



ASSESSMENT OF RISK FACTORS IN RICE FARMING IN ADAMAWA STATE, NIGERIA

Adebayo, E. F., Dauna, Y. and Giroh, D. Y.

Department of Agricultural Economics and Extension, Faculty of Agriculture and
Agriculture, Modibbo Adama University Yola, Nigeria

Corresponding Author's Email: daunayakubu@gmail.com **Tel.:** 08038480338

ABSTRACT

Risk factors such as frequent changes in input cost, drought, herdsmen activities and high degree of product price fluctuation could bring about severe loss in rice production and discouragement to present and prospective rice farmers. The study was conducted to assess the risk factors associated with rice farming in Adamawa State, Nigeria. The specific objectives were to: investigate risk factors that limit rice farmers from achieving maximum potential yields from rice farms and to predict the future state of rice farm output in the long run. Data were collected from 184 rice farmers using multi stage sampling techniques. Risk impact/probability chart was used to assess the potential impact of risk factors on rice output. The Markov chain model was employed to predict the future state of rice farm output. The result revealed that frequent change in input costs is a risk that its occurrence is almost certain and has high destructive tendency. The result of Markov chain predicted that in the long run more than 51% of the rice farmers in Adamawa State would produce above 10 tonnes annually. To improve rice production, it is recommended that input prices should be subsidized and stabilized by government.

Keywords: Risk, Rice, Farming, Markov chain, Adamawa.

INTRODUCTION

Rice is an important food and cash crop cultivated in all agro ecological zones of Nigeria. The production of the crop has been on the increase over the years owing to its uses in various forms. The cereal is widely consumed all over the country regardless of cultural, religious or geographical boundaries. Thus, a strategic commodity in the Nigerian economy (Dauna *et al.*, 2019). However, with increasing population coupled with impacts of climate and environmental degradation, current supply does not keep up with its demand.

A risk is defined as the probability of loss and depends on factors such as hazard, vulnerability and exposure. This means that if the magnitude of any of these changes, the risk will correspondingly increase or decrease (Fang *et al.*, 2019). Rice production is inherently risky resulting in wide variability in output due to biological and climatic factors such as pest and diseases, flood, drought, soil and so on. Thus, rice farming is susceptible to failure (Ambarawati *et al.*, 2018).

The objectives of this paper therefore, is to investigate risk factors that limit rice farmers from achieving maximum potential yields from rice farms and to predict the future state of rice farm output in the long run.

MATERIALS AND METHODS

The Study Area

The study was conducted in Adamawa State, Nigeria. It is located at the North-Eastern part of Nigeria. It lies between latitude 7° and 11°N of the equator and longitude 11° and 14°E of the Greenwich Meridian. It shares boundary with Taraba State in the South and West,



Gombe in the North-West and Borno to the North. It also has an international boundary with the Cameroon Republic along its eastern border. The State has a land area of about 38,741Km² with a population of 3,860,023 people which are predominantly farmers (projected from NPC, 2006).

Sampling Procedure and Sources of Data

Multi stage sampling techniques was employed in selecting the respondents from all the four Agricultural zones of the State. Zone 1: Madagali, Michika, Mubi North, Mubi South and Maiha Local Government Areas (LGAs). Zone 2: Hong, Gombi, Song and Girei LGAs. Zone 3: Fufore, Ganye, Jada, Mayo-Belwa, Toundou, Yola North and Yola South LGAs. Zone 4: Demsa, Guyuk, Lamurde, Numan, and Shelleng LGAs. The second stage involved the purposive selection of nine popular rice producing areas from the zones. The final stage was random selection of respondents in each of the rice producing proportionate to size. In all 184 questionnaires was used to obtain information from the sampled 460 respondents. Data collected were analyzed through the use of risk impact/probability chart, and Markov Chain Technique. The data for this study were obtained from rice farmers, through the use of questionnaires which will be supplemented with oral interview.

Methods of Data Analysis

The risk impact/probability chart was used to evaluate the potential impact of risk factors on rice output. It is based on the principle that risk has two primary dimensions:-

- a. Probability: A risk is an event that may occur. The probability of it occurring can range anywhere just above 0% to just below 100%.
- b. Impact: A risk by its nature always has a negative impact. However, the size of the impact varies in terms of cost and impact on returns.

The Markov chain model was employed to predict the future state of rice farm output. This has been demonstrated by and Baruwa *et al.* (2011). The model is expressed as:

$$P = \begin{bmatrix} P_{11} & P_{12} & P_{13} \\ P_{21} & P_{22} & P_{23} \\ P_{31} & P_{32} & P_{33} \end{bmatrix}$$

where; p = transition matrix, P₁₁, P₁₂, P₁₃, P₂₁, P₂₂, P₂₃, P₃₁, P₃₂ and P₃₃ are output of rice at different States.

