EVALUATION OF RISK MANAGEMENT PRACTICES IN RICE PRODUCTION IN ABIA STATE, NIGERIA

BY

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Abstract

The study was conducted to evaluate risk management practices in rice production in Abia State, Nigeria with the specific objectives to: (1) examine the profile of rice producers (2) identify sources of risk and the degree of influence on rice production. (3) examine appropriate risk management Practices. Data for the study were collected using well structured questionnaires administered on 60 farmers who were obtained through random sampling technique. Data were analysed using mean, frequency table, percentage, w-statistics and Pearson Criterion. Results of the study indicate that the highest risk sources to rice production were technical and political risk with mean rank of 1.29 and 2.29 respectively. The w-statistics was calculated to be 0.674 implying that concordance of rice producers' judgement should be regarded as satisfactory hence can be used for policy formulation given that it was significant at 1% probability level. It is recommended that farmers should adopt technical methods of handling risk such as use of improved variety of seed, fertilizer, and pesticide in controlling risk. Also the government institutions charged with the responsibility of making the inputs available should be strengthened while extension services by government agencies should be reorganised to carryout effective extension services, on how to use the inputs. Besides, there should be rice insurance scheme to cover disaster like flood.

Introduction

Rice (Oryza Sativa) is an important staple food for majority of Nigerians. It is one of the fastest growing crops in Nigeria's food question and rapid urbanisation which has led its prominence in fast food joints. Also, many products like spaghetti, noodles and other industrial products are constantly being derived from rice. The relative ease of preparation and convenience in storage have contributed significantly in making rice a highly acceptable dish in several homes especially during festival and ceremonies (Ekeleme *et al.,* 2008; Umeh and Ataborh, 2006 and Daramola, 2005).

Despite its relative importance as Nigerian major food and industrial material, the domestic supply is still considered insufficient to match the consumption demand. The

local production falls short of the demand (Basorum and Fasakin, 2012) hence, leading to augmentation of shortfall through import.

According to Ekeleme *et al.,* (2008) and United States Agency for International Development USAID, (2013), Nigeria consumes 5.4 million metric tonnes of rice annually, of this value, annual domestic output of rice still hovers around 3.0 million metric tonnes leaving the huge gap of about 2 million metric tonnes to importation. This is consistent with the Daramola (2005) that rice importation in Nigeria is around US$ 2.2 Billion which is to the detriment of the scarce foreign exchange reserve. This is an unfortunate scenario for a country that is presumed to be the largest producer of rice in West Africa also depending on imports from countries like Thailand, India and USA etc.

Nigeria has the capacity for the expansion of rice production given the favourable agro-ecological base as well as the encouragements the local farmers receive (such as subsidised loan facilities, tax holiday for young producers etc) from government, yet average rice yield in the country is still low and ranged between 1 and 2.5 tonnes per hectare. This is not healthy to the population of Nigeria which is currently growing at 3.1% (Nto and Mbanasor, 2008). At macro level, the estimated potential and actual area for rice production stand at 4.6-4.9 million hectare and 1.77 million hectare respectively. Out of the actual land area under rice production, estimated outputs of 2.3 million metric tonnes are realised. This translates to a low productivity of about 1.3 tonnes per hectare, due to low risk management culture and practices of the rice farmers. (Umeh and Ataborh, 2006; West African Rice Development Association WARD, 1996; Singh *et al.,* 1997 and Imolehin and Wada, 2000)

Nto et al., (2011) observed that poor yield in rice and low productivity among rice producers will continue to be observed in Abia State and Nigeria in general considering that rice production depends on vagaries of the environment and nature. Farmers in Abia State seem to have low incentive and attitude towards risk management practices. Nigeria and Abia State in particular may continue to face acute shortage of food and high rate of poverty unless concerted efforts are given towards appropriate risk reducing methods in rice production. This is critical given that food supply is at low rate of 2.5% while the demand is at alarming rate of 3.5%.

