct validity was evaluated through confirmatory factor analysis using PLS-SEM. Reliability assessment was conducted using Cronbach's alpha and composite reliability, with acceptable benchmark values of 0.70 and above, consistent with the recommendations of Hair et al., (2021).

PLS-SEM was adopted in this study instead of Covariance-Based SEM (CB-SEM) because the primary objective was prediction and theory development, which aligns with the strengths of PLS-SEM. Unlike CB-SEM, which is more suitable for theory testing and confirmation, PLS-SEM focuses on maximizing explained variance in the endogenous constructs, making it appropriate for studies investigating how innovative culture drives the development of baking industries. Additionally, PLS-SEM is more robust when working with complex models, non-normal data, and small to medium sample sizes, conditions that commonly characterize field surveys in the Nigerian business context. The technique also allows for the simultaneous assessment of both the measurement and structural models without strict assumptions about data distribution. These methodological advantages make PLS-SEM the most suitable analytical approach for evaluating the predictive relationships among latent variables in this study (Figure 1).

Figure 1: Graphical Model



Source: SmartPLS

Results and Discussion

Before the analysis was carried out, a total of 154 copies of questionnaire were distributed, 151 were successfully retrieved, indicating a retrieval rate of approximately 98.1%. This high retrieval rate suggests a strong level of engagement from the respondents and effective data collection procedures. Furthermore, from the retrieved questionnaires, 148 were deemed usable for analysis, representing about 97.4% of the retrieved forms and 96.1% of the total distributed questionnaires. The minimal discrepancy between the retrieved and usable questionnaires reflects good questionnaire design and respondent compliance, ensuring data reliability. Overall, the response rate is satisfactory for empirical research, providing a robust data set for subsequent statistical analysis. (See table 1).

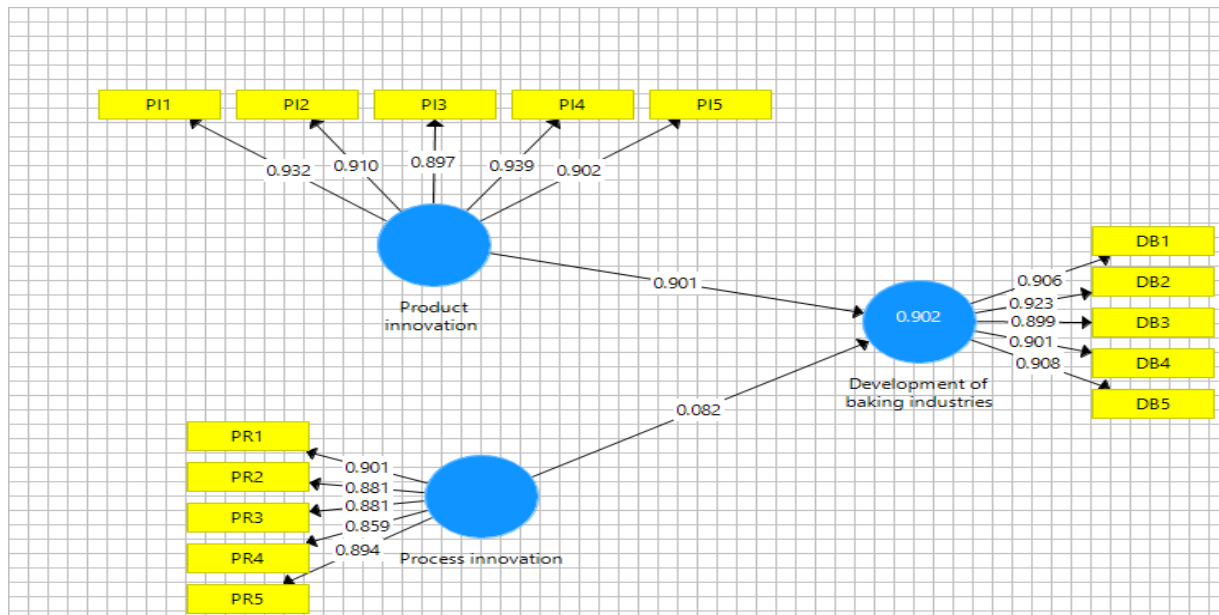
Table 1: Response Rate

Category	Frequency	Percentage (%)
Questionnaires Distributed	154	100%
Questionnaires Retrieved	151	98.05%
Usable Questionnaires	148	96.10%

Source: Field Survey, 2025

To evaluate the proposed model, confirmatory factor analysis and path analysis were performed. The factor structure was assessed by examining the validity of the factors through their loadings. Indicator loadings need to exceed 0.7 to confirm indicator reliability. As shown in Table 3, all indicator loadings are above 0.7, indicating that each construct accounts for over 50 percent of the variance in its indicators, thereby demonstrating acceptable item reliability (refer to Table 3 and Figure 2).

