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FACTORS INFLUENCING RISK MANAGEMENT STRATEGIES AMONG RICE VALUE CHAIN ACTORS IN KEBBI STATE, NIGERIA

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Abstract

The study analysed factors influencing risk management strategies among rice value chain actors in Kebbi State, Nigeria. The study employed multi-stage sampling techniques in the selection of 400 rice value chain actors from the four Local Governments Areas within the four agricultural zones of the state. Primary data were sourced through field survey with the aid of structured questionnaire. Farm budgeting was used in data analysis. The result of the Logistic regression estimates shows that the significant factors influencing the use of risk management practices by the actors in the study area were age of rice input suppliers (P<0.01), years of experience (P<0.01) and monthly income (P<0.01), also age of rice produces were significant (P<0.01), household of rice producers had a negative coefficient and significant (P<0.10) and years of farming experience is significant (P<0.01), the age, sex, marital status and years of rice processors all had a positive coefficient and significant (P<0.01), similarly, the age, years of marketing experience and membership of cooperative society were all significant (P<0.01), while, rice consumers age and marital status were significant (P<0.01), sex, household size and years of experience were significantly (P<0.05) influencing the risk management practices in the study area. It can be concluded that age, sex, marital status, level of education, years of experience, monthly income, household size and membership of cooperative

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Prof. H. U. Nwanjo [Nigeria]

society were the factors that significantly influencing risk management practices in the study area. The study recommends that there should be adequate institutional supports in form of functional extension services and policies that will help boost the socio-economic welfare of the actors as this will significantly propel an increase in the choice effective risk management strategies in the area.

Introduction

There is growing concern for food security in Nigeria today with particular focus on rice being a staple food. If effective policies must be made to improve rice production, it is important to examine the phenomena underlying its value chain in the first place. The concept of value chain describes the "full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use" Input suppliers, producers, processors, wholesalers and retailers; produce, transform, store, transfer or market the product, adding to its value at each step in the process (Ogaji *et al*., 2022). However, the Nigerian Agricultural production environment is full of risks and uncertainties arising from several factors and these risks affect the efficient conversion of input to output of which rice production is inclusive. Risk which investment economists describe as the variation from expected outcomes due to imperfect knowledge of investor in decision making is inherent in every form of enterprise but is more intensive in input-output relation among agribusiness production (Buhari *et al.,* 2024).

Rice value chain involves long chain of intermediaries in between the producers and consumers. These intermediaries function in an environment constrained by many risks and thereby making the Nigerian rice industry uncompetitive. However, Nigeria being prone to a lot of environmental inconsistencies requires high degree of risk management strategies in rice value chain activities to break the circle of poverty which engulfed over 70% of its population and also to achieve increased food production (Sani *et al.*, 2024). As with other types of Agribusiness, rice value chain is also subjected to uncertainties of weather condition, prices, pests and diseases infestation, availability of hired labour, machinery and equipment malfunctioning as well as government policy (Binuyo *et al.,* 2020). These have negative effects on food prices, availability and farm profitability.

Abdulrazaq *et al.* (2022) defined risk as an uncertainty that affects an individual's welfare and is often associated with adversity and loss. Rice value chain actors face many risks in their investment activities which hinder them from pursuing their business activities. The risk situation is made worse by the fact that they operate in an

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Prof. H. U. Nwanjo [Nigeria]

environment with weak markets and lack of access to sufficient support from the institutions that can assist them to cope with these risks. These lead to not only uncertainty in the level of production, but also in output prices. This can result in severe income losses and fluctuations in consumption. Given their limited ability to offset these shocks, many actors suffer from extreme income fluctuations and were sent out of business (Welay *et al*., 2024) Despite numerous studies on factors influencing risk management strategies among rice value chain actors in Kebbi State, past studies have shown none or little empirical studies that analyzed factors influencing risk management strategies among rice value chain actors in Kebbi State. Thus, the need for this study to analyzed factors influencing risk management strategies among rice value chain actors in Kebbi State, Nigeria. This study was aimed at: (i) determining the factors that influence the use of risk management practices by the actors in the study area.

