Nigerian Journal of Science and Engineering Infrastructure (NJSEI)

Volume 1, Issue 1 (2023), 174-182. Onivehu et al.

Risk Management Practices in Rice Production: A Case of Smallholder Farmers of Soba Community in Northern Nigeria

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ABSTRACT

Rice production in Nigeria has frequently proven difficult to sustain, despite the significant focus of the Nigerian government on discouraging its importation and encouraging its farming. However, rice production has its own risk, just like any production process. Therefore, the researchers of this study aimed to assess the risk management strategy employed by the farmers in Soba, Kaduna State and stipulate the most appropriate risk management strategy in rice production. The research data for the study were gathered using structured questionnaires that were pre-tested and validated before being administered to a sample of 354 rice production personnel (342 paddy farmers and 12 rice producers). Results of the study showed that rice producers are focused more on cause-oriented risk management practice than effect-oriented risk management practice, with 'information exchange among rice producers' as the most favoured risk management practice with a mean value of 4.13, followed by 'selling/distribution of products to market they understand very well', and 'diversification of enterprise' with mean values of 4.11, and 3.81 respectively under cause-oriented risk management practice. Results of the study suggest that rice producers in Soba, Kaduna State, tend to rely more on cause-oriented risk management practices, such as information exchange and market familiarisation, than on effect-oriented practices. These findings have important implications for policymakers and rice producers alike. They highlight the need for targeted support and training programs to help farmers manage risk and improve their productivity and profitability.

Keywords: Risk Assessment, Risk Factors, Rice Production, Risk Management, Small Holder Farmers, Cause-oriented risk

INTRODUCTION

The risks confronted by rice grains are of specific interest given that for many years, Nigeria has invested a lot in rice farming and constantly attempts to cut back rice importation into the country (Danbaba et al., 2019). Despite the importance of rice both as a major food in Nigeria and industrial material usage, the local supply is quite low and still can't meet the consumption demand (Terwase & Madu, 2014). PricewaterhouseCoopers (PWC) released a report stating that rice production has

DOI.org/10.61352/2023AT07

frequently proven difficult to sustain in Nigeria, despite the significant focus by the Nigerian government. The unsustainability is not just to the nation as a whole but to the farmer himself. In 2017, rice production in Nigeria peaked at 3.7 million tonnes, whereas the demand or consumption rate was estimated at 6.4 million tonnes (Akoyi, 2018).

Risk management entails choosing between the different alternatives to minimise the impact of different types of risks. It normally entails calculating trade-offs between variability changes and changes in expected income (Chu et al., 2020; Santos & de Oliveira, 2019). To take a risk is to disclose yourself to a chance of injury or loss. For several reasons, the risk is usually considered inconsequential since the extent of a probable loss is little and/or the probability of suffering that loss is quite low. However, to prevent unfavourable outcomes connected with such risks or to avoid destroying the existence of an enterprise as the source of income generation, risk should be effectively handled within the power of the individual business or cluster (Baryannis et al., 2019). Having been initially aware of risks associated with a particular process under study as obtained from the research, subsequent worry becomes how the party (or parties) concerned can curtail such risks. First, risk management should be planned before such risks are realised (Chu et al., 2020).

A study by Nto (2014) identified the two most significant risks to risk management practices in rice production in Abia State, Nigeria. These significant risks were technical and political risk causes, with mean ranks of 1.29 and 2.29, respectively. The weights assigned by the rice manufacturers to the sources of danger differed from one to five (Likert scale), with 1 being the very best, which implies that the higher the mean, the lower the influence of the risk variable on rice production. An empirical study conducted by Aminu et al. (2020) using econometric tools like w-statistics and Pearson Criterion showed that the real causes of risk to agro-allied enterprises are financial, marketing, currency and production risks in order of priority. Similarly, Prokopchuk et al. (2019), in a study conducted in Ukraine on the current trend in agricultural insurance market operation, reported that the major risk sources that plagued profit are financial risk and del credere(agency) risk in order of priority with mean ranks of 10 and 13 respectively.

Based on the literatures, different researchers have employed different methods of conducting risk management strategies. Similarly, in the case of rice production, most researchers merely identified various activities to follow and conditions to be met to manage risk. In risk management, two main strategies are commonly used: cause-oriented and effect-oriented (Li et al., 2022). Cause-oriented risk management seeks to avoid or reduce risk by identifying and addressing its root causes. This approach involves taking proactive measures, such as early planting and premonitory safety and security initiatives, to prevent potential risks from occurring (Li et al., 2015). Effect-oriented risk management focuses on reducing the negative impact of risk events that have already occurred (Li et al., 2022). In rice production, large-scale producers often use hedging and insurance to mitigate and transfer risk, with crop insurance compensating for losses caused by natural hazards. These measures aim to reduce the damage caused by risk events and

protect the producer from financial losses (Sholihah et al., 2018; Kijima, 2019).

