RISK MANAGEMENT PRACTICES IN BREAD FACTORIES: AN EMPIRICAL STUDY FROM ENUGU, NIGERIA

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ABSTRACT

The bread-baking industries face several risks that can negatively impact their operations, financial performance, and public health. This study adopted a survey design approach to analyze risk management in 60 bread factories in Enugu State, Nigeria. Primary data were generated with the aid of a semi-structured questionnaire and analyzed with both descriptive and inferential statistics. Results revealed that bread factories commonly use production (66.7%), supply (45.0%), and financial (36.7%) risk management strategies. Key factors influencing the choice of strategy include ownership structure (-1.018241), factory size (0.003131), market distance (0.034149), and access to credit (0.043334 for supply and 0.043258 for financial risk management), as well as location (0.485676 for supply and 0.493554 for financial risk management). Significant constraints to effective risk management were insufficient technical knowledge (2.98), lack of documented policies (2.77), inadequate financial resources (2.80), and difficulty accessing insurance (2.55). The study recommends workforce training, industrial cooperation, and better financial and insurance access to enhance sector resilience.

Keywords: Risk Categories, Institutional Traits, Management Strategies, Bread Industry, Nigeria.

JEL CODES: L66, G32, Q130

1. INTRODUCTION

Nigeria's bakery industry has rapidly expanded due to population growth, changing consumer preferences, and economic improvements (Onyemaechi, 2023). Small- and medium-sized bakers now control 72% of the $621 million market, driven by innovation and automation (Anudu, 2017). Micro, small, and medium enterprises (MSMEs) are crucial for Nigeria's industrial development, contributing significantly despite rising unemployment (Lekan-Akomolafe, 2021). MSMEs development can significantly impact global SDGs 1, 2, 3, 5, 8, and 9, aiming to end poverty, eradicate hunger, promote health, gender equality, and promote sustainable economic growth. Small and Medium Enterprises (SMEs) are vital to Nigeria's

economy, comprising 97% of industrial companies (General Statistics Office, 2007) and contributing 48% of GDP (ILO, 2022).

Despite a 3.5% GDP decline, their employment contribution rose by 3.5% (MSME Survey, 2024). MSMEs are crucial for job creation, economic growth, and poverty reduction, and they enhance resource efficiency, boosting productivity and competitiveness (NBS Survey, 2010). However, the sector still faces challenges from business risks and uncertainties. Given that SMEs concurrently support Nigeria's economy, we cannot ignore the nation's social and economic progress (Ejimonye and Nwosu, 2017).

The bread bakery industry in Nigeria has grown into a multi-billion-dollar sector, contributing significantly to the GDP and job creation (Edom, 2023). However, bread factories face financial, operational, and strategic risks, including food safety hazards, supply chain vulnerabilities, industry volatility, pricing risks, and regulatory compliance challenges (Zoghi, 2017; Emeje et al., 2008). Effective risk management is crucial for resilience and sustainability (Banjo & Abere, 2022). In Nigerian SMEs, higher profitability often comes with increased risk (Kehinde et al., 2017). To ensure sustained success, bread factories should adopt strategies like supply chain management, quality control, and operational resilience (Tukamuhabwa, 2023). Policy effectiveness depends on acceptability and implementability (FAO, 2017). SMEs should implement tailored risk management strategies to address various risks, such as adhering to safety regulations, providing regular risk management training, and preparing for operational and business emergencies related to processing, manufacturing, and payment (Belinskaja & Velickiene, 2015). Risk assessment and control activities significantly and positively impact SMEs' financial performance (Illo et al., 2022). By effectively identifying, assessing, and mitigating risks, factories can sustain operational efficiency, financial stability, customer satisfaction, and regulatory compliance (Ugwu et al., 2023).

Despite the importance of risk management, specific practices in bread factories in Enugu State, Nigeria, remain under researched. While several studies have examined risk management in the bakery industry (Igwe, Ede, & Udeh, 2023; Kwelle, Nwulu, & Hamilton-Ibama, 2023; Ilemona, 2022; Ighomereho, 2022; Kafigi, 2020; Kehinde et al., 2017; Rabihah & Norlida, 2017), none focused on the institutional factors influencing risk management strategies in Enugu. This study addressed this gap by analyzing risk management practices in Enugu's bread factories. Objectives include describing institutional characteristics, identifying common risks, examining managers' risk management strategies, and determining institutional factors influencing the choice of risk management options. The paper includes a literature review, methodology detailing population, data collection, and empirical model specifications, and results with descriptive and inferential statistics, concluding with policy recommendations.

