

MODERATING EFFECT OF INNOVATION ON OPERATIONAL MANAGEMENT AND ORGANIZATIONAL PERFORMANCE OF FOOD AND BEVERAGE COMPANIES IN KADUNA METROPOLIS.

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Abstract

This study explores the moderating role of innovation in the relationship between operational management and organizational performance among food and beverage companies in Kaduna Metropolis, Nigeria. Employing a cross-sectional survey design, primary data were collected from 452 respondents across selected firms and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Findings reveal that operational management encompassing planning, supervision, product development, and inventory control significantly enhances organizational performance. Innovation was also found to have a positive and direct impact on performance. However, contrary to expectations, innovation did not significantly moderate the relationship between operational management and performance, suggesting that both contribute independently to organizational outcomes. The study concludes that while innovation and operational strategies are vital drivers of performance, their integration does not necessarily produce synergistic effects. It recommends that firms pursue parallel strategies for innovation and operational efficiency, supported by dedicated resources, training, and policy frameworks. These insights are valuable for managers, policymakers, and researchers aiming to optimize organizational performance in competitive and resource-constrained environments.

Keywords: Innovation, Operational Management, Organizational Performance and Food and Beverage Sector

1.1 Introduction

The food and beverage industry is a major contributor to the Nigerian economy, accounting for over 22% of the nation's manufacturing output (Efini, 2019). However, the competitiveness and profitability of food and beverage companies in Nigeria face several challenges. Key among these is the high cost of production arising from inefficient operational management and an inability to innovate (Ogaboh et al., 2020). Previous studies have indicated the potential for innovation to enhance operational management and corporate performance in the food and beverage sector (Adeoye & Epemolu, 2021; Nwosu & Chidozie, 2022). However, the role of innovation specifically as a moderating factor between operational management and firm performance in the food and beverage industry within the Nigerian context remains unclear and under-researched.

In this context, operations management is a great interest from various quarters of the sector, including industrial psychology, comportment management and management of human capital to improve employee productivity performance in organisations (Heinemann, 2019). The foundation of any organization's performance is deeply rooted in its operational capacity, particularly through strategic corporate planning (Heinemann, 2019). In operations

management, effective planning ensures a well-defined blueprint for employee responsibilities and workflows, which enhances process efficiency, internal relationships, and the reliability of delivery systems.

Operations supervisors in today's global economy face complex challenges due to heightened competition, technological advancements, and evolving consumer expectations (Prabhala, 2021). These shifts have transferred power from producers to consumers, demanding that operations managers deliver higher-quality products, faster service, and enhanced customer experiences while reducing operational costs. Operations management must now focus on resource optimization, cost control, and customer satisfaction to enhance productivity and maintain organizational competitiveness (Heinemann, 2019).

Statement of the Problem

Despite the food and beverages firms in Nigeria utilizes the procedures or operations to take inputs and make yields that fulfil clients., inadequate market research leads to a lack of understanding of consumer preferences, resulting in the production of goods that may not meet market demands (Schroeder, 2018). Inefficient production planning has led to overproduction or stockouts, causing disruptions in the supply chain and impacting overall profitability. Poor planning in allocating resources, both human and capital, has led to inefficiencies and increased production costs (Efini, 2019).

The process of embracing technology for inventory management, production processes, and supply chain tracking by firms can be challenging, especially for smaller firms with limited resources (Nwosu & Chidozie, 2022). The food and beverage industry in Nigeria is likely to be highly competitive. Staying innovative and differentiating products can be challenging, especially for smaller firms. Also, timely and efficient delivery of products to retailers or consumers is crucial. Challenges in logistics and distribution can lead to product spoilage or stockouts. Inconsistent supervision within food and beverage companies has significantly undermined quality control efforts, often resulting in the production of substandard goods that jeopardize brand reputation and customer trust (Yusuf, 2023).

From an operations management perspective, supervision is crucial for ensuring adherence to quality standards, and any lapses can lead to defective products that damage the organization's competitive position. More so, insufficient focus on research and development result in a lack of product innovation, making it difficult to keep up with changing consumer preferences (Adeoye & Epemolu, 2021). Poor inventory management has led to overstocking of perishable items, resulting in wastage due to expiration or spoilage. Causing inaccurate inventory tracking may lead to stockouts, causing disruptions in the supply chain and potential loss of customers (James-Moore, 2016).

However, the role of innovation specifically as a moderating factor in the operational management-performance relationship among food and beverage firms remains unclear within the Nigerian context. Most studies such as Adeoye and Epemolu, (2021); Adegorila (2021) and Abbas (2020) on innovation in the Nigerian food and beverage sector have focused on its direct effects on overall firm performance, with limited emphasis on how innovation interacts with operational management elements to impact performance. Therefore, this study aims to examine if innovation has any moderating effects on the link between operational management practices and the organizational performance of food and beverage companies in Kaduna metropolis.

Research Questions

The following questions are formulated to attain the laid objectives.

- i. What is the influence of operational management on organizational performance of food and beverage companies in Kaduna metropolis?
- ii. To what extent does innovation influence organizational performance of food and beverage firms in Kaduna metropolis?
- iii. What is the moderating effect of innovation on operational management and organizational performance of food and beverage companies in Kaduna metropolis?

Objective of the Study

The main objective of the study is to examine the moderating effect of innovation on operational management and organizational performance of food and beverage companies in Kaduna metropolis.