RESULTS AND DISCUSSION

Impact of Risks in Rice Production

The impact of risk in rice production is shown in Figure 1. The result of the analysis revealed that changes in government policies, difficulty in marketing of local rice, increase in cost on land rent, inadequate credit facilities, pests and disease infestation and flooding had moderate risk impact on rice output and the likelihood of their occurrence is also moderate. These risks therefore, are of moderate importance. This implies that if any of these risks occurred, the farmers can cope and move on. However, it is more rational that the rice producers should try to reduce the likelihood that these will occur so as to maximize output.

The risk associated with forest fire has low likelihood of occurrence and if it occurs the impact on output is low. This risk is of little importance and less or no concern should be given to it because is unlikely to occur and even if it occurs, its impact on output is low. Variation in price of output, herdsman activities and drought, are risks of high importance because they are likely to occur and can be devastating if they occur. The farmers should therefore have contingency plan in place to mitigate just in case they occur. Changes in inputs cost is a risk of

critical importance. It is a risk that its occurrence is almost certain and has high destructive tendency. This is of top priority and that close attention should be given. The result of this study is consistent with Philips (2016) who opined that major risk factors which affect cereal crops like rice are technical and political risk.

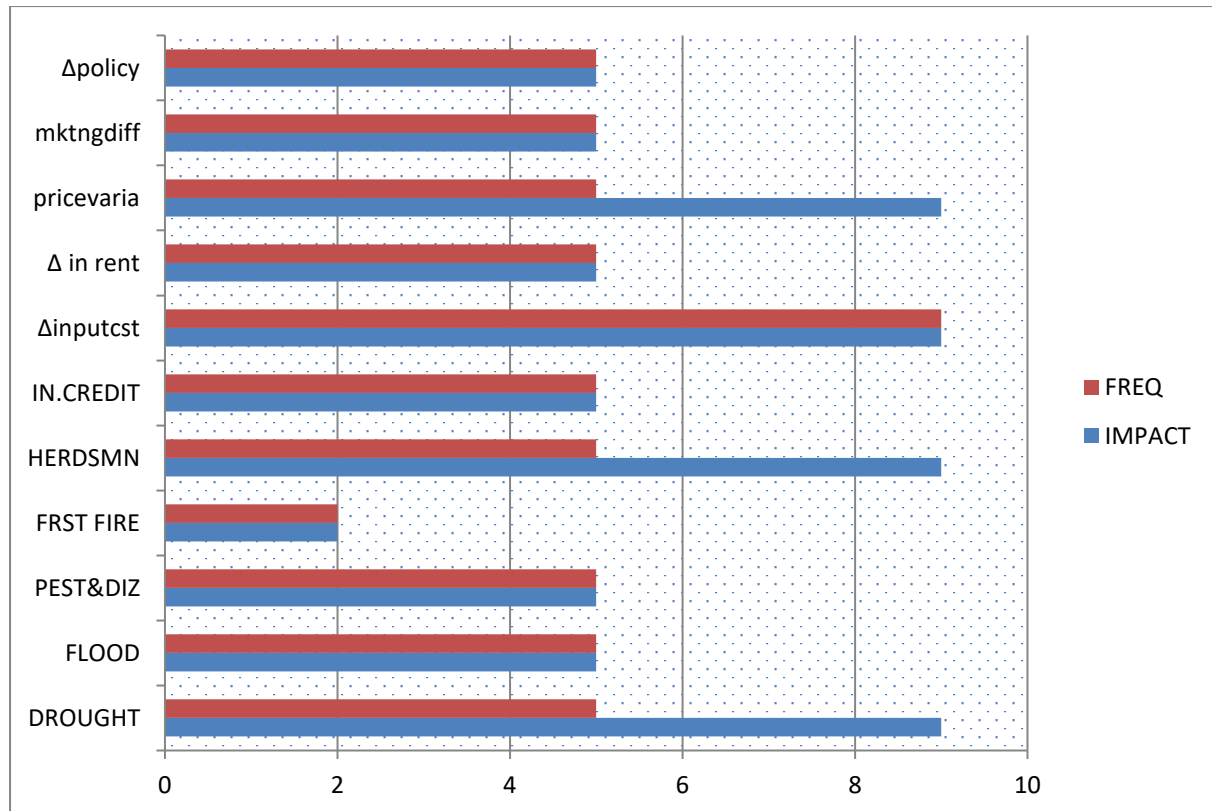


Figure 1: *Impact of risks in rice production*

Transition Probability Matrix output of Rice Produced in Adamawa State

The long run output of rice quantity in Adamawa State was predicted using Markov chain technique. This was obtained by predicting the number of rice farmers on different states of quantity of rice to be produced at the long run in Adamawa State. The transition matrix and probability vector were obtained for projected output of rice from two years output: 2017 (t_0) and 2018 (t_{0+1}). Quantity produced was classified into three categories ' S_i ', obtained from the total output of rice produced for year 2017 and year 2018. The three categories were designated in the output states ' S_i ' the states created on the basis of tons of rice produced as: S_1 =Less than or equal 5tonnes

S_2 = Between 5.1 and 10 tons.