It's believed that the world we live in is liable to risk, and rice production is not an exception to such risk since its production is in a world subject to disruptions, disturbances and reliance on the resilience of individuals and communities to negotiate its ruggedness(Martin & Sunley, 2015). Atta & Micheels (2020) outlined risk as a product of hazard and vulnerability. This research paper, therefore, for the first time, focuses on assessing the risk management practices in rice production among smallholder farmers in Soba Community, Nigeria, with a bid to create a desire for a refined knowledge of risk and the management of risk which is believed to lead to food security.

RESEARCH METHODOLOGY

A descriptive survey research approach was chosen to properly assess risk management practices in rice production among the smallholder farmers in Soba community in Northern Nigeria. This is due to the survey method's suitability for gathering vast amounts of raw data from a large number of respondents to facilitate a thorough grasp of the topic under research (Neminebor et al., 2022; Alam, 2021). The sample size was calculated using the Yamane formula based on the study population. Based on the information obtained from the Kaduna Agricultural Development Agency (KADP), there are about 3000 rice farmers in the Soba Local Government of Kaduna State and about 100 local rice millers in Soba Local Government of Kaduna State.

Using the "Yamane formula" for determining sample size (Yamane, 1967) as given in Equation 1, a sample size of 354 respondents was obtained, out of which 342 were paddy farmers while 12 were rice millers.

$$\text{Sample Size} = \mathrm{N}/(1 + \mathrm{N}e^2) \quad (1)$$

Where N is the population size, and e is the alpha level (0.05 for 95% accuracy)

Data were collected using a structured questionnaire administered to the respondents using the random sampling method. The questionnaire was designed to gather information on the risk management practices of smallholder rice farmers in Soba community. The questionnaire consisted of two main parts: the first part collected demographic information such as age, gender, level of education, and farming experience. The second part of the questionnaire focused on risk management practices and included sections for rating different types of risk in terms of cause and effect using a Likert scale. The Likert scale used in the questionnaire consisted of a series of statements for each type of risk identified in the literature review. Respondents were asked to indicate their level of agreement with each statement using a five-point scale ranging from strongly disagree to strongly agree. For example, the risk avoidance section included statements such as "I carry out proper site selection" and "I carry out proper land preparation with machineries". The risk reduction section included statements such as "I make use of improved inputs (seeds, fertiliser

and herbicides) and the right specification" and "I apply modern technology practice".

To ensure accuracy in data collection, the data collectors were selected based on their knowledge and expertise in rice farming. Their knowledge and expertise were used as criteria for recruiting data collectors to ensure accuracy in data collection. The data collectors were also trained on the researcher's need to avoid conflict of ideas and avoid misinterpreting questions. Before the data collection process began, the questionnaire was pre-tested with a group of rice farmers to ensure its clarity and ease of understanding. Any necessary modifications were made before the final version was used for data collection. Statistical Package for the Social Sciences (SPSS) Version 26 was used for data analysis, and data from measurements were presented as mean and standard deviation. Kendall's Coefficient of Concordance (W) was used to show how credible the respondents were and how closely their opinions agreed.

RESULTS AND DISCUSSION

Cause-Oriented Risk Management Practices

Based on the data obtained from the field, Table 1 shows the cause-oriented risk management practices by the paddy farmers and the level at which they employ certain practices. The results show that 'information exchange among rice producers' was the most favoured risk management practice in the study area, with a mean value of 4.13. This is because the farmers in the area face common risks and challenges in their rice production activities, such as disease outbreaks or market fluctuations. Therefore, they find it beneficial to share information and knowledge to manage these risks better. The next cause-oriented risk management was 'selling/distribution of products to market they understand very well' and 'diversification of enterprise' with mean values of 4.11 and 3.81, respectively. The least favoured risk management technique is hiring scouts to spot disease and nutritional balances with a mean value of 2.0.

According to Adnan et al. (2020), the highest risk management strategy employed by agricultural farmers was 'enterprise diversification'. This suggests that efforts to promote the diversification of agricultural enterprises could be an effective way to mitigate risks faced by farmers and may be a key focus for policy interventions aimed at improving agricultural productivity and resilience. Similarly, 'enterprise diversification' being one of the most favoured risk management practices in this study is in line with the work of Ohen et al. (2017), who found crop enterprise diversification as the most accepted risk-decreasing approach by rice millers in Cross-river State, Nigeria. The reason for the 'hiring of scout' being the least favoured can indicate that the respondents lack awareness of rice disease on farms and are ignorant about hiring scouts because they assume they have a proper understanding of their farming activities.