LITERATURE REVIEW

2.1 Conceptual Literature

A bread factory, or bakehouse, is where bread is baked on an industrial scale. Various types, including industrial, artisanal, and in-store, specialize in different bread production roles (Maurice et al., 2022). Bread production is a complex process involving key steps like ingredient mixing, dough development, proofing, shaping, cooling, and slicing/packaging (Chukwulozie et al., 2010). Following these steps ensures the creation of delicious, high-quality loaves. Risk refers to potential negative outcomes or losses resulting from actions, decisions, or situations. Bread factories face various risks, including safety, health, environmental, operational, security, and compliance. Risk management strategies are crucial

for identifying, assessing, evaluating, and preventing potential risks that impact safety, quality, and profitability (Oliveira & Ribeiro, 2023). Strategies include food safety, supply chain management, operational, environmental, health, safety, financial risk management, and regulatory compliance. Bread factories' institutional characteristics, including size, ownership, and years of operation, influence risk management practices. Managers manage supply chain, production, financial, regulatory, and market risks using strategies like supply chain management, quality control, business continuity plans, and diversification. Managing risk is not without challenges due to lack of knowledge, financial constraints, technological limitations, institutional weaknesses, regulatory compliance burden, and risk perception and culture.

2.2 Theoretical Literature

Scholars frequently discuss fundamental theories of risk management, particularly enterprise risk management (ERM) (Alijoyo, 2021). One key theory is Herbert A. Simon's "decision-making theory," for which he won the Nobel Prize in 1978. This theory addresses rational behavior in uncertain situations, focusing on making sensible choices to manage businesses, governments, or enterprises. Simon posited that decision-making involves selecting actions or inaction based on effectiveness, acceptability, and implementability (FAO, 2017). His theory, introduced in *Administrative Behavior* (1947), underscores timely judgments to achieve organizational goals. ERM supports risk-based decision-making by ensuring both the choice and subsequent actions are crucial. This study applies decision-making theory to analyze bread bakery managers' decision-making in risk management.

2.3 Empirical Literature

Igwe, Ede, and Udeh (2023) assessed conflict management strategies' impact on bakery firms' productivity, finding that collaboration enhances employee experience and recommending strategic planning for conflict management. Similarly, Kwelle, Nwulu, and Hamilton-Ibama (2023) identified a significant positive relationship between supplier development and competitiveness in Rivers State, Nigeria, using a survey of 88 managers from 112 bakeries. Ilemona (2022) explored the effect of safety costs on the performance of 163 staff across seven bread bakeries in Kogi State, Nigeria. The study revealed that safety costs partially mediate performance, urging business owners to prioritize safety equipment and training. In Lagos State, Ighomereho (2022), in his study of the influence of marketing mix variables and customer orientation on the performance of bakeries in Lagos State, Nigeria, found that product, price, distribution, and customer orientation significantly impact bakery performance, recommending a focus on quality, pricing, and distribution Ajah *et al*. (2022) focused on mitigating risks in cassava production in Imo State, Nigeria. The study highlights poor yield as a result of weather effects and poor transportation networks as the major risks faced by cassava farmers and identified mixed cropping, mixed farming, and off-farm investment as the major risk management strategies adopted by cassava farmers. Kafigi (2020) examined risk-taking and performance in Tanzanian bakeries, revealing that age and gender influence the relationship that exists between risk-taking strategies and SMEs performance and suggesting SMEs enhance risk-taking practices for competitiveness. Kehinde et al. (2017) analyzed enterprise risk management in small-scale Nigerian businesses, finding that effective risk management significantly impacts profitability, with higher returns correlating with increased risk. Rabihah and Norlida (2017) investigated risk management in a bakery, identifying financial, operational, strategic, and human resource risks with direct impacts such as increased costs and indirect impacts like decreased production and sales.