The specific objectives are to;

- i. Examine the influence of operational management on organizational performance of food and beverage companies in Kaduna metropolis.
- ii. Examine the extent innovation influence organizational performance of food and beverage firms in Kaduna metropolis.
- iii. Examine the moderating effect of innovation on operational management and organizational performance of food and beverage companies in Kaduna metropolis.

2.1 Literature Review

Conceptual Framework

This sub-chapter views the different literature of previous scholar in regards to the concept of organizational performance and operations management. Also, the conceptual framework of innovation is been operationalized.

Organizational Performance

Organizational performance refers to the assessment and measurement of how well an organization achieves its goals, objectives, and outcomes. Organizational performance refers to the ability of an organization to achieve its stated goals and objectives effectively and efficiently (Yusuf, 2023). Yusuf, (2023) define performance as the attained outcomes of actions with skills of employees who perform in some situation. Organizational performance is the result produced by the efforts of the organization's people and resources. It includes financial measures, market share, customer satisfaction, and other indicators of success (Sadri, 2020).

Operation Management

According to James (2019) operations management is the management of that part of an organization that is responsible for producing goods and/or services. That is, the act of working together successfully means that everyone understands not only their own role, they also understand the roles of others. Operational management practices refer to every procedure or methodological solution which is carried out on the shop floor and which is meant to improve the efficiency of production and logistic processes (Harry, 2019).

Operations management is concerned with the design, management, and improvement of the systems that create the organisation's goods or services (Parker, 2021).

Innovation

Innovation refers to the introduction of new or significantly improved products, processes, services, technologies, or ideas by an organization. It involves deliberate application of information, imagination and initiative which leads to the introduction of something new (Adeoye & Epemolu, 2021). The new thing could be a product, service, process, business model etc. Innovation results when new ideas, concepts, methods, or technologies are actually implemented rather than just being thought of. It is about execution of an idea (Efini, 2019). Innovation leads to introduction of new products, opens up new markets and opportunities for growth, improves operational efficiency through new processes, enhances competitiveness of businesses (Mohammed, Ibrahim, & Embat, 2021).

Empirical Review

This section provides different reviews of literature from different scholars in relation to the moderating effect innovation has on the operational management and performance of food and beverage companies.

Campbell, Fowles and Weber (2020) in their study 'Operational structure and job specification in public health nursing' found that there is a significant relationship between organizational structure variables and job satisfaction for public health nurses employed in down state Illinois local health departments. 764 questionnaires were administered to non-managing nurses in three Belgian general care hospitals and the results showed negative effect of centralization and positive effects of specification and formalization of nurses on job satisfaction. They discovered that the best predictors of organizational structure were dimensions of centralization and formalization which related significantly but negatively to job satisfaction.

Eshiett (2022) examine the effect of new product development on organizational performance, additional challenging issues include; the far-reaching effect of market research, specific allocation of budget for NPD by manufacturing firms and effective training and re-training of personnel for Research and Development (R&D). The study evaluates the concept of new product development and organizational performance by adopting the dynamic capability theory. The descriptive research methodology was adopted in which 302 questionnaires were administered to respondents who were basically staff, distribution intermediaries and end users of products in Uyo, Akwa Ibom State and Port Harcourt Rivers State. The result of the study revealed that there was a significant relationship between New Product Development and organizational performance.

Bosire (2021) examined the effect of operation strategies on performance of automotive industry in Kenya. The specific objectives were to determine the effects of customer driven strategies, to establish the influence of product and service development, to determine the effects of developing core competencies and to establish the effects of competitive priorities on performance of Scania East Africa Limited. The study employed the use of descriptive survey research design to study effects of operation strategies on organizational performance in the automotive industry in Kenya. The study sampled 97 employees of Scania East Africa Limited. Purposive sampling technique was used in selection of respondents in each

department. The data collection instruments used in this study was questionnaires. The study findings showed positive correlation between customer driven strategies, product development strategies, personnel development strategies, competitive advantages strategies and organization performance. The study concluded that organizations used varies customers driven strategies which attract more new customers hence achieved a wider range of market hence improve performance and loyalty to the organization and increased product flexibility and superior customer value delivery impacts positively towards organizational performance.

Musa, Abdu, and Jimoh (2022) examine the moderating effects of innovation on the relationship between microcredit and financial performance of microenterprises in Kaduna metropolis was examined. The study formulates two hypotheses and applied Multiple Regression technique aided by SPSS to analyze the relationship between financial performance and microcredit with innovation as moderator. Primary data used, were collected from a sample size of 413 owners-managers of microenterprises using structured questionnaires. The finding of the study is that micro-credit significantly has positive effect on the financial performance of microenterprises in Kaduna metropolis. Findings also revealed the moderating effect of innovation on micro-credit and financial performance as significant. It is recommended micro-finance institutions increase the quantum of microcredit so as to enhance and improve the financial performance of microenterprises. Also, the microfinance institutions should employ innovation which may include product innovation, process innovation, technological innovation among others, to strengthen the relationship between micro-credit and financial performance of the microenterprise.

Adegoriola (2021) examines the effect of innovation on Small and Medium Enterprises (SMES) performance in Abuja Municipal Area Council, FCT-Abuja. The research design adopted for this study is the descriptive research design; while structured questionnaire was administered to 265 SMEs in Garki, Wuse and Utako districts of AMAC, FCT. The study sought out how innovation (product innovation and marketing innovation) enhances performance of SMEs Abuja Municipal Area Council of FCT. Reliability test was conducted to examine the extent to which the measuring instruments will produce consistent scores using Cronbach reliability test, Alpha values of 0.8289, indicating that the tool was suitable for the analysis. ANOVA was used to analysis the data in order to know the effect of innovation on SMEs performance. The findings from the result showed that product innovation has a significant relationship with SMEs performance in AMAC. It was discovered that marketing innovation has a significant relationship with SMEs performance. The study thus recommends that SMEs can achieve a higher performance by carefully selecting their operating markets, focusing on particular product groups and innovation types, avoiding spread of marketing activities. In addition, SMEs must prioritize their marketing innovations by improving their marketing strategy in this era of e-commerce to suit the ever-changing advertising business environment.