Table 1: Cause-Oriented Risks Management in paddy production

	Mean	Std. Deviation
Risk Avoidance	3.2445	1.14683
Proper site selection	3.5146	0.66197
Proper land preparation with machineries "tractor."	2.7251	0.84964
Procurement of Inputs (seed and fertiliser) from certified dealers	3.1930	1.19538
Avoid late planting and planting in risky environments	3.6053	1.08267
Effectively measure farmland to know the right amount of inputs to apply	2.9620	1.39806
Record Keeping	3.0556	1.38694
Information Exchange among Paddy Producers	4.1316	.93023
Information Seeking from extension agents on "weather forecast."	2.7690	1.66977
Risk Reduction	2.9624	1.03903
Use of improved inputs (seeds, fertiliser and herbicides) and the right specification	3.1754	0.81675
Applying modern technology practice (GAP)	2.7281	0.65368
The hiring of scouts to spot diseases, nutrition balances and pest control	2.0117	1.07211
Diversify across various enterprises as an alternate source of income	3.8129	0.91904
Cooperative Marketing (Selling in groups)	2.5848	1.05708
Hedging (Contractors to reduce risk exposure, e.g., Project Monitoring Team)	2.3129	1.68269
Sell or distribute outputs to market you know very well	4.1111	1.07187
Valid N (list-wise)		

Effect-Oriented Risks Management

Table 2 shows the effect-oriented risk management strategies the farmers employ. The results show crop insurance and forward contracts with mean values of 2.22 and 2.16 as the least effect-oriented risk management technique employed by rice farmers in the study area. This can be attributed to a lack of knowledge by most farmers on applying for crop insurance and its benefits and because most are small-scale farmers who may not see the need for these measures.

Table 2: Effect-Oriented Risks Management in paddy production

	Mean	**Std. Deviation**
Risk Retention	3.5936	1.18211
Use of Chemical weeding to effectively remove weeds (Use of Herbicides)	3.5936	1.18211
Risk Transfer	2.1929	1.4381
Crop Insurance	2.2222	1.18038
Forward Contracts (employing off-takers prior to production in other to share risk)	2.1637	1.69598
Valid N (list-wise)		

Credibility of Respondents Responses

Table 3 shows Kendall's coefficient of concordance of the responses from the rice producers, in which the coefficient of concordance was calculated to be 0.338. Since the W-statistic falls between 0.3 and 0.5, the result shows moderate agreement among the respondent, which is fairly acceptable. Based on the result, it can be asserted that the concordance of rice producers' judgement is non-random(Mitchell et al., 2022).

Table 3: Kendall's Coefficient of Concordance of Rice Producers

Test	**Results**
N	342
Kendall's W[a]	0.338
Chi-Square	1963.653
Degree of Freedom	17
Asymp. Sig.	0.000

In accordance with the non-randomisation of the rice producers' judgements, as obtained in Table

3, the mean rank of risk management practices from highest to lowest is shown in Table 4. Based on this result, it is obvious that rice farmers in the study area adopt cause-oriented risk management strategies more than effect-oriented risk management, indicating that rice farmers try to avoid risk as much as possible. The farmers rarely adopt insurance due to initial investment and recurring interest charges. Based on the researcher's interview, the little resources the farmers have at the initial stage of the farming process are managed throughout the rice production; hence they can do little to offset the risk that comes up during the production.

Table 4: Mean Rank of Risk Management Practice in Rice Production

Risk Sources	Mean Rank	Order of Mean Rank
Cause-Oriented Risk Management Practice	1.70	2nd
Effect-Oriented Risk Management Practice	1.30	1st

CONCLUSION

This study shows that rice producers focused more on cause-oriented (risk avoidance and reduction) risk management strategies than effect-risk management strategies. From these findings, rice producers (Farmers and processors) in Soba try to avoid risk as much as possible. This is because the farmers operate on a low scale; hence, they can only do much with cause-oriented risk management strategies (risk avoidance and prevention). Information exchange among paddy rice producers was the most favoured of the different cause-oriented risk management practices. Also, the findings showed that the respondents rarely practice risk transfer (use of insurance). The recommendations from this study include training farmers on best practices, promoting insurance and risk management, offering government subsidies for agricultural inputs and equipment, and encouraging farmers to take proactive steps to improve their own situations. This can be done through forming cooperatives or associations for collective bargaining and knowledge sharing with NGO support.

ACKNOWLEDGEMENTS

The authors acknowledge the support offered by the staff and students of the Department of Mechanical Engineering, Ahmadu Bello University, Zaria, Nigeria.

Conflicts of Interests

The authors declare no competing interests

Authors' Contributions

O.Y.O. is responsible for collecting data, methodology, and writing the original draft. U.A.U. is responsible for the conceptualisation, supervision, methodology and writing of the original draft.

A.N.O. is responsible for the data analysis, formal analysis, writing of the original draft, and revision.

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