2.4 Gaps in the Literature and Value Addition

Kafigi (2020) worked on the SMEs managers' demographic characteristics and their relationships with risk-taking strategies and firm performance, while this present study, on the other hand, looked at the effects of the institutional characteristics on the choice of risk management strategies. Rabihah and Norlida (2017) also investigated risk management practices in only one bakery shop, while the present study looked at several bread factories in Enugu State. The present study provided information on the institutional factors influencing the choice of management strategies adopted by bread factory managers in Enugu State, Nigeria.

3. METHODOLOGY

Enugu State, Nigeria, was the study area. Enugu state comprises 17 local government areas, including Enugu North, Udenu, and Nsukka (Nnadi et al., 2024). Enugu State is located between longitudes 7°08'E and 7°48'E and latitudes 5°58'N and 7°08'N. Researchers used simple random sampling to select 60 bread factories from Enugu North, Enugu South, and Enugu East. Primary data were obtained using a semistructured questionnaire and analyzed with descriptive statistics and a multivariate probit regression model.

3.1. Model Specification

Specification of multivariate probit regression model: This model was employed when analyzing the institutional features influencing bread factory managers' choice of risk management options (Belderbos et al., 2004). As done by Greene, (2012) the multivariate probit model is as follows;

$$Y^* = X_m\beta_m + \varepsilon_m Y_m = 1 \; if \; Y^*_m > 0{,}0 \; otherwise$$

$$m = 1 \ldots m$$

When dealing with a multivariate model in which there is possibility of the choice of risk management options, the error terms jointly follow a multivariate normal distribution (MVN) with a zero conditional mean and a variance normalized to unity;

$$E\,(\varepsilon_m | X_1 \ldots\ldots\ldots X_m) = 0$$

$$Var(\varepsilon_m | X_1 \ldots \ldots\ldots X_m) = 1$$

$$Cov\left(\varepsilon_j \; \varepsilon_m \middle| X_1 \ldots X_m\right) = \rho_{im}$$

The joint probability of the observed events;

$([Y_{il}, Y_{i2} \ldots Y_{im} | X_{il}, X_{i2} \ldots X_{im}])\; i = 1 \ldots n$ that form the basis for the log-likelihood function were the m-variate normal probabilities,

$$Li = \emptyset_m(q_{il}X_{il}\beta_i \ldots q_{im}B_{im}R^*)$$

$$Where, q_{im} = 2_{yim} - 1, R_{im} = q_{ij}q_{im}\rho_j$$

Definitions of Variables: Dependent Variable (bread factory managers' choice of risk management): This is a binary dependent variable measured by the probability of bread factory managers preferring either of the alternative risk management choices. It was represented in the model as Y1 for those bread factory managers who choose the supply risk, Y2 for those bread factory managers who choose the production risk, and Y3 for those bread factory managers who choose the financial risk

Independent Variables: These are the explanatory variables hypothesized to influence bread factory managers' choice of risk management options include the following.

X1= Sex of the bread factory managers (SEXBFM)
X2= Education status of the Bread factory managers (EDBFM)
X3= Family size (FAMSZ)
X4= Size of land for bread production (SIZLBP)
X5= Quantity of bread Produced (QUBP)
X6= Bread factory managers experience (BRFMEX)
X7= Distance to nearest market (DMRKT)
X8= Frequency of Extension contact (FEXCONT)
X9= Ownership of transport facilities (TROWR)
X10= Cooperative Membership (COMSHIP)
Ɛ = Error term

4. RESULTS AND DISCUSSION Of FINDINGS

4.1 Institutional Characteristics of Bread Factories:

The result in Table 1 shows that bread factories in Nigeria are predominantly owned by family (38.3%) and personal businesses (46.7%), with varying governance and decision-making impacts (Zinina, Dalisova, & Olentsova, 2020). Most have been operational for 0 to 10 years (50.1%), with a mean operation span of 12.92 years. Production volumes range from 1001 to 5000 loaves daily with a daily mean production of 2559.60 loaves. 96.7% of factories were implementing food safety and quality control. Wholesale distribution is the main channel (61.7%), followed by retail shops (28.3%) and supermarkets (16.7%). Most factories employ 10 to 30 workers (65.1%) with an average of 14 employees (Rabihah and Norlida, 2017), with a majority (80%) owning transportation facilities.