Theoretical Framework

Systems Theory

The systems theory was published by Kuhn, (1974) and states that a system is characterized by the interactions of its components and the nonlinearity of those interactions. It was adopted by Holland et al (1990) and indicated that Systems theory is the interdisciplinary study of systems in general, with the goal of elucidating principles that can be applied to all types of

systems at all nesting of an organization. This means that in a given organization, there exist models, principles, and laws that apply to generalized systems or their subclasses, irrespective of their particular kind, the nature of their component elements, and the relationships between themselves.

There is no element that operates in singularity implying they all have and affect the overall performance of the firm. Every strategy that the firm employs has a significant role to play in contributing towards the performance. The application of it can either enhance the performance or contribute negatively to the performance. No organisation can survive without interacting with its environment. Organisations get inputs from the external environment, they are processed and the outputs are released to the external environment, which provides feedback to the organisation. Customers who are part of the environment will give feedback by using different means including value judgment on quality, price, style and fashion. Therefore, organisations are seen as systems with components and parts that are related and interconnected in such a manner that failure of a component or part leads to the failure of another (Robbins 1990).

Dynamic Capabilities Theory

In The Dynamic Capabilities Theory, a capability is a set of learned processes and activities that enable a company to produce a particular outcome. Ordinary capabilities are like best practices. They typically start in one or two companies and spread to the entire industry (Teece, 2014). Dynamic capabilities, unlike ordinary capabilities, are distinctive, that is, unique to each company and rooted in the company's history. They are captured not just in routines, but in business models that go back decades and that are difficult to imitate (Gratton, 2013). According to Wade and Hulland (2004), resources may take on many of the attributes of dynamic capabilities, and thus may be particularly useful to firms operating in rapidly changing environments. Thus, even if resources do not directly lead the firm to a position of superior sustained competitive advantage, they may nonetheless be critical to the firm's longer-term competitive-ness in unstable environments if they help it to develop, add, integrate, and release other key re-sources over time.

In relation to the study on the moderating effect of innovation on the operational management and performance of food and beverages companies is underpinned using both the system and dynamic capability theories. This is because from the aspect of system theory, given the often-unidentified challenges in automotive industry, systems should be tackled. food and beverages companies should therefore identify strategies that they can use to ensure that they are able to deal with the constraints that face their operations and push them to better performance by addressing the constraint. While, the dynamic capability theory is relevant to this study because it describes the process through which the pursuit of a strategy not only utilizes a firm's resources but also augments them through the creation of skills and knowledge that are the products of experience, which is essential in company performance.

3.1 Methodology

The study adopts the survey and cross-sectional research design for this study. The research design enabled the researcher to make assessment of the performance of food and beverages as well as analyze their views and opinion on the impact of operation management. The survey design also ensures that data are collected from respondents by carrying out a sample

survey. That is, the use of questionnaires in getting the desired information from the respondents of the case study.

Population of the Study

The population for this study was the total staff of the listed large-scale food and beverages firms in Kaduna metropolis. For the purpose of this research, permanent staff of the company were selected. The population of the study comprises of all the permanent staff as at 2nd March, 2023

Table 1 List large-scale Food and Beverage Companies in Kaduna State, Nigeria, Manufacturing Association of Nigeria.

S/N	Company Name	Sector	Location
1	Arla Foods Nigeria	Food (Dairy)	Kaduna
2	Niyya Farm Group Limited	Food (Juices & Yogurt)	Kaduna
3	Crown Flour Mill	Food (Grain Processing)	Tudun Wada, Kaduna
4	JJB Foods and Processing Limited	Food (Processing)	No. 5 Doka Street, Sabo, Kaduna
5	Nikoy Nigeria Limited	Food (Grain Processing)	Kudenda Industrial Estate, Kaduna
6	Mamia Seeds Oil Limited	Food (Vegetable Oils)	Katuru Road, Along Kaduna Airport
7	Nagari Seeds Nigeria Limited	Food (Seeds)	Sokoto Road, GRA, Zaria, Kaduna
8	Cool-me Beverages Limited	Beverage	Kaduna
9	Deekwambos Nigeria Limited	Food	B126 Kazaure Road, Sardauna Crescent, Kaduna
10	Oxen Foods	Food	Plot 2 Jemaa Road, FHE, Gonin-gora, Kaduna
11	Nigerian Breweries Plc, Kaduna	Beverage	Makera Road, Kaduna
12	Northern Noodles Limited	Food (Noodles)	NNPC Industrial Layout, No. 168 Kachia Road, Sabo, Kaduna
13	PepsiCo (Seven-Up Bottling Co.)	Beverage	PepsiCo Complex, Kaduna
14	Zazzau Foods Ltd	Food	Rigasa Industrial Layout, Kaduna
15	Dangi Foods Limited	Food	No. 18 Abubakar Kigo Road, Kaduna
16	Arewa Bottling Company	Beverage	Arewa Industrial Area, Kaduna
17	Cway Food & Beverages Nigeria Co. Ltd.	Beverage	Kachia Road, Kaduna

Source: Manufacturing Association of Nigeria, 2024.