The long chain of activities associated with rice production namely planting, harvesting, parboiling, drying, milling, threshing and distribution expose producers to high degree of risk even when the country is endowed with fertile arable land and agro-climatic

conditions which are supposed to provide a robust natural resource base for increased yield. (Alimi and Ayanwale, 2005; Mikhaylova, 2005; Nto *et al.,* 2011 and Aneke, 2007) Umeh and Ataborh, (2006) noted that self-sufficiency in rice production will continue to elude Nigeria over a long period if a study of this nature is not conducted. Based on the aforementioned, the study was conducted with the following objectives to: (1) examine the profile of rice producers, (2) identify sources of risk and the degree of influence on rice production and (3) examine appropriate risk management practices. This study is important if a rice-deficit nation like Nigeria is to become rice-surplus and exporter nation in the West-African sub-region. Though similar studies may have been conducted in other study areas and crop enterprises but the findings may not be relevant for policy formulation aimed at managing risk of rice production in Abia State of Nigeria.

Such studies and literatures consulted assembled major sources of risk to rice production as: (a) Macroeconomic Source and policies inconsistency which lead to non-implementation of government policy like high tariff on imported rice; diversion of government subsidised inputs; high cost of inputs and imported equipments; legal and illegal taxes; ban and unban of rice importation thereby making forecasting of expected event difficult in rice production (Daramola, 2005; Alimi and Ayanwale, 2005). (b) Production Risk: This includes scarcity of labour due to migration of youths to urban areas in search of white collar jobs or quick money yielding ventures. Other components of this risk are lack of improved varieties, obsolete, and inefficient technology; drought, flooding, poor soil fertility, decayed infrastructure, Pest and diseases as well as land tenure (Ekeleme *et al.,* 2008 and Daramola, 2005). (c) Marketing Risk: This is related to high cost of input and low price of output due to improper post harvest handling especially in terms of polishing and packaging (Daramola, 2005, USAID, 2012 and Aneke 2007). (d) Finance Risk: Nto *et al.,* (2011) noted that interest rate and non accessibility of credit to rice producers are major component of finance risk in rice production. Rice farmers often borrow money from informal sources with very high interest rate. Formal credit institutions are highly constrained in financing rice production because of inherent risk and limitations associated with the enterprise (Nto and Acha 2012, Odoemenan and Inakwu 2011)

An empirical study conducted by Nto *et al.,* (2011) on "Analysis of risk among agribusiness enterprises investments in Abia State, Nigeria", using econometric tools like w-statistics and Pearson Criterion reveals that the major source of risk to formal

agribusiness enterprises are financial, marketing, currency and production risks in that order.

Mikhaylova (2005) in a study conducted in Ukraine on "Risk Management in International agricultural Markets" using the above model reported that the major risk sources that affected profitability of export-import operations at DE "Rize-Agro-Services" are currency risk and del credere risk in that order with mean rank of 10 and 13 respectively.

The findings of these studies cannot be adopted for policy formulation aimed at managing risk associated with rice production given that data used, were collected from formal agribusiness enterprises which never included rice producers in the area who are mainly informal farmers in the case of Nto et al., (2011) while Mikhaylova (2005) was conducted outside the study area. Though, the studies offered useful guide in shaping the scope and background of this study.

Methodology

The study was conducted in Abia State of Nigeria. The State lies between longitude $04^0$45' and $06^0$17' North, and latitude $07^0$00' and 08^0.10' East. It is located within the forest belt of Nigeria with temperature range of 20^0C to 36^0C. Agriculture is the major occupation of the people, especially in the rural areas where food crops such as cassava, yam, rice, plantain, maize and melon among others are cultivated (ABSEED, 2005).