Table 1: Distribution of respondents according to their institutional characteristics

Institutional characteristics	Frequency	Percentage	Mean
Ownership structure of the bread factory			
Family Business	23	38.3	
Personal Business	28	46.7	
Community owned	2	3.3	
Leased	2	3.3	
Company	3	5.0	
Partnership	1	1.7	
Stakeholder	1	1.7	
Years of Operation			
0 – 10	30	50.1	
11 – 20	23	38.4	
21 and above	7	11.8	12.92 years
Quantity of bread produced			
10 – 100	13	21.8	
101 – 500	11	18.4	
501 – 1000	14	23.3	
1001 – 5000	28	46.9	
5001 and above	5	8.5	2559.60 loaves
Food safety and quality control			
Yes	58	96.7	
No	2	3.3	

If yes, bodies involved			
NAFDAC	34	56.7	
Standards Organization of Nigeria	26	43.3	
International Organization for Standardization	5	8.3	
Corporate Affairs Commission	5	8.3	
Major distribution channels			
Wholesale	37	61.7	
Retail Shops	17	28.3	
Supermarkets	10	16.7	
Direct-To-Consumers	15	25.0	
Size of bread factory employees			
10 – 30	39	65.1	
31 – 60	12	20.1	
61 and above	9	15.1	14 employees
Membership to co-operative association			
Yes	15	25.0	
No	45	75.0	
Membership to Bread Producers Association			
Yes	26	43.3	
No	34	56.7	
Ownership of transportation facilities			
Yes	48	80.0	
No	12	20.0	
Frequency of equipment inspection			
Daily	9	15.0	
Weekly	12	20.0	
Monthly	31	51.7	
Semi-monthly	1	1.7	
Quarterly	2	3.3	
Yearly	5	8.3	
Environmental swabs and product testing			
Yearly	4	6.7	
Monthly	21	35.0	
Weekly	16	26.7	
Daily	12	20.0	
Quarterly	5	8.4	
Semi-annually	1	1.7	
Extension services visit			
0 – 5	42	70.1	
6 – 15	5	8.3	
16 and above	1	1.7	4.23 times
Distance of bread factory from the market			
0 – 15	25	41.7	
11 – 30	18	30.1	
31 and above	17	28.4	9km
Access to credit			
Yes	22	36.7	
No	38	63.3	
Amount of credit accessed			

5000 – 100000	4	6.8	
100001 – 1000000	12	20.1	
1000001 and above	4	6.8	₦893250.00

Source: Field Survey (2024).

4.2 Risk Categories and Management Strategies

In table 2 below, the vast majority of respondents (60.0%) recognize every risk that has been outlined, highlighting the complexity of challenges that arise in the course of manufacturing and company operations. Of the identified risk factors, 26.7% of respondents emphasized the difficulties and unknowns encountered in the production of bread. Lesser numbers of respondents mention difficulties getting the supplies they need (3.3%) and losing money because of erratic market circumstances or investment results (8.3%). When risk experiences are examined, respondents frequently report experiencing supply risk (66.7%), financial risk (63.3%), and production risk (81.7%). Production risk, which includes difficulties encountered during the production process, is the most common category, suggesting that maintaining product quality and uniformity would always be difficult. Supply risk, which includes doubts about locating required supplies and fulfilling operating requirements, is also extensively (Rabihah and Norlida ,2017; Hillerbrand *et al*., 2012). The financial stability of bread manufacturers is significantly challenged by financial risk (Rabihah and Norlida ,2017), which includes uncertainty in investment outcomes and market conditions. This highlights the significance of solid financial management procedures (Geetha & Shreenidhi, 2022). Regarding the risks that are now being faced, the respondents' top three worries are supply risk (33.3%), production risk (46.7%), and financial risk (28.3%).