Sample Size

A sample is a part or subset of people, items, or events from a larger population that one collects and analyzes to make inferences. The sample size of the study was chosen based on the selection criteria. Companies that those not meet the criteria will be excepted from the study.

The following criteria are:

- i. Those companies that are not operating within Kaduna metropolis.
- ii. Those companies that have not being operational for over a decacde.
- iii. Those companies that produces only grains, animal feeds, seeds and oil.
- iv. And those companies that are only into processing and not production are excepted.

Therefore, the sample population are

Table 2 Sample Size

S/N	Company Name	Sector	Number of Employees
1	Arla Foods Nigeria	Food (Dairy)	276
a2	Niyya Farm Group Limited	Food (Juices & Yogurt)	118
3	Cool-me Beverages Limited	Beverage	178
4	Deekwambos Nigeria Limited	Food	182
5	Oxen Foods	Food	78
6	Nigerian Breweries Plc, Kaduna	Beverage	300
7	Northern Noodles Limited	Food (Noodles)	146
8	PepsiCo (Seven-Up Bottling Co.)	Beverage	326
9	Zazzau Foods Ltd	Food	63
10	Dangi Foods Limited	Food	54
11	Arewa Bottling Company	Beverage	89
12	Cway Food & Beverages Nigeria Co. Ltd.	Beverage	258
TOTAL			2,662

The target population of the study are permanent staff of the selected large-scale food and beverages companies in Kaduna metropolis of Kaduna state. Therefore, the sample population of the study is estimated using Taro Yamane (19769) sampling formular. As a result of the inability of the researcher to effectively study the whole seller's strength population, a representative number was chosen as the sample size population. Three hundred and forty-eight (348) was used as the sample size. The sample size was calculated using the Taro Yamane scientific formula which is given as:

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

$$1 + N(e)^2$$

Where:

N is the Population (2,662 was the Population for the Study)

1 is the constant

e is the degree of error expected

n is the sample size? **n= 348**

Therefore, the sample size of the study is 348

For the purpose of increased representation, 30% of the sample size as recommended by Israel (2013) was added bringing the total to 393 ($302 \times 30\% = 348 \times 0.3 = 384 + 104 = 452.4$ or 452). This takes care of other unavoidable errors such as incorrect filling and failure of some respondents to return questionnaire.

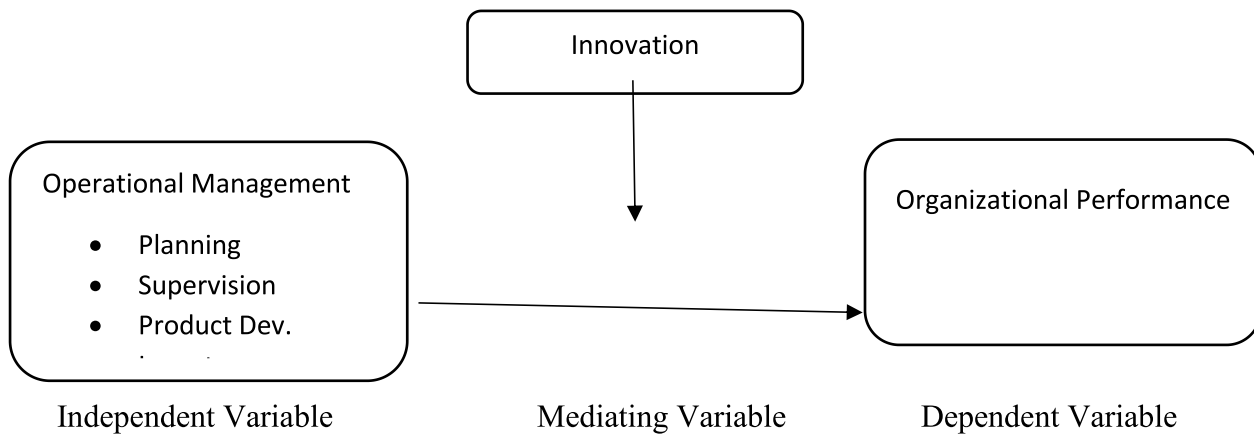
Source and Method of Data Collection

The primary data is a survey method of data collection in which the respondent's opinions was used to determine the outcome through their perception. The use of 5-point scale Likert was used for the collection of the data from the respondents. This is because it enables clear patterns in responses and it provides an enhanced rationale for reliability and quality of insights.

Technique for Data Analysis

Multiple regression analysis was employed to test the hypotheses, as the study focused on examining the relationship between operations management and performance. These analyses were conducted using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach. Furthermore, the study's hypotheses were tested through bootstrapping analysis. Smart PLS was used to identify which variables in the dataset are qualitative or categorical. For binary variables, create a single dummy variable (0 or 1). For categorical variables with more than two categories, use one-hot encoding, creating binary variables for each category.

Model Specification



Reliability and Validity

the reliability results of the models of the study are presented and interpreted. The reliability and validity test was formulated for the study in order to check the validity and also the level of reliability of the questionnaire that used in collecting the data which is being presented in Table 3 below;

Table 3 Reliability Statistics

Cronbach's Alpha	Variables
0.793	Organizational Performance
0.805	Innovation
0.753	Planning
0.759	Supervision
0.819	Product Development
0.811	Inventory

Source: Field Survey, 2024

4.1 Data Analysis and Presentation of Results

Data Analysis

SPSS and Smart-PLS 4 were used as statistical tools for data analysis. The data analysis displays the distribution of respondents' answers and demographic factors.