The respondents for the study were drawn from Bende and Arochukwu Local Government Areas (LGAs) of the State. The two LGAs were purposively selected because they are the major rice producing areas in the state. They are engaged in all stages of rice production activities such as planting, harvesting, parboiling, drying, milling/threshing and marketing. Rice production in these LGAs is done by small scale producers, whose output range between 1 and 2.5 tonnes per hectare. (Daramola, 2005; Nto and Mbanaso, 2010 and Nto, 2012)

Primary data were collected through well structured questionnaires administered on 60 rice producers. The 60 experienced rice producers were selected through random sampling technique from list of rice producers obtained from community heads of the area. The communities were Abam and Bende of Arochukwu and Bende LGAs

respectively. The two communities were selected through purposive sampling technique because they enjoy comparative advantage in rice production over the other parts of the LGAs. The 60 rice producers who are well experienced give excellent reflection of the rice producers in the area.

Data which were collected through enumerators drawn from the Departments of Agriculture in the Local Governments covered key issues like socio-economic characteristics of the farmers, sources of risk and the degree of influence, risk management practices, income of the producers, etc.

Objectives 1 and 2 were analysed with mean, frequency table and percentages while objective 3 was realised with ranking and further validated with econometric tools such as W-Statistics and Pearson Criterion.

Following Nto *et al.,* (2011) and Mikhaylova (2005) the procedures adopted were summarised as:

1. Selection of experienced 60 rice producers who are competent to know issues regarding the various risk factors.
2. Ranking factors by the experienced rice producers with the help of the enumerators.
3. Information processing
4. Verification of concordance and probability of experienced producer's judgement.
5. Use of estimation results for working out the econometric model.

It is important to state that during ranking, some kinds of risks were given the same rank. Rice producers were requested to specify the position given to such kind of risks in the process of general ranking; the risk factors in order of ranks decrease from 1-5 based on severity experienced by the rice producers with 1 being the most severe, followed by 2 in that order. We assumed that weight of position of each rice producer was the same since no producer had any advantage over the other in ranking of risk. The factors which were given the same risk weight were equal to arithmetic middling of corresponding positions. The next was the determination of the coefficient of concordance to verify concordance of rice producer's judgements, using equation 1.

$$W = \frac{S}{\frac{1}{2} m^2 (n^3 - n) - \frac{m}{12n} \sum_{j=i}^{M} T_j} \qquad (1)$$

Where; S= sum of deviation squares (derived from processing of rice producer's judgements); M= number of experienced rice producers (60); n= number of risk and Tj = Indicator that allows taking into consideration coincidence of ranks and was estimated by the formula;

$$Tj = \sum_{K=1}^{n} (t_k^3 - t_k) \qquad (2)$$

Where; t_k = number rank K coincidences while ranking factor by producer j. Thus, coefficient of concordance varied within the range of 0≤ w ≤ 1. The decision rules were that if w ≥ 0.5 the concordance may be regarded as satisfactory, if W ≥ 0.7, and then concordance is considered as good. W = 1 means entire coincidence of producer's judgements. (That is, excellent and most dependable result) The probability of concordance coefficient was verified by Pearson criterion. This criterion was calculated thus:

$$\chi^2 = \frac{S}{\frac{1}{12} * m * n * (n+1) - \frac{1}{n-1} * \frac{1}{12} * \sum_{j=i}^{M} Tj} \qquad (3)$$

Calculated value χ^2 calc exceeds χ^2 tab, then the null hypothesis about concordance of 60 producer's judgements on the risk factors ranking may be rejected, that is, we may assert that concordance of producers' judgements is non-random. So in accordance with producers' judgements, we determine the factors which have extreme influence upon the output and returns of rice production. Following Alimi and Ayanwale, (2005); and Mikhaylova, (2005); and Nto *et al.,* (2011) the risk factors for consideration were:

X_1 = Political risk

X_2 = Technical risk

X_3 = Market risk

X_4 = Financial risk

X_5 = Social risk

Results and Discussion

The results of the data analysis and discussion are presented in this section. It started with the average statistics of the socio-economic profile of the rice producers. Table 1 indicates the profile of rice producers in the study area.

Table 1: Average Statistics of Socio-Economic Profile of Rice Producer in Abia State.