METHODOLOGY

The Study Area

The study was conducted in Kebbi State, Nigeria. The State is located in North Western part of Nigeria which lies between latitudes 10°8'N and 13°15'N and longitudes 3°30'E and 6°02'E. The area falls within the dry Savanna agro ecological zone of Nigeria with an average annual rainfall of between 650mm and 1100mm, with distinct wet (May- October) and dry (November-April,) seasons (Gona *et al*., 2023).

The State has 21 local government areas (LGAs) with a population of about 3,630,931 people in 2006, and was estimated to have 9,860,521 people by the year 2020 (NPC, 2006). More than 70% of the population of the study area engaged in both crop and livestock production. The prominent crops grown in the area are rice, millet, sorghum, cowpea, maize, groundnut, sugarcane as well as mango (Gona *et al*., 2023). Kebbi State is one of the major rice hubs in Nigeria and most farmers produce on rain-fed conditions, while many others produce on a semi- commercial basis (selling 75% of the rice). For farmers in this State, rice is a major crop with over 25,000 farmers producing the rice according to Kebbi State Ministry of Agriculture and Natural Resources (KBMNR, 2020). There is also a long history of the government trying to support rice production in this state, so farmers have been encouraged to start growing rice in the past. As almost all rice is produced by smallholders and almost 80% is produced for sale, rice is clearly an important source of income for smallholders. Also, in Kebbi State there are a number of potential partners such as Labana Rice Mill, Stallion Rice Mill, Starling Bank and many others that have partners with the farmers and other value chain actors in the area of rice production, processing and marketing.

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Sampling Procedure and Sample Size

The lists of 296 registered rice input suppliers were obtained from Agro-allied marketers association, 856 registered rice farmers from Rice Farmers Association of Nigeria (RIFAN) office, 533 registered rice processors from rice processors cooperative societies, 736 registered rice marketers were obtained from rice marketers association and 525 Households rice consumers from National Population Commission (NPC) offices. This gave rise to a total sample frame of 2,946 population of the study. The sample size of the study was computed scientifically using Taro Yamane's formula for computing sample size of a finite population as follows;

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

where;
n= sample size
N= sample frame (population)
1= constant
e= exponential (usually 5% or 0.05)

Therefore, $n = \frac{2{,}946}{1+2{,}945\,(0.05)^2} = 400$

The 21 LGAs of the State were grouped into 4 ADP zones namely Zone i, ii, iii and iv. Multi-stage sampling procedure consisting of 3 stages was used to select the respondents of the study. The 1st stage involved the use of purposive sampling technique to select two (2) LGAs in each of the 4 ADP zones where rice is produced, processed, marketed and consumed in commercial quantity giving rise to a total number of 8 LGAs that were selected, The 2nd stage also involved the use of purposive sampling technique to select one (1) major town in each LGA where there is high concentration of rice input suppliers, farmers, processors, traders and consumers giving rise to a total number of 8 towns that were selected. The 3rd stage involved the use of proportionate sampling technique at 13.5% to select; 40 rice input suppliers, 116 rice farmers, 73 rice processors, 100 rice marketers, as well as 71 rice consumers from each of the towns that were selected giving rise to a total number of 400 respondents for the study as shown in Table 1 and 2.

Table 1: Sampling Frame for Rice Value Chain Actors

Actors	Sampling Frame	Sample Size (13.5%)
Input suppliers	296	40
Farmers	856	116

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Actors	Sampling Frame	Sample Size (13.5%)
Processors	532	73
Marketers	736	100
Consumers	525	71
Total	**2,945**	**400**

Source: Field survey, 2024

Table 2: Sampling Frame for Rice Value Chain Actors

Zone	LGAs	Registered Input supplier	Sample Size (13.5%)	Registered Rice Farmers	Sample Size (13.5%)	Registered Rice Processors	Sample Size (13.5%)	Registered Rice Marketers	Sample Size (13.5%)	Registered Rice Consumers	Sample Size (13.5%)
Zone I	Argungu	47	6	129	18	74	10	135	18	86	12
	Aliero	41	6	120	16	66	9	77	11	73	10
Zone II	Bunza	38	5	114	15	77	11	96	13	74	10
	Dandi	32	4	115	15	94	13	142	19	68	9
Zone III	Zuru	40	5	96	13	53	07	62	8	67	9
				85	12	44	06	59	8	56	8
	Danko Wasagu	37	5								
Zone IV	Yauri	33	5	103	14	71	10	110	15	53	7
				94	13	54	7	55	8	48	6
	Koko Besse	28	4								
Total	**8**	**296**	**40**	**856**	**116**	**533**	**73**	**736**	**100**	**525**	**71**

Method of Data Collection

Primary data was used for this study; The data was collected with the aid of a well-structured questionnaire. Five (5) different questionnaires were used for the study, one each for rice input-suppliers, farmers, processors, marketers and consumers.