Descriptive Statistics of Variables of the Study

The study's variables are statistically described using mean and standard deviation in the subsection that follows. The outcome is shown in Table 4.

Table 4: Descriptive Statistics of Variables

Variables	Sample	Mean	Std. Deviation
PL	405	3.05	0.849
SV	405	2.62	0.810
PD	405	2.77	0.787
IV	405	2.16	0.633
IN	405	1.99	0.693
OP	405	1.94	0.638

Source: SPSS Output (2025)

A five-point Likert scale was used to measure each study variable. According to Table 4, the standard deviation for planning was 0.849 and the mean response was 3.05 respondents moderately agreed with comments regarding planning. Respondents agreed that their supervision is above average since they somewhat agreed with remarks about it (2.62 and 0.810). Similar to this, respondents somewhat agreed with assertions about the pace of product development, as shown by a mean response of 2.77 and a standard deviation coefficient of 0.787. This implies that respondents think local microenterprises regularly embrace the idea of product development. With a standard deviation of 0.633 and a mean level of 2.16 inventory, the data indicated that respondents thought the idea of inventory was frequently accepted by them. the standard deviation for planning was 0.693 and the mean response was 1.99 respondents moderately agreed with comments regarding innovation. Respondents agreed that their organisational performance is above average since they agreed with remarks about it as the mean show a score of 1.94 and 0.638.

Discriminant Validity

Table 5a: Discriminant Validity (Fornell-Larcker Criterion)

Constructs	IN	IV	OP	PD	PL	SV
IN	0.744					
IV	0.628	0.753				
OP	0.653	0.689	0.729			
PD	0.527	0.530	0.692	0.714		
PL	0.246	0.553	0.609	0.355	0.765	
SV	0.140	0.502	0.537	0.302	0.618	0.833

Source: Smart-PLS Output (2025)

Table 5a, all of the reflective latent constructs in the current study are significantly different from one another, with the exception of the OP correlation with IV, which is the only AVE correlation the second was higher than the first at 0.753 and 0.689. This is due to the lack of a substantial association between any of the study's reflective latent variables. More importantly, criterion analysis by Fornell and Larcker (1981) showed that each of the previously stated constructs is unique and captures phenomena that other reflective latent constructs do not.

Consequently, an assessment of the discriminant validity based on the cross-loadings criterion is given in Table 5b.

Table 5b: Discriminant Validity (Cross Loading)

Items	IN	IV	OP	PD	PL	SV
IN2	0.722	0.205	0.339	0.341	0.182	-0.029
IN3	0.850	0.723	0.762	0.482	0.302	0.379
IN4	0.757	0.264	0.279	0.188	0.044	-0.191
IN5	0.633	0.025	0.261	0.119	-0.021	-0.129
IV1	0.552	0.800	0.606	0.311	0.524	0.489
IV2	0.172	0.758	0.515	0.230	0.512	0.435
IV3	0.713	0.798	0.758	0.446	0.356	0.414
IV4	0.277	0.804	0.536	0.443	0.438	0.243
IV5	0.448	0.506	0.519	0.393	0.309	0.289
OP1	0.420	0.633	0.788	0.659	0.534	0.412
OP2	0.649	0.537	0.772	0.490	0.435	0.178
OP3	0.263	0.484	0.599	0.301	0.351	0.174
OP4	0.652	0.598	0.720	0.348	0.260	0.405
OP5	0.357	0.543	0.752	0.525	0.586	0.676
PD1	0.375	0.315	0.510	0.813	0.380	0.182
PD2	-0.013	0.124	0.314	0.777	0.284	0.325
PD3	0.362	0.238	0.428	0.558	0.072	0.089
PD4	0.143	0.319	0.419	0.848	0.343	0.319
PD5	0.726	0.582	0.648	0.774	0.186	0.209
PL1	0.278	0.415	0.540	0.334	0.854	0.317
PL2	0.061	0.437	0.383	0.264	0.809	0.368
PL3	0.076	0.443	0.480	0.272	0.598	0.895
PL4	0.315	0.448	0.377	0.249	0.773	0.261
SV1	0.067	0.451	0.470	0.208	0.517	0.869
SV2	0.234	0.332	0.304	0.300	0.509	0.726
SV4	0.090	0.467	0.512	0.301	0.560	0.897

Source: Smart-PLS Output (2025)

Based on the cross-loading analysis and the indicators' loadings (i.e., shaded loadings) of each construct being larger than their corresponding loadings diagonally, Table 5b above shows that all of the reflective latent variables in the current study had discriminant validity. Lastly, the heterotrait-monotrait (HTMT) ratio of correlation measure, which is regarded as superior to the two previously discussed methods, was used to assess the discriminant validity of the reflective constructs. Although the Fornell-Larcker criterion and cross-loading evaluation are the two most widely used techniques for evaluating discriminant validity, Henseler et al. (2015) asserted that they do not always show that discriminant validity is lacking in the great majority of research situations. They propose the HTMT as an alternative approach based on the multitrait-multimethod matrix to assess discriminant validity using the HTMT ratio of correlations. By contrasting the novel approach with the Fornell-Larcker standard and assessing (partial) cross-loadings, Duarte and Amaro (2018) further demonstrated the advantages of HTMT using Monte Carlo simulation trials.