S_3 =Above 10 tons.

Table 1 presents t_0 (2017) and t_{0+1} (2018). The first category, (S_1 = less than or equal to 5 tons), the second category (S_2 = 5.1 to 10 tons) and the third category (S_3 = above 10 tons). S_{11} were the number of farmers who produced less than or equal 5 tons in year 2017 and still produced the same quantity 2018. S_{12} were the number of farmers that produced less than or equal to 5tonnes in 2017, but transited to produce up to5.1 to 10 tons in 2018. S_{13} were the number of farmers that produced less than or equal 5 tons in 2017 but, graduated to produce above 10 tons in 2018. S_{21} were the number of farmers that produced between5.1 to 10 tons in



2017, but fall back to produce below or equal 5 tons in year 2018. S_{22} were farmers that produced between 5.1 to 10 tons in 2017 and still maintained the same quantity in year 2018. S_{23} were farmers that produced between 5.1 to 10 tons in 2017, but proceeded to produce above 10 tons in 2017. S_{31} are number of those that produce above 10 tonnes in year 2017 but produce below or equal to 5 in 2018. S_{32} were those that produced above 10 tons in 2017 but fall back to produce between 5.1 to 10 tons in 2018. S_{33} were the number of farmers that produced above 10 tons in 2017 and maintained the status quo in 2018.

Projected Output of Rice in Adamawa State

The result obtained from initial probability for year t_0 and t_{0+1} (2017 and 2018) as shown in Table 1. Projection from the table revealed that in the long, 31% of the population of rice farmers in Adamawa State would produce below or equal 5 tons rice per annum, 18% of the farmers would have an output of 5.1 to 10 tons of rice per annum while 51% of the farmers would produce above 10 tons of rice per annum. This result indicates that more than 50% of the rice farmers in Adamawa would in the long run produce more than 10 tons of rice per annum which an indication of increase of rice output in the state. This complements Udemezue (2018) who states rice output in Nigeria is on the increase and is expected to keep on increasing.

Table 1: Results of Transition Matrix of Rice Output on 2017 and 2018 Production

Class		Year 2018(t_{0+1})			
Year 2017(t_0)		S_1	S_2	S_3	Total
	S_1	71	26	1	98
	S_2	3	27	14	44
	S_3	0	0	42	42
	Total	74	53	57	184

S_1 = below or equal to 5 tons, S_2 =5.1 to 10 tons, S_3 = above 10; Result: $S_1=0.31$, $S_2=0.18$, $S_3=0.51$. This can be interpreted as 31%, 18% and 51%, respectively. Conformation: $0.31+0.18+0.51=1$

Source: Field survey, 2019

CONCLUSION AND RECOMMENDATIONS

The study concluded that rice farming in Adamawa State is mostly done under moderate risk factors and high prospects in the long run. However, rice producers should device a means of reducing the likelihood of risk factors from occurring so as to maximize output.

REFERENCES

- Ambarawati, G. A. A., Wajiya, M. A. and Budiasa. W. (2018). Risk mitigation for rice production through agricultural insurance: farmer's perspective. *Journal Manajemen and Agrisinis*, 15(2): 129-135.
- Baruwa, O. I., Masuku, M. B. and Alimi, T. (2011). Economic Analysis of Plantain Production in Derived Savannah Zone of Osun State, Nigeria. *Asian Journal of Agriculture Sciences*, 3(5): 401-407.
- Dauna, Y., Mshelia, S. I. and Akinrefon, A. A. (2019). Price fluctuation and spatial market integration of rice in Adamawa State rice market. *FULafia Journal of Science and Technology*, 5(2): 31-37.
- Fang, C., Huicong. J. and Donghua. P. (2019). Risk Assessment of Maize Drought in China Based on physical vulnerability. *Journal of Food and Quality*, 19:1-9.



- NPC (2006). *National Population Commission, Census Estimate for Nigeria Abuja*.
- Philips, N. O. O. (2016). Analysis of risk management practices among maize based on farmers in Abia State, Nigeria. *Asian economic Journal and Financial Review. Journal of Plant Protection*, 1(3):490-498.
- Udemezue, J. C. (2018). Analysis of rice production and consumption Trend in Nigeria. *Journal of Plant Sciences and Crop Protection*, 1(3): 305-310.