Variable	Mean	Standard Dev.	Min	Max
Sex, (Male=73%, Female=27%)	-	-	-	-
Age	42.7166	14.2080	14	70
Years spent in school	8.4333	4.0184	0	16
Years of Experience	18.2833	10.2264	3	40
Household Size	5.600	2.3878	1	10
Farm Size	2.325	1.6282	1	8
Total Income	229650	226941	12000	1000000

Source: Calculated from field survey data 2013

The table indicated that majority (73%) of the respondents are male while 27% are female. This contradicts the findings of Ijere and Mbanasor, (1998) and Nto, (2012) that women dominate (60-79%) of the rural agriculture. The mean age is 42.7166 years. This is an indication that majority of the rice producers are still within the active stage, thus should be more able to employ various methods of handling risk. The average number of years in school is 8.4333 indicating that most of the rice producers have junior secondary school certificate, hence; strengthens the ability to take appropriate risk management practices. Education is an important element in rice production because of the long value chain, so producer without good level of education may not be able to predict outcome of the investment plan or take appropriate risk management decisions in rice production. The mean years of experience in rice production in the area is 18.2833. This is consistent with the findings of Nto and Mbanasor, (2008) that mean years of experience of farmers in Abia State is 18-25 years. Several years in rice business enhance rice producers' ability to forecast and manage various risk sources. According to Nto et al., (2011), as years of experience increase, producers and entrepreneurs tend to develop methods and skill to handle issues of risk.

Table 1 also depicts that the mean size of household is about 6 while the average farm size is 2.325 hectares. Rice producers with small household size of about 5 are likely to depend on hired labour so may be confronted with social risk. Also, the low level of farm size is expected following Daramola, (2005); Odoemenem and Inakwu, (2011); and Nto

and Mbanasor, (2008) which opined that rice production in the area is primarily by small scale producers, with average farm size of 1-2.5 hectares. According to the table, the minimum total income of the respondents was ₦12000 while the maximum was ₦1000000 given room for high standard deviation of ₦226941. This points to high income inequality among rice producers in the area.

Table 2 examined the sources of risk in rice production in Abia State. According to the table 96.67% of the respondents were of the opinion that the major source of risk in rice production is pests/diseases while 86.67% noted that the major source of risk is flood.

Table 2: Distribution of Respondents According to Sources of Risk

Source of Risk	Frequency	Percentage
Technical Risk		
Pest/Diseases	58	96.67
Draught	7	11.67
Flood	52	86.67
Lack of improved variety	35	58.34
Low technology	37	61.67
Market Risk		
High Preference for imported rice	39	65.00
High input price	24	40.00
Low output price	14	23.33
Poor storage system	7	11.67
Political Risk		
Decay infrastructure	24	40.00
Policy inconsistency	41	68.34
Weak government Institution	33	55.00
Social Risk		
Theft	13	21.67
Aging labour	21	35.00
Death/Sickness	20	33.33
Boundary/Civil disturbance	25	41.67
Land tenure	12	20.00
Financial Risk		
High interest rate	33	55.00
Low access to credit	47	78.34

Source: Field survey data 2013
***Multiple responses were recorded**

The result on flood seems justifiable in view of the flood disaster which occurred in most parts of Nigeria (Abia State inclusive) in year 2012. The table also indicated that

78.34% of the respondents observed that low access to credit is another important source of risk to rice production. Accessibility to credit will energise and mobilise rice producer to acquire relevant inputs required to achieve rice production targets.

Table 2 also revealed that about 68% and 65% of the rice producers were of the view that other sources of risk to rice production are policy inconsistency, and consumers' preference for imported rice respectively. In Nigeria, there is continuous ban and unban of the importation of foreign rice hence compounding decision making by the producers. The policy of imposing high tariffs on the imported rice may not have yielded the desired target of increasing domestic rice product given high consumers' preference for imported rice as indicated by the result. Empirical evidence by Ekeleme et al., (2008) and Daramola, (2005) opined that the price elasticity of demand for foreign rice is low especially at the urban markets hence tariff and duties on importation can be increased without a corresponding decline in preference and demand for imported rice.