Assessment of the Structural Model

This section presents the structural equation model for the direct and moderating relationships, which is based on bootstrap analysis. With a total of 5000 bootstrap samples, the traditional bootstrapping method was applied to investigate the importance of the path coefficients of direct and moderating linkages for 281 cases (Hair et al., 2014; Hair et al., 2012; Henseler et al., 2009). Nonetheless, the purpose of this study is to empirically examine the relationships between independent variables (IVs) and dependent variables (DV), as well as the moderating function of innovation between the two.

Table 6: Measures and Threshold Values for Assessment of Inner Model

Assessment Measure	Measure	Threshold value
Path Coefficient	T-value	1.96 ($p < 0.05$)
Coefficient of Determination	R^2	0.19 (weak), 0.33 (mediocre), 0.67 (good)
Effect Size	F^2	0.02(weak), 0.15(moderate) and 0.35(strong)
Predictive Relevance	Q^2	0.02 (small), 0.15 (medium), 0.35 (strong)

Henseler et al., (2009) and Hair et al., (2014).

Path coefficient estimations, coefficient of determination (R^2 values), f^2 effect sizes, and predictive relevance (Q^2) were the main factors for the evaluation of the inner model (Hair et al., 2014). In addition, the thresholds listed in Table 6 had been taken into account for this study.

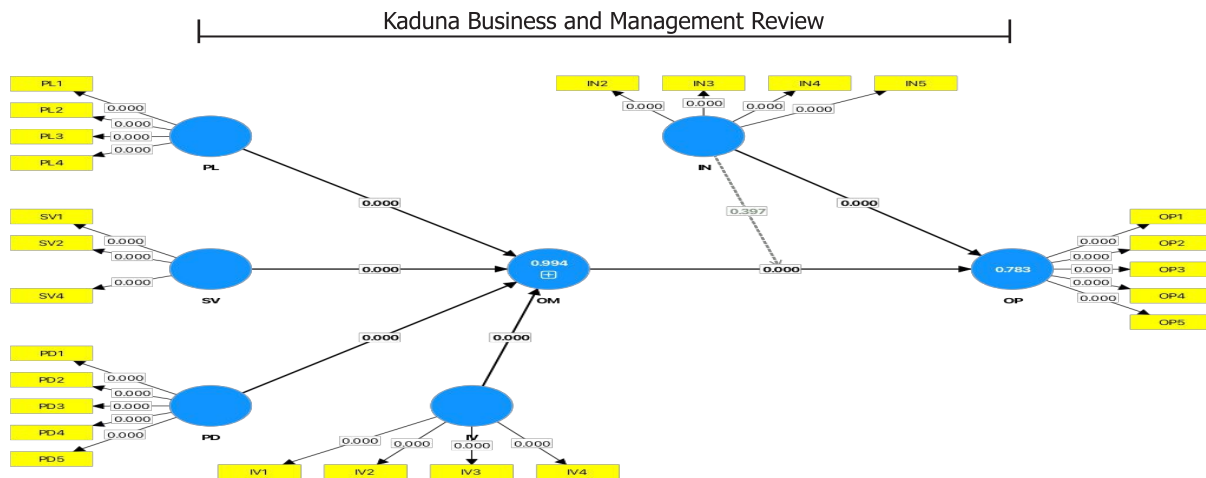


Figure 1: PLS bootstrapping

Hypotheses Testing for Direct Relationships

Figure 1 shows the direct relationship between the study's dependent variable (organisational performance) and the four independent variables (operational management). The results of the structural model based on the causal relationships between the study's criteria variables and predictors are also displayed in Table 7 below. These results are interpreted using the t-value, standard error (SE), and coefficients (Beta) of the path connection. (T Statistical). At the 5% level, the hypothesis' significance was assessed.

Table 7: Hypotheses test for direct and moderating relationship

R/Ship	Beta Values	Std. Dev.	T Statistics	P Values	Decision
OM -> OP	0.692	0.016	37.590	0.000	Reject
IN -> OP	0.292	0.022	13.408	0.000	Reject
IN x OM -> OP	0.020	0.023	0.847	0.397	Accept

Source: Smart-PLS Output (2025)

Operational Management (OM) has significant influence on Organisational Performance (OP) of food and beverage firms in Kaduna metropolis. It is seen on Table 7 that Operational Management is significantly related to Organisational Performance with ($\beta = 0.692$, T- stat = 37.590, $p < 0.000$). Therefore, H_0^1 Operational management has no significant influence on organizational performance of food and beverage firms in Kaduna metropolis is empirically rejected. Similarly, innovation (IN) has a significant influence on Organisational Performance (OP) at less than five percent significant level ($\beta = 0.292$, T- stat = 13.408, $p < 0.000$). Consequently, H_0^2 that states that Innovation has no significant influence on organizational performance of food and beverage companies in Kaduna metropolis is empirically rejected.

Hypotheses Testing for Moderation Relationships

The test for moderation first looks only at the main effects of the independent variables on the dependent variable, then only at the main effects of the independent variables, including the moderator, and lastly at the interaction terms, which are the independent variables multiplied by the moderator variable (Esposito Vinzi et al., 2010). The product of the variable indicators represents the latent interaction variables (Chin et al., 2003). Accordingly, the moderating effect only holds true when these interaction terms are substantial (Hair Jr. et al., 2013).

The moderating analysis in this study was conducted using the PLS two step technique. When dealing with continuous predictor and moderator variables, this approach is especially recommended for enhancing estimation and detection of the interaction effects (Helm et al., 2010; Henseler & Fassott, 2010). The latent variable scores of the lower order components (LOCs), which are inventory, planning, product development and supervision on the higher order component (HOC), which is operational performance, were first obtained using the repeated indicator approach because the reflective-reflective type of hierarchical component model (HCM) (Afthanorhan & Afthanorhan, 2014; Becker, Klein, & Wetzels, 2012). The values of each LOC were then used as a reflective indicator to the HOC in a two-stage technique that was implemented utilising the latent variable scores that were collected (Hair et al., 2014; Ringle et al., 2012).