Method of Data Analysis

The data collected were analysed using, binary logistic regression

Logistic regression technique was used in achieving objective (i) of the study. The explicit form of the model is specified as follows;

$$Y_{ij} = X'_{ij}\beta_{ij} + E_{ij} \quad \text{--- (2)}$$

$$X'_{ij}\beta_{ij} = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 \quad \text{--- (3)}$$

Where:

Y = Risk management practices used by the value chain actor (Dummy: 1 if there was high utilization (mean value greater than or equal to 2.5) and 0 if there was low utilization (mean value less than 2.5)

X_1 = Age (age of the actors in years)

X_2 = Sex (dummy: 1 if male and 0 if female)

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Prof. H. U. Nwanjo [Nigeria]

X_3 = Household size (number of people in the household)
X_4 = Education status (dummy: 1 if formal, and 0 if non-formal)
X_5 = Experience (number of years engaged in value chain activities)
X_6 = membership of cooperative (dummy: 1 if member and 0 if not a member)
X_7 = monthly income (₦/month)
β_1 - β_7 = unknown parameters
β_0 = constant term
E_{ij} = error term

RESULTS AND DISCUSSION

Factors Influencing the use of Risk Management Practices by Rice Input Suppliers

The factors influencing the use of risk management practices by rice input suppliers is presented in Table 3. A binary logistic regression was performed to ascertain the effects if any, of selected socioeconomic characteristics on utilization of risk management practices by rice input suppliers. The model shows a moderate explanatory power with a pseudo R-square of 0.539, indicating that the independent variables explain approximately 53.9% of the variability in the use of risk management practices by input suppliers. The LR chi-square value of 32.68 suggests the overall model is statistically significant. Among the predictor variables, three were found to have a statistically significant positive influence on the use of risk management practices. Results from Table 4 indicates that three out of the eight independent socio-economic variables were found to have significantly contributed to utilization of risk management practices. The significant variables; age, sex and educational level were positive. This result signifies that the higher the age and level of educational of the input suppliers, the greater the likelihood of utilizing risk management practices According to findings by (Mustafa, 2022), the educational level of farmers affected their decision making capacity as the higher educated farmers make better decisions in terms of management skills and resource allocation for profitability. Similarly, large household size was found to be positively related to the use of precautionary saving to deal with risk (Kouame, 2021). The size of mill (capacity) determines the risk management practices to utilize since the increase in capacity translates to high risk as the values of the enterprise increases. Therefore, as the level of risk increases so the utilization of risk management practices will increase to save the enterprise from collapse due to business risk. Also, the engagement of the input suppliers in other enterprises and high level perception of risk sources by the input suppliers will lead to an increase in the utilization of risk management practices. This findings is corroborated by the finding of (Kouame, 2021) who using the multivariate probit approach to analyze risk management strategies for cocoa farmers in Cote D'Ivoire,

EDITOR-IN-CHIEF
Prof. H. U. Nwanjo [Nigeria]

pointed out the importance of farm size, household size, literacy level, engagement in other farm activities and risk aversion as factors that increase the likelihood of adopting risk management strategies.

Table 3: Factors that influence the use of risk management practices by rice input suppliers

Variables	B	Standard error	T-Value	Sig.
Intercept	**0.721**	**0.851**	**2.273**	**0.017****
Age	0.721	0.851	2.273	0.017**
Sex	0.065	0.049	3.550	0.003***
Marital status	0.176	0.090	1.586	0.115^{NS}
Household size	0.253	0.129	0.190	0.726^{NS}
Years of Experience	-0.810	0.157	-0.465	0.826^{NS}
Educational level	0.092	0.034	2.692	0.008***
Membership of cooperative	0.253	0.129	0.190	0.726^{NS}
Monthly income	-0.023	-0.056	-.412	0.681^{NS}
Pseudo R-square = 0.5390				
Log likelihood = 110.31777				
LR chi square = 32.68				