The result showed that 61.67% and 58.34% of the respondent perceived low technology and lack of improved variety respectively as the various sources of variation in the realisation of operational targets in rice production. This is in consonance with the findings of Ekeleme et al., (2008), Nto, (2012); Daramola, (2005) which maintained that rice producers in Nigeria still rely on traditional technology and low yielding variety of inputs. The respondents also stated that weak government institution (55%) and high interest rate (55%) act as important risk components. Weak institution leads to poorly funded research institute, poor public extension system/services and seeds certification (Daramola, 2005).

Nto et al., (2011), observed that descriptive statistics method of examining risk may be misleading as the tool may not be validated with econometric tools, hence the analysis by ranking the risk factors to ascertain the degree of influence on rice production was further validated using W-Statistics and Pearson Criterion χ^2. The concordance of rice producers' judgements and ranking were verified based on coefficient of concordance using W-Statistics. The results are presented in table 3. According to the table, the coefficient of concordance was calculated to be 0.674.

Table 3: Test Statistics of Rice Producers' Ranking

Test	Result
Kendall's W-Statistics	0.674
Chi Square	161.830
Degree of Freedom	4.000
Asympton Significance	0.000***
Nos of Observations	60.000

Source: Calculated from field survey data 2013

According to Nto et al., (2011) and Mikhalova (2005) if W≥0.50, the concordance may be regarded as satisfactory, but if W≥0.7 then concordance is considered as good, W=1 means entire concordance of rice producers judgements. Since the result in table 3 is W=0.674, it means that the concordance should be regarded as satisfactory. The Chi-Square and degree of freedom was calculated to be 161.830 and 4 respectively. The result was significant at 1% probability level hence hypothesis about the concordance of 60 rice producers' judgements ranking the five risk sources (namely, Technical, Market, Political, Social and Financial) may be accepted, ie we may assert that concordance of rice producers' judgements is non-random. In accordance with this, the mean rank of the risk sources is presented in table 4.

Table 4: Mean Rank of Risk Sources

Risk Sources	Mean Rank	Order of Mean Rank
Social Risk	4.51	5th
Market Risk	3.88	4th
Financial Risk	3.08	3rd
Political Risk	2.29	2nd
Technical Risk	1.29	1st

Source: Calculated from field Survey data 2013

According to the table, the risk sources were placed in order of decreasing mean rank ie the risk source with lowest mean rank has the highest impact on the realisation of the expected target of the rice producer. Based on this, the most severe source is technical risk followed by political risk. To determine the most significant risks in the sphere of rice production, figure 1 is used to further illustrate it in order of decreasing influence of risk sources and is based on mean rank.

According to the diagram, the two most important risks are technical and political risk sources with mean rank of 1.29 and 2.29 respectively. Since the weights assigned by the rice producers to the risk sources ranged from 1 to 5 with 1 being the highest, it

means that the higher the mean, the lower the influence of the risk variable on the rice production.

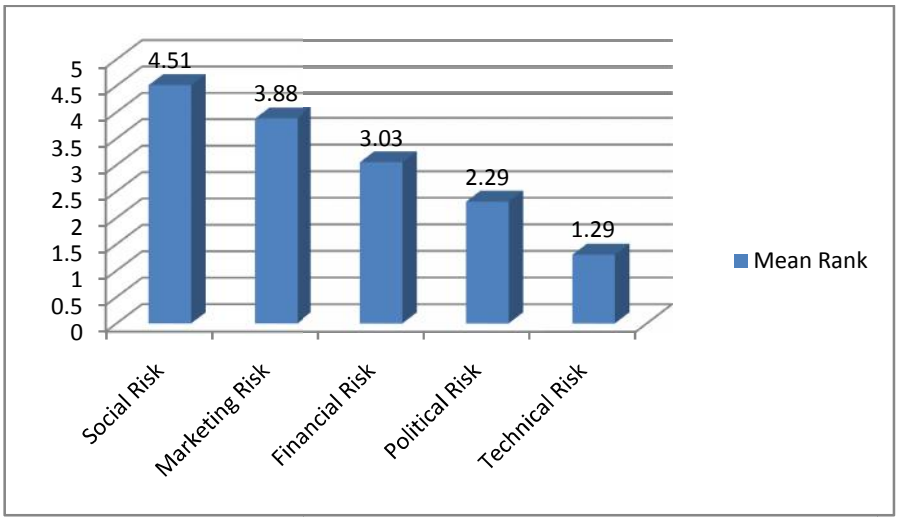

Figure 1: Diagram of decreasing influence of risk factor.