The outcomes of the interaction between innovation and the relationship between operational management and organisational performance were studied and reported after the aforementioned technique. The repeated indicator model in figure 4.5b displays the moderator's hierarchical component model (HCM), which is reflective- reflective in nature. This is accomplished by repeatedly measuring all lower order component (LOC) indicators, such as inventory, planning, product development and supervision, on the higher order component (HOC), operational management. The latent variable scores for LOCs were then obtained and used in further analysis.

The results are displayed in Table 7 above for both the direct and moderating relationship. Of special interest is the significance of the interaction term. If the interaction term has a large effect on the endogenous construct, it is observed that the moderator has an insignificant moderating effect on the link between the IVs and DV and vice versa. An insignificant moderating effect on OP occurs when IN and OP does not interact, as shown by the bootstrapping result in the table ($\beta = 0.020$, T- stat = 0.847, $p < 0.397$). The moderating relationship between IN*OM on OP was not significant. Thus, hypothesis H03 is acceptable in light of this finding.

Coefficient of Determination: R-Squared

The coefficient of determination, or R-square level, was used to analyse the amount of variance that the external latent variables explained on the endogenous latent variables.

Table 8: Coefficient of Determination: R-Squared

Construct	R Square
OM	0.995
OP	0.778

Source: Smart-PLS Output (2025)

Table 8 shows that 77.8% (0.778) of the variation in operational management may be attributed to inventory, planning, product development and supervision, while, 99.5% (0.995) of the variation in organisational performance may be attributed to operational management. According to Chin's (1998) recommendation that R² values of 0.67, 0.33, and 0.19 be assessed as substantial, moderate, and weak, respectively, the R² value explained by these latent variables on the target endogenous latent variable is therefore substantial.

Assessment of the Effect Size: F-Squared

According to Hair, Ringle, and Sarstedt (2013), the effect size (f^2) need to be assessed subsequent to the endogenous latent variables' coefficient of determination. The effect size is the difference in R^2 between the main effects when one exogenous latent variable is included in the model and when it is also removed.

$$F^2 = \frac{R^2 \text{ included} - R^2 \text{ excluded}}{1 - R^2 \text{ included}}$$

Where:

The value f^2 defines how much an exogenous latent construct will influence an endogenous latent construct. R^2 Included is the endogenous latent variable's R^2 score prior to the elimination of a certain exogenous latent variable. R^2 Excluded, on the other hand, represents the changes in the endogenous latent variable's R^2 value following the removal of a particular exogenous latent variable from the model. According to Hair et al (2013) advice, the formula above f^2 values of 0.02, 0.15, and 0.35 indicated Small, Moderate, and Substantial effects, respectively (Cohen, 1988). For the effect size, refer to Table 4.7.4.

Table 9: Determination of the Effects Size; F-Square (f^2)

Constructs	f^2	Effect Size
IN -> OP	0.141	Small
IV -> OP	0.174	moderate
PD -> OP	0.266	moderate
PL -> OP	0.090	Small
SV -> OP	0.057	moderate

Source: Smart-PLS Output (2025)

The effect of operational management on organisational performance is displayed in Table 9. The exogenous variables that have a minor effect on operational management which include inventory, product development, planning and supervision. According to Cohen's (1988) criteria for effect size interpretation, the results also suggest that the effects of these four exogenous latent variable on operational performance can be categorised as small, moderate, and substantial, respectively.

Assessment of Predictive Relevance: Q-Squared

As a measure of prediction accuracy, researchers are advised to look at Stone-Geisser's Q^2 value in addition to the R^2 value level (Geisser, 1974; Stone, 1974). The predictive utility of a model is measured by this criterion (Hair et al., 2014). But according to Stone (1974) and Duarte and Roposo (2010), this criterion can be seen as an extra assessment of the model fit in the PLS-SEM analysis. Consequently, the Q^2 shows how well the model and its parameter estimations produce the observed values (Chin, 1998).

The capacity of the external latent variables to predict the endogenous latent variable was also evaluated using Stone-Geisser's Q^2 value in this model (Geisser, 1974; Stone, 1974). A cross-validated redundancy criterion was applied to measure the predictive relevance (Q^2) using the

blindfolding procedure. Table 10 presents the findings to be as OM with a Q2 value of 0.348 and OP with Q2 value of 0.405.

Table 10: Predictive relevance on endogenous variables: Q-square

Construct	Q ² (=1-SSE/SSO)
OM	0.348
OP	0.405

Source: Smart-PLS Output (2025)

Discussion of the findings

The study found that operational management significantly influences organizational performance in food and beverage companies in Kaduna Metropolis. Efficient practices such as resource allocation, process optimization, and quality control are essential for improving productivity and profitability. Therefore, Hypothesis 1 (HO1) was rejected.

Similarly, innovation was shown to have a direct, significant positive effect on performance, indicating that firms must adopt new technologies, enhance product offerings, and innovate marketing strategies to stay competitive. As a result, Hypothesis 2 (HO2) was also rejected.

However, the study revealed that innovation does not significantly moderate the relationship between operational management and performance. This suggests that while both innovation and operational management independently enhance performance, their interaction does not produce an amplified effect. Thus, Hypothesis 3 (HO3) was accepted.