Note: *=p<0.01, **=p<0.05, ***p<0.10. NS=Not Significant

Source: Field Survey, 2024

The factors influencing rice farmers' utilization of risks management practices in the study area are presented in Table 4. The model was statistically significant (**LR χ^2 (10) = 145.86; p = 0.0426**) with a log-likelihood of **-217.9564,** suggesting an overall good model fit. Age of the rice farmers was significant at 1% and positively influences percentage of risks management practices by the farmers. This indicated that age is an important factor that sensitizes farmers' adoption of risk management practices among the rice farmers. This agreed with the findings of Enete, *et al* (2011) that farmer's number of years of formal education was also positive and highly significantly related with the level of investment in indigenous technologies and practices in climate change adaptation. Amusa *et al*, (2020) found that household size encourages farmers to adopt innovations. The coefficient of years of experience was also a significant factor which positively influenced farmers' risk management practices at 1% level of significance. The implication of this finding is that rice farmers with higher years of farming experience tend to practice more risk management

techniques than those with lower years of farming experience in the study area. Amusa *et al*, (2020) also reported that farmers with higher years of farming experience are often considered to be more likely to get information about new technologies for adoption and take risky businesses than those with lower years of farming experience.

Table 4: Factors that influence the use of risk management practices by rice producers

Variables	B	Standard error	T-Value	Sig.
Intercept	**1.020**	**0.166**	**6.125**	**0.000*** **
Age	2.182	0.049	3.688	0.000***
Sex	0.150	0.100	0.958	0.341^{NS}
Marital status	0.367	0.140	2.055	0.420^{NS}
Household size	-0.233	0.120	-1.933	0.056*
Years of experience	1.890	0.6750	4.659	0.000***
Educational level	0.330	0.5067	1.500	0.068^{NS}
Membership of cooperative	1.560	1.9500	0.614	0.124^{NS}
Monthly income	1.672	1.940	0.802	0.714^{NS}
LR chi^2(10) = 145.86				
Prob > chi^2 = 0.0426				
Log likelihood = -217.9564				

Note: *=p<0.01, **=p<0.05, ***p<0.10, NS=Not Significant

Source: Field Survey, 2023

Result of the binary logit model used in estimating factors that influenced utilization of risk management practices by rice processors in the study area is presented in table 5. The model was statistically significant (**LR χ^2 (10) = 222.13; p = 0.0412**) with a log-likelihood of **-315.774,** suggesting a strong overall model fit. Two variables emerged as statistically significant: **years of experience** and **membership in cooperative societies**. The results in Table 5 showed that five (5) out of the eight predicators namely; age, sex, marital status, household size, years of processing experience were statistically significant. The regression coefficients of age, sex, marital status, household size and years of processing experience were positive implying a direct relationship between these variables and utilization of risk management practices by rice processors. Age had a positive coefficient and significant at (P<0.001) of probability. The finding implies that the probability of utilization risk management practices increases by a factor of 2.85% for older farmers. Hence the utilization of risk management practices for rice processors is higher among

EDITOR-IN-CHIEF
Prof. H. U. Nwanjo [Nigeria]

old processors than youth. In other word, the likelihood of utilization increases with increase in age of the processors. The likelihood of processors' risk management utilization decision increases as the processors advances in age. This is in consonance with findings by Mamudu *et al.* (2012) on adoption of modern agricultural production technologies by farm household in Ghana that old farmers tend to be more productive, and usually conservative and abhorring innovation information. The sex had a positive coefficient and significant at (P<0.001) level of probability meaning that extent of utilization of risk management practices by male rice processors was greater than that of their female counterpart. Similar findings were reported by Onumadu *et al*. (2014) and Awotide *et al*. (2011). The coefficient of marital status was positive in the model. This suggested that rice processors who are married were better than their colleagues whose marital status was single or divorced in terms of utilization risk management practices. This might be attributable to the family responsibility and marketing support married rice processors are likely to receive from their spouses. Household size had a positive coefficient and significant at (P<0.001) level of probability. This relationship implies that the likelihood to use risk management practices by rice processors in the study area increase with an increase in the number of family members. Increased household size implies more mouth to be fed. Consequently, rice processors will adopt any risk management practices that will improved their income. This finding agrees with Adejoh *et al*. (2017) who in a study on assessment of the adoption of improved rice processing technologies in the Federal Capital Territory Abuja, identified household size as an important variable in the adoption of improved rice processing technologies. The finding is however in contrast with Sani *et al*. (2014) who reported a significant positive relationship between household size and adoption level in a study on socio-economic factors influencing adoption of dual-purpose cowpea production technologies in Bichi Local Government Area of Kano State, Nigeria. Years of processing experience had a positive coefficient and significant at (P<0.001) level of probability implying a direct relationship with utilization of risk management practice by rice processors. This implies that the likelihood to adopt risk management practices increases with an increase in the number of years spent in rice processing. Specifically, it shows that a unit increase in the years spent in rice processing would lead to an increase in adoption level by 1%. It is expected that, as the processors add more years in rice processing, more knowledge and skills are accumulated thereby contributing to use of the risk management practices. The finding aligns with Abubakar *et al*. (2019) who reported positive and significant relationship between years of experience and adoption of agricultural technologies.