This result is satisfactory, especially when compared with that obtained in table 1 where majority (98.67% and 86.67%) of the respondents revealed that the major components of technical risk such as pest/diseases and flood respectively had highest degree of influence on the output of year 2012 rice production.

Several risk management practices and control were identified that risk averse rice producer could adopt to reduce exposure to variation of income and returns to rice productions. The strategies used by the respondents are summarised and presented in table 5.

According to the table, majority of the respondents (75%) noted that the use of pesticide is the best option for controlling technical risk resulting from attack of rice by pest either during planting stage or stored product. Significant proportion (73%) of the rice producers practiced forward contracting. This is the arrangement which the rice producer enter into for buying inputs or selling output in the future date while cash is exchanged or determined instantly. This is used to control variation in price of input or output. According to Pandey (2004) forward contracts originated for hedging risk of agricultural commodities.

Table 5: Risk Management Practices adopted by rice producers in the area

Practices	Frequency	percentage
Technical Method		
Used of improved seed	33	55.00
Use of fertilizer	27	44.99
Use of pesticide	45	74.99
Diversification		
Non-farm business	11	18.33
Mix cropping	4	6.67
Others		
Sequential Marketing	28	46.66
Cooperative Marketing	3	4.99
Insurance	2	3.33
Native safeguard	40	66.68
Forward contracting	44	73.33

Source: Field survey data 2013
***Multiple responses were recorded.**

Table 5 also revealed that 66.68% of the respondents used native safeguard to control risk especially social and technical risk. The native safeguard involved the use of scare crows to keep birds away from destroying rice plant. It also involves fencing of farm to bar destructive animals from entering the farm as well as use of native medicine (Juju) and guards (watchmen) to scare and prevent thieves (Alimi and Anyanwale, 2005). Reasonable proportion (55%, 46% and 44%) used improved seed/seedlings, sequential marketing and fertilizer respectively to control risk in returns to rice production. Sequential marketing entails gradual release of rice products to the markets to prevent glut which may lead to output price risk.

The result further shows that marginal proportion (18.33%, 6.66%, 4.99% and 3.33%) used non-farm business, mix cropping, cooperative marketing and insurance respectively as the best practices of handling rice production risk. In the case of non-farm business, the rice farmers were also engaged in other income yielding non-farm activities like teaching, politics, artisan, motorcycle or tricycle transportation business etc. There were not full time rice farmers or producers.

Conclusion

The study was conducted to evaluate risk management practices in rice production in Abia State of Nigeria. The respondents were drawn from Abam and Bende

communities of Arochukwu and Bende LGAs respectively. Data which were collected through primary sources from 60 rice producers were analysed using mean, frequency tables, percentage, ranking, W-Statistics and Pearson criterion. The result reveals that the risk sources that had the highest severity on rice production are technical and political. The most popular risk management practices adopted in the area were use of pesticide, forward contracting, native safeguarding and improved seed/seedling.

Based on these, it is recommended that government should ensure availability of pesticide, and improved seed/seedling to experienced rice farmers through input subsidy. National Cereal Research Institute which is the institution charged with research and extension services to rice producers should be strengthened so that rice farmers will be taught how to use the inputs. There may be need to discourage the current trend in the importation of foreign rice, in order to enhance local production. Besides, there should also be special rice insurance scheme to cover disaster like flood in Nigeria with Central Bank of Nigeria paying greater percentage of the premium while rice producers should be given adequate enlightenment on this.

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