5.1 Conclusion and Recommendations

The study explored the interplay between operational management, innovation, and organizational performance in the food and beverage industry in Kaduna Metropolis. Drawing from empirical findings, the following conclusions are reached:

- i. Operational management is a strong driver of organizational performance. This confirms that structured planning, supervision, continuous product development, and effective inventory control are essential to achieving efficiency, reducing costs, and improving output quality.
- ii. Innovation directly improves organizational performance. Firms that embrace innovation experience better responsiveness to environmental changes, improved quality of offerings, and enhanced competitiveness.
- iii. Innovation does not significantly moderate the relationship between operational management and performance. This finding diverges from some prior research and theoretical assumptions. It suggests that, in the current business environment in Kaduna's food and beverage sector, operational efficiency and innovation contribute to performance independently.

These conclusions challenge the assumption that combining innovation with operational strategies always leads to a synergistic improvement in performance. Instead, they underline the need for strategic alignment rather than simple co-application of innovation and operations management.

Based on the findings and conclusions, the following recommendations are proposed:

- i. Food and beverage firms should institutionalize best practices in planning, supervision, product development, and inventory management. Regular audits, workflow automation, and staff training should be used to improve the efficiency of these functions.
- ii. Firms should develop dual strategies one for operational efficiency and another for innovation. Each strategy should have its KPIs, timelines, and accountability structure.
- iii. Government agencies and policymakers should provide supportive infrastructure, tax incentives, and funding opportunities to encourage both innovation and operational development.

References

- Abbas, Y. (2020). *Innovation and firm performance in the Nigerian food and beverage sector*. Unpublished manuscript.
- Adegoriola, A. (2021). Effect of innovation on Small and Medium Enterprises (SMEs) performance in Abuja Municipal Area Council, FCT-Abuja. *Journal of Business and Entrepreneurship*, *12*(3), 45-60.
- Adeoye, A. O., & Epemolu, T. O. (2021). Innovation and operational efficiency in the Nigerian food and beverage industry. *African Journal of Management Research*, *9*(2), 112-128.
- Bosire, J. (2021). Effect of operation strategies on performance of automotive industry in Kenya. *International Journal of Business and Management*, *16*(4), 78-92.
- Campbell, R., Fowles, E., & Weber, M. (2020). Operational structure and job specification in public health nursing. *Journal of Nursing Management*, *28*(5), 1023-1035. <https://doi.org/10.1111/jonm.13045>
- Chin, W. W. (1998). The partial least squares approach to structural equation modeling. *Modern Methods for Business Research*, *295*(2), 295-336.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Duarte, P., & Amaro, S. (2018). Methods for modelling reflective-formative higher order constructs in PLS-SEM: An application to tourism research. *Tourism Review*, *73*(2), 211-227. <https://doi.org/10.1108/TR-05-2017-0090>
- Efini, J. (2019). *Challenges and opportunities in the Nigerian food and beverage industry*. Lagos: Prime Publishers.
- Eshiett, T. (2022). Effect of new product development on organizational performance. *Journal of Product Innovation Management*, *39*(1), 34-50. <https://doi.org/10.1111/jpim.12567>
- Gratton, L. (2013). *The key: How corporations succeed by solving the world's toughest problems*. New York, NY: HarperCollins.

- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Thousand Oaks, CA: Sage.
- Heinemann, S. (2019). *Operations management: Principles and practices for strategic impact*. New York, NY: Routledge.
- James, A. (2019). *Operations management: A practical introduction*. London: Palgrave Macmillan.
- James-Moore, S. (2016). *Inventory management for competitive advantage*. London: Kogan Page.
- Mohammed, A., Ibrahim, B., & Embat, M. (2021). Innovation and business growth in emerging markets. *Journal of Business Innovation*, *7*(2), 89-104.
- Musa, A., Abdu, M., & Jimoh, L. (2022). Moderating effects of innovation on microcredit and financial performance of microenterprises in Kaduna metropolis. *Journal of Small Business and Entrepreneurship*, *14*(1), 55-70.
- Nwosu, C., & Chidozie, F. (2022). Technological adoption and operational efficiency in Nigerian manufacturing. *African Journal of Industrial Research*, *10*(1), 22-38.
- Ogaboh, A., Udo, E., & Okon, S. (2020). Challenges of food and beverage firms in Nigeria: A strategic analysis. *International Journal of Business and Economic Development*, *8*(2), 1-15.
- Parker, R. (2021). *Operations management for dummies*. Hoboken, NJ: Wiley.
- Prabhala, N. (2021). *Global operations management in the digital age*. New York, NY: Springer.
- Robbins, S. P. (1990). *Organization theory: Structure, design, and applications* (3rd ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Sadri, G. (2020). *Measuring organizational performance: A comprehensive guide*. Thousand Oaks, CA: Sage.
- Schroeder, R. (2018). *Operations management in the supply chain* (7th ed.). New York, NY: McGraw-Hill.
- Teece, D. J. (2014). The foundations of enterprise performance: Dynamic and ordinary capabilities in an (economic) theory of firms. *Academy of Management Perspectives*, *28*(4), 328-352. <https://doi.org/10.5465/amp.2013.0116>
- Wade, M., & Hulland, J. (2004). Review: The resource-based view and information systems research: Review, extension, and suggestions for future research. *MIS Quarterly*, *28*(1), 107-142. <https://doi.org/10.2307/25148626>
- Yusuf, A. (2023). *Organizational performance in the Nigerian food and beverage sector: Trends and challenges*. Kaduna: Greenfield Press.