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Prof. H. U. Nwanjo [Nigeria]

Table 5: Factors that influence the use of risk management practices by rice processors

Variables	B	Standard error	T-Value	Sig.
Intercept	**0.762**	**0.526**	**2.625**	**0.017****
Age	2.850	0.8143	3.5000	0.000***
Sex	3.150	0.3706	8.5000	0.000***
Marital status	1.380	0.4059	3.4000	0.000***
Household size	2.100	0.6176	3.4000	0.000***
Years of experience	1.890	0.6750	2.8000	0.003***
Educational level	1.360	0.9067	1.5000	0.068^{Ns}
Membership of cooperative	1.560	1.9500	0.8000	0.212^{Ns}
Monthly income	1.672	1.9400	0.8000	0.314^{Ns}
LR chi²(10) = 222.13				
Prob > chi² = 0.0412				
Log likelihood = -315.774				

Note: *=p<0.01, **=p<0.05, ***p<0.10, NS=Not Significant

Source: Field Survey, 2024

The binary logit model was used in estimating factors that influenced utilization of risk management practices by rice marketers in the study area. The model was statistically significant (**LR χ^2 (10) = 222.13; p = 0.0412**) with a log-likelihood of **-315.774,** suggesting a strong overall model fit. Two variables emerged as statistically significant: **years of experience** and **membership in cooperative societies**. The results in Table 6 revealed that age had a positive coefficient and significant at (P<0.01) of probability. The finding implies that the probability of utilizing risk management practices increases by a factor of 2.85% for older farmers. Household size had negative coefficient and significant at (P<0.01). There are two opposing interpretations as to the nature of the relationship between household size and utilization of risk management practices, it implies that the larger the household size, the greater will be the total consumption needs of the farm family and thus, the less willingness to bear risk. Educational level had a positive coefficient and significant at (P<0.01) this implies that the more educated marketers are the more they will be more willing to bear risk than the less educated ones. This is in line with the findings of Abdulrazaq *et al.* (2022) who reported that at low game levels, education variable had little influence on risk aversion, but at higher game levels, it generally reduce the level of risk aversion and was often statistically significant. The result also agrees with finding of Olarinde *et al.* (2021) whose findings show that schooling had a positive impact on the risk taking. Marketing experience had a positive coefficient and statistically significant at

EDITOR-IN-CHIEF
Prof. H. U. Nwanjo [Nigeria]

(P<0.01) level of probability. It shows that a unit in the years of marketing experience will lead to an increase in the reduction of risk on sales of marketers. This agreed with the finding of Olarinde *et al.,* (2021) observed that the longer the years of farming experience, the more efficient the farmer becomes because the number of years a farmer has spent in the farming business may clearly give an indication of the practical knowledge he has acquired. This is an advantage to reduce farming risk which will help to boost production in any pre-determined period in farming business.