Table 2: Distribution of respondents according to the categories of risk faced by bread factories

Categories of risk in bread factories	Frequency	Percentage
Definition of risk		
Challenges and uncertainties faced during the manufacturing and creation of bread	16	26.7
Challenges bread factories face in order to obtain the necessary materials to meet their operational needs and delivery	2	3.3
Loss of money due to uncertain market conditions, investment outcomes or transactions made by bread factories	5	8.3
All of the above	36	60.0
None of the above	2	3.3
Risk experiences		
Production risk	49	81.7
Supply	40	66.7
Financial	38	63.3
Currently faced risk		
Supply Risk	20	33.3
Production	28	46.7
Financial	17	28.3
Other	3	5.0
More faced risk		
Supply Risk	16	26.7
Production Risk	25	41.7

Financial Risk	15	25.0
Others	2	3.3

Source: Field Survey (2024).

4.3 Choice of Risk Management Options and their Determinants

4.3.1 Choice of Risk Management Options

Bread factories adopt supply risk management strategies to enhance resilience, minimize disruptions, and ensure continuity in production processes. In figure 1 below, Production risk management is preferred by 66.7%, providing insights into risk perception and mitigation tactics. Financial risk management is also widely adopted by 36.7%. A small percentage (1.7%) suggests other risk management approaches.

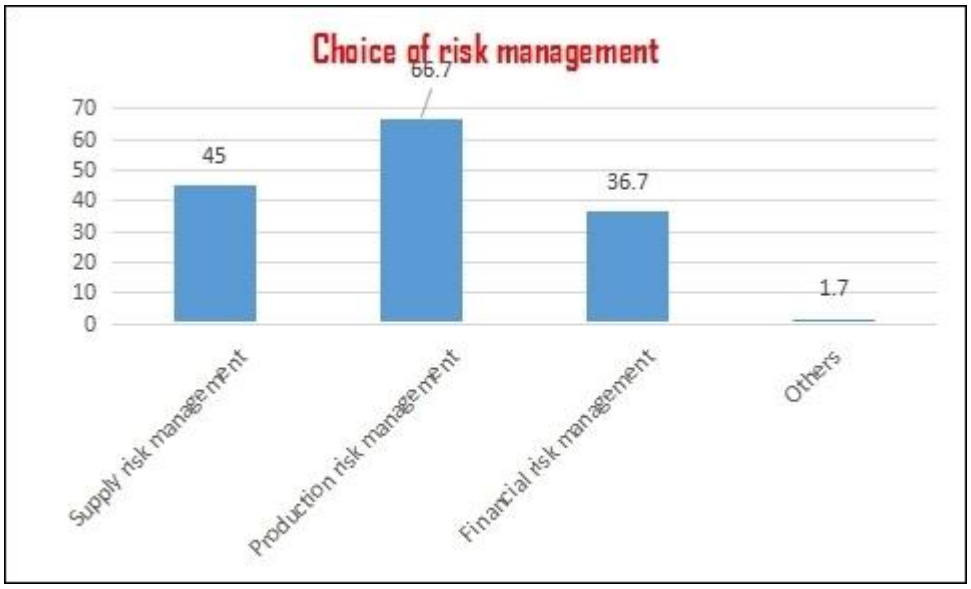

Figure 1: Distribution of respondents according to their choice of risk management; ***Source: Field Survey (2024).***

4.3.2 Determinants of Choice of Risks Management Strategies

Table 3 below reveals that ownership structure, factory size, market distance, credit access, and location significantly influence risk management strategies in bread factories. The study reveals that family-owned bread factories are less likely to adopt supply risk management strategies compared to other ownership structures. Family-owned bread factories are more likely to adopt financial risk management strategies, indicating that ownership structure significantly influences risk management decisions and varies in risk mitigation strategies (Donaldson & Preston, 2024). Bread factory size, based on employee count, influences risk management choices, with larger factories more likely to adopt production risk management strategies. Distance from the market (0.034149) significantly influences risk management decisions, with bread factories farther from the market more likely to adopt supply risk management strategies due to logistical challenges (Donaldson & Preston, 2024). Access to credit emerges as a significant determinant of risk management strategies within bread factories. The positive coefficients for access to credit (0.043334 for supply risk management and 0.043258 for financial risk management) suggest that bread factories with better credit access were more likely to adopt both supply and financial risk management strategies highlighting the importance of financial resources and liquidity in enabling risk mitigation

efforts, particularly in addressing supply chain and financial uncertainties (Goryńska-Goldmann *et al*., 2020; Ozioko and Enya, 2021).