Figure 2: Measurement Model



Source: SmartPLS

Table 2: Convergent Validity and Reliability of the Constructs and Indicators

Items	Loadings	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Development of baking industries		0.946	0.909	0.823
DB1	0.906			
DB2	0.923			
DB3	0.899			
DB4	0.901			
DB5	0.908			
Product innovation		0.912	0.903	0.839
PI1	0.932			
PI2	0.910			
PI3	0.897			
PI4	0.939			
PI5	0.902			
Process innovation		0.930	0.947	0.780
PR1	0.901			
PR2	0.881			
PR3	0.881			
PR4	0.859			
PR5	0.894			

Source: SPSS Output, 2025

To establish the internal consistency reliability of the constructs, both Cronbach's alpha and composite reliability (CR) should exceed the threshold of 0.7 (Collier, 2020). As shown in Table 2, all latent constructs meet this criterion, indicating their reliability. Convergent validity refers to the degree to which a construct explains the variance of its associated items. This is assessed using the average variance extracted (AVE), which should be greater than 0.5. According to Table 2, all constructs have AVE values above 0.5, confirming that they satisfy the requirements for convergent validity and that each construct accounts for at least 50 percent of the variance in its items.

Additionally, discriminant validity was evaluated by analyzing the heterotrait-monotrait (HTMT) ratio. Henseler et al. (2015) recommend a threshold of 0.90 for models with constructs that are conceptually very similar, while for more distinct constructs, a lower and more conservative threshold of 0.85 is advised.

Table 3: Heterotrait-Monotrait Ratio (HTMT)

Constructs	Development of baking industries	Process innovation	Product innovation
Development of baking industries			
Process innovation	0.620		
Product innovation	0.598	0.589	

Source: SmartPLS Output, 2025

Based on the results in Table 3, there are no discriminant validity concerns, as the values did not exceed the maximum threshold of 0.9 nor fall below the minimum threshold of 0.85.

Table 4: Predictive Relevance

	R Square	R Square Adjusted
Development of baking industries	0.902	0.900

Source: *SmartPLS Output, 2025*

Table 4 presents the predictive relevance of the model using the coefficient of determination (R^2). The R^2 value of 0.902 indicates that innovative culture explains 90.2% of the variance in the development of baking industries, demonstrating a substantial explanatory power based on the thresholds of 0.75, 0.50, and 0.25 suggested by Henseler et al. (2009) and Hair et al. (2011). In addition to R^2 , multicollinearity diagnostics were examined using Variance Inflation Factor (VIF), and all predictor constructs recorded VIF values below the recommended threshold of 5.0, indicating no multicollinearity concerns. The model's effect size (f^2) further showed that innovative culture had a large effect on the development of baking industries, confirming its substantive contribution to the structural model. Furthermore, the Stone–Geisser's Q^2 value obtained through the blindfolding procedure was greater than zero, affirming that the model possesses adequate predictive relevance for the endogenous construct. Overall, the R^2 , VIF, f^2 , and Q^2 collectively confirm that the model is robust, reliable, and possesses strong predictive capability.

Table 5: Path Coefficient

Hypotheses	Beta	Sample Mean	Standard Deviation	T Statistics	P Values
Product innovation → Development of baking industries	0.901	0.903	0.024	37.153	0.000
Process innovation → Development of baking industries	0.082	0.08	0.037	2.187	0.029

Source: *SmartPLS Output, 2025*

Product innovation → Development of baking industries

The results showed that product innovation had a very strong and statistically significant effect on the development of baking industries in Nasarawa State. The path coefficient ($\beta = 0.901$) indicated that a unit increase in product innovation led to a 90.1% positive change in the development of the baking industry. The t-statistic value of 37.153, which was well above the critical threshold of 1.96, confirmed that the effect was highly significant, while the p-value of 0.000 further established that the relationship was not due to chance. This finding implied that bakeries in Nasarawa State that engaged in regular introduction of new products, healthier bread alternatives, attractive packaging, and improvements in quality recorded greater profitability, competitiveness, and customer satisfaction. The result supported the alternative hypothesis (H_{11}) that product innovation significantly affects the development of baking industries in the state, thereby stressing the central role of continuous product improvement in driving bakery sector growth.