Table 6: Factors that influence the use of risk management practices by rice marketers

Variables	B	Standard error	T-Value	Sig.
Intercept	**0.682**	**0.405**	**2.573**	**0.015****
Age	0.087	.049	3.650	0.004***
Sex	-0.144	.090	-1.596	0.113^{NS}
Marital status	0.093	.117	0.800	0.426^{NS}
Household size	-0.010	0.057	-4.465	0.006***
Years of Experience	0.092	0.034	2.692	0.008***
Educational level	0.079	0.054	2.825	0.002***
Membership of cooperative	-0.023	-.056	-.412	0.681^{NS}
Monthly income	0.045	0.067	0.732	0.531^{NS}
LR chi²(10) =146.81				
Prob > chi² = 0.0472				
Log likelihood =-281.0631				

Note: *=p<0.01, **=p<0.05, ***p<0.10, NS=Not Significant
Source: Field Survey, 2023

The binary logit model was used in estimating factors that influenced utilization of risk management practices by rice consumers in the study area. The model is statistically significant, with a **Likelihood Ratio Chi-square of 161.312 (p = 0.0062)**, indicating that the predictors jointly explain a significant proportion of variation in the dependent variable the adoption of risk management practices. The results in Table 7 revealed. Age had a positive coefficient and significant at (P<0.001), this implies that a unit increase in age of the consumers increases the use of risk management practices, it means older consumers might be more aware of potential risks associated with food safety, such as contamination or spoilage, leading them to be more cautious. This could be due to life experience, past incidents, or greater knowledge about food safety. Sex had a positive

EDITOR-IN-CHIEF
Prof. H. U. Nwanjo [Nigeria]

coefficient and significant at (P<0.05) this implies that a unit increase in number of female consumers increases the use of risk management practices, Women might generally perceive higher risks associated with food safety, leading them to be more proactive in employing risk management practices. Marital status had a positive coefficient and significant at (P<0.05) this implies that a unit increase in number of married consumers increases the use of risk management practices. Married individuals often have increased responsibilities, such as caring for a spouse or children. This responsibility might make them more cautious about food safety, leading to more frequent use of risk management practices to protect the health of their household. In married households, food preparation and safety may be given greater importance, especially when there are children or elderly members involved. This can result in more diligent risk management practices, such as better storage, careful inspection, and thorough cooking methods. Household size had a positive coefficient and significant at (P<0.05). A positive coefficient between household size and the utilization of risk management practices suggests that as the number of individuals in a household increases, the likelihood or intensity of adopting risk management practices also increases. The implications are Larger households may perceive greater risks due to the higher number of dependents. This could lead to a greater focus on managing risks effectively to ensure household stability and security. Years of consumers experience had a positive coefficient and significant at (P<0.05). A positive coefficient between the years of consumer experience and the utilization of risk management practices implies that as consumers gain more experience, they are more likely to adopt or make greater use of risk management strategies. The implications, with increased experience, consumers likely become more aware of the various risks they face.

Table 7: Factors that influence the use of risk management practices by rice consumers

Variables	B	Standard error	T-Value	Sig.
Intercept	2.817	0.880	3.201	0.005***
Age	0.047	0.011	4.273	0.003***
Sex	0.118	0.045	2.622	0.015**
Marital status	0.324	0.083	3.904	0.006***
Household size	0.048	0.022	2.182	0.014**
Years of experience	0.041	0.017	2.412	0.017**
Educational level	0.008	0.987	0.008	0.951 NS
Monthly income	0.005	0.462	0.004	0.572 NS
LR chi²(10) =161.312				
Prob > chi² = 0.0062				
Log likelihood =139.165				

Note: *=p<0.01, **=p<0.05, ***p<0.10, NS=Not Significant

Source: Field Survey, 2023

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Prof. H. U. Nwanjo [Nigeria]

CONCLUSION AND RECOMMENDATIONS

The study concluded that age, sex, marital status, years of experience, monthly income, household size, level of education and membership of cooperative society were the major factors that significantly influencing the use of risk management practices by the actors in the study area. The study, therefore, recommended that;

i. There should be adequate institutional supports in form of functional extension services and policies that will help boost the socio-economic welfare of the actors as this will significantly propel an increase in the choice effective risk management strategies in the area.

ii. Also the provision of accessible and affordable formal education should be made to the rice value chain actors in order to enhance their skills to enable them adopt innovations and make an informed decisions for effective risk management of the identified risks.

iii. The rice value chain actors should strengthen their cooperative structure so that they can pool their resources together and provide financial incentives and credits to the low-income actors to increase their capacity to adopt more risk management practices there by increasing their income and productivity.

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