Finally, the location of the bread factory, particularly its urban setting, significantly influences risk management decisions. The positive coefficients for urban location (0.485676 for supply risk management and 0.493554 for financial risk management) indicate that bread factories located in urban areas are more likely to adopt both supply and financial risk management strategies. This suggests that urban environments offer distinct advantages in terms of infrastructure, market access, and support services, facilitating the implementation of risk mitigation measures (Juliana De Oliveira Motaa *et al*., 2021).

Table 3: Multivariate regression of the choice of risk management strategies

	Supply risk mgts		**Financial risk mgt.s**		**Production risk mgt.s**	
Variable	**Coefficient**	**SE**	**Coefficient**	**SE**	**Coefficient**	**SE**
Constant	0.440500	1.057506	0.357603	1.198330	1.280601	1.102331
Ownership structure of bread factory	-1.018241	0.504835	1.008789**	0.507932	-0.236842	0.274258
Size of bread factory (number of employees)	-0.000516	0.034288	0.000825	0.035478	0.003131**	0.034979
Food safety and quality control	0.000159	0.000149	0.000157	0.000148	-4.51E-05	0.000108
Distance from market	0.034149***	0.440149	0.079019	0.533677	0.097416***	0.474789
Access to credit	0.043334***	0.023448	0.043258**	0.023342	-0.022249	0.022275
Inspection and preventive maintenance of equipment	0.446966	0.593400	0.426547	0.610030	-0.712116	0.559563
Transportation facility ownership	0.891101	0.579821	0.861669	0.611451	0.676348	0.496402
Years of existence of bread factory	0.063148	0.646622	0.068571	0.650235	0.026002	0.609237
Location of bread factory (urban)	0.485676***	0.281136	0.493554**	0.286967	-0.279433	0.266486
McFadden R-squared	0.178303		0.178593		0.295802	
S.D. dependent var	0.502519		0.502519		0.490310	
Akaike info criterion	1.459586		1.495551		1.566124	
Schwarz criterion	1.788058		1.860521		1.931093	
Hannan-Quinn criter.	1.586609		1.636688		1.707260	
Restr. Deviance	75.79102		75.79102		73.14419	
LR statistic	13.51380		13.53571		7.007394	
Prob (LR statistic)	0.005352		0.009826		0.006350	
Mean dependent var	0.454545		0.454545		0.381818	
S.E. of regression	0.488353		0.493819		0.505090	
Sum squared resid	10.97046		10.97356		11.48020	
Log likelihood	-31.13861		-31.12765		-33.06840	
Deviance	62.27722		62.25530		66.13680	
Restr. log likelihood	-37.89551		-37.89551		-36.57210	
Avg. log likelihood	-0.566157		-0.565957		-0.601244	

Source: Field Survey (2024); Mgt.s=management strategies

5. CONCLUSION AND RECOMMENDATIONS

The study analysed risk management among bread factories in Enugu State. Specifically, the study described the institutional characteristics of bread factories, examined risk management strategies employed by bread factory managers and determined institutional factors influencing the choice of risk management option by bread factory managers. The results of the study offer comprehensive insights into the demographic, organizational, and operational aspects of bread factories in the industry. The demographic analysis reveals a predominantly middle-aged managerial workforce, with a notable representation of both genders and varying levels of educational backgrounds and experience. The findings shed light on the risk management strategies employed by bread factories, with a significant focus on supply, production, and financial risk mitigation. The findings highlight the diverse risk categories faced by bread factories, the commonly adopted risk management strategies, and the factors influencing strategy choices. It highlights the importance of continuous adaptation, innovation, and collaboration to drive sustainable growth and success within the bread manufacturing sector. Based on the findings of the study, bread factories should invest in workforce training, form industry alliances for knowledge exchange, and engage with regulatory bodies to stay updated on compliance. The government should work with insurance providers to develop industry-specific insurance plans, and promote collaboration among factories, research institutions, and regulatory bodies to foster public-private partnerships.

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