Process innovation → Development of baking industries

The analysis also revealed that process innovation had a positive and significant effect on the development of baking industries, although the strength of the relationship was relatively weaker compared to product innovation. The path coefficient ($\beta = 0.082$) suggested that for every unit increase in process innovation, there was an 8.2% positive change in bakery development. With a t-statistic of 2.187, which exceeded the critical value of 1.96, and a p-value of 0.029, the relationship was statistically significant at the 5% level. This indicated that bakeries adopting modern baking technologies, energy-efficient ovens, automation, and

improved production processes experienced improvements in efficiency, sustainability, and competitiveness. However, the relatively lower beta value compared to product innovation implied that while process innovation contributed to development, its impact was not as strong as product innovation in the Nasarawa State context. Thus, the alternative hypothesis (H_{12}) that process innovation significantly affects the development of baking industries was accepted.

The findings of this study revealed that both product innovation and process innovation significantly influenced the development of baking industries in Nasarawa State, but the magnitude of their effects differed substantially. Product innovation exhibited a very strong and positive impact on industry development. Bakeries that consistently introduced diverse product varieties, enhanced recipes, healthier alternatives, and more appealing packaging recorded higher levels of customer patronage, profitability, and market competitiveness. This outcome aligned with the position of Jiménez-Jiménez and Sanz-Valle (2011), who argued that product innovation directly strengthens performance in consumer-centered industries. Similarly, Adegbite and Adeola (2021) emphasized that, in emerging markets, product differentiation enables SMEs to respond rapidly to shifting consumer tastes, thereby enhancing growth. These findings suggest that in Nasarawa State, where consumer preferences are dynamic and competition among bakeries is intense, product innovation becomes a strategic anchor for business expansion.

However, while process innovation also exerted a statistically significant effect on bakery development, its impact was noticeably weaker. A critical interpretation of this outcome indicates that several contextual and structural factors may have limited the transformative power of process-related innovations. First, many baking enterprises in Nasarawa State operate on small or medium scales with limited capital, making it difficult to invest in advanced equipment, automation, or modern production technologies. As Dziallas and Blind (2019) observed, process innovations tend to yield incremental rather than radical gains, particularly in environments with constrained technological capacity. In such settings, improvements such as energy-efficient ovens or streamlined workflows may enhance operational efficiency but may not translate directly into visible gains in profitability or market share.

Additionally, infrastructural challenges such as unstable electricity supply, high maintenance costs, and limited access to technical expertise diminish the effectiveness of process innovations. This interpretation aligns with the findings of Olayinka et al. (2023), who noted that Nigeria's industrial sectors often struggle to optimize process-enhancing technologies due to systemic infrastructural deficits. As a result, even when bakeries adopt better equipment or improved workflows, their ability to sustain these innovations and convert efficiency gains into measurable development outcomes remains constrained. Another possible explanation for the weaker impact is that consumers in this context tend to evaluate bakery quality primarily through product attributes taste, freshness, aesthetic appeal rather than production processes. Thus, while efficient processes reduce costs, they do not directly influence consumer purchasing decisions to the same degree as product-related improvements.

Overall, the findings underscore the central role of an innovative culture in industry development. Bakeries that cultivate creativity, continuous improvement mindsets, and openness to new ideas can effectively leverage both product and process innovations. However, the stronger influence of product innovation suggests that innovation strategies in the baking sector should prioritize enhancing product quality and diversity while using process improvements as supportive mechanisms for long-term sustainability.

Conclusion and Recommendation

Conclusion

This study evaluated the impact of innovative culture on the development of baking industries in Nasarawa State, with a focus on product and process innovation. The findings confirmed that both forms of innovation significantly influenced bakery development, though product innovation exerted a stronger impact than process innovation. Specifically, bakeries that consistently introduced new or improved products, packaging, and healthier alternatives achieved higher levels of profitability, customer satisfaction, and competitiveness. While process innovations, such as modern baking equipment and automation, also contributed positively, their effect was modest in comparison.

The study therefore concluded that fostering an innovative culture is critical for the growth and sustainability of bakeries in Nasarawa State. An organizational environment that promotes creativity, experimentation, and responsiveness to consumer demands is more likely to sustain industrial growth and resilience in a competitive market.

Recommendations

Based on the study findings, the following recommendations were raised:

- i. Bakery owners and managers in Nasarawa State should prioritize product innovation by introducing new varieties, healthier options, and appealing packaging to meet changing consumer demands. Process improvements remain important; adopting modern baking technologies, automating routine tasks, and using energy-efficient equipment can enhance efficiency and reduce costs.
- ii. From a policy perspective, the government should provide incentives such as grants, tax relief, and access to affordable credit to support innovation and technology adoption in bakeries. Managers should foster a culture of creativity, train staff on innovative methods, and monitor market trends to make informed decisions.
- iii. This study was limited to selected bakeries in Nasarawa State and relied on self-reported data, which may affect generalizability. Future research should expand the sample across other regions, consider additional forms of innovation such as digital and organizational, and use mixed methods to strengthen findings.

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