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Research Article

The Impact of Extension Teaching Strategies on Small-Scale Farmers' Adoption of Better Rice Varieties (FAROs) in Badeggi, Niger State

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Abstract

The study looked at the impact of extension education on farmers in Badeggi area of Katch Local Government, Niger State in adopting rice cultivars, particularly FAROs. A multi-stage random sample procedure was used to select 160 farmers from five villages within the Katcha local government in order to achieve the study's objectives. Descriptive statistics, multiple regression analysis, and the T-test were used to examine the collected data. According to the results, 48.5% of the farmers of enhanced rice varieties were in the active age range of 30 to 40 years. In the study area, the most effective way to instruct farmers in planting improved rice varieties was through demonstration (Small Plot Adaptive Research Technique), which accounted for 43.8% of the sample population. The results of the regression analysis showed that among the variables influencing farmers' output, land size, adoption rate, and educational attainment were all statistically significant and positively correlated with their output. The T-test result for adopters of enhanced rice varieties and non-adopters showed statistically significant (2.579) at the 5% level. The constraints to adoption of the improved rice varieties in the study area included insufficient communication channels (28.8 %), a lack of technical understanding about enhanced rice varieties (43.8,%) and challenges getting improved seed kinds (60 %). Formulation of agricultural policies that will enhance better communication channels, adequate and timely supply of inputs such as improved seeds of rice and fertilizer, provision of adequate knowledge on the control of pest and diseases will increase the adoption of rice and output of the farmers in the study area.

Keywords: *Extension, teaching, adoption, output, improved rice varieties*

Introduction

Over 50% of the world's population depends on rice as a staple food, and it is currently the most expensive crop to grow worldwide, (NCRI, 2008). In 1960s, Nigeria's population was 99 percent self-sufficient in rice consumption. This falls to about 38% in 1970 and 1980 which leads to wide demand gap of about 62% deficit. To augment this 62% deficit, the Federal Government has to embark on large importation of rice. Tones of rice that were imported in 1983 alone were about 540,000 metric tons. Since per capita income increased along with the rapid population growth, per capita rice utilization increased from 3.5 kg in 1970 to nearly 14 kg in 1990 (Anonymous, 1994). A comprehensive strategy to agricultural production is required in light of the decline in supply and rise in demand. This can be achieved by arranging for the structured educational transfer of technology to farmers. This could take the shape of upgraded farming equipment, improved varietals, or cutting-edge farming methods that farmers use on their farms. All of these things are

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necessary to raise the amount of rice that is produced.

Better rice varieties, technical knowledge, and skills should be made available to our farmers so that nearly all of them—up to 70%—can become self-sufficient in producing enough local rice, both in terms of quantity and quality (Ayotade, 1991). The goal of extension education is to arm farmers with knowledge and skills to help them make better management decisions that will advance agricultural output. Extension education systems include channels, connections, and platforms that facilitate the easy delivery of all packages, prepared findings, and outcomes to producers (Laogun 2005; Ratanachai, 2000). Enhancing comprehension of the benefits and drawbacks of any employed technique is crucial, and this method's role in convincing the farmer to embrace the innovation is highly relevant. Therefore, the degree to which a new idea is adopted or not depends on the technology's ease of use and the approach taken in instructing manufacturers about the innovation. The study aims to determine the impact of agricultural extension education methods on the production and acceptability of improved rice varieties among respondents in the Badeggi area of Katcha local government area, Niger State, based on these data. The study attempts to describe agricultural extension education methods used for respondents in the Badeggi area to accept improved rice varieties given their socioeconomic characteristics, the extension education methods they require, the yield of paddy for those who adopt and those who do not, and the socioeconomic factors that influence respondents' output in relation to the issues they face

Materials and Methods

In Nigeria, Niger State is located in the Guinea Savannah zone. Badeggi is a district area under Katcha Local Government Area (Local Government Area) where the study was conducted, with an annual temperature range of 27 to 34 degrees Celsius and 1000 to 1200 millimeters of rainfall (source?). the people are predominantly farmers, a mixture of crop and animal production. Their occupation includes artisans, trading and civil service.

. In this study, a multistage sampling technique was used. Firstly, purposive selection of Badeggi district was employed being an area with large proportion of rice producers. The second stage was a random selection of four (4) rice growing communities, and in the third stage, twenty adopters and non-adopters of the FAROs varieties were randomly selected from each of the selected communities making a total one hundred and sixty respondents who constituted the sample size for the study. . For the analysis, multiple regressions, the t-test, and descriptive statistics were used.

The expression of the regression model is as follows:

$Y = f(X1, X2, X3, X4, X5, X6, X7, X8+ e)$

Y = the value of rice output (Kg)

X1 = size of farm (ha)

X2 = Cooperative membership (1 = member and 0 = non-member).

X3 = Respondent's age (in years)

X4 = Householdsize (number)

X5 = Extension contact (year-to-year number)

X6 = Years of farming experience (yrs)

X7 = Educational attainment (number of years in school)

X8 = Adoption Index; 0 indicates non-adoption and 1 indicates adoption

e = Error term the explicit forms of the functional form express as;

Linear

$Y= b_0+b_1X_1 + b_2X_2 +b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + e$

Double log

$InY = Inb_0 + b_1InX_1 + b_2InX_2 + b_3InX_3 + b_4InX_4 + b_5InX_5 + b_6InX_6 + b_7InX_7 + e$

Exponential

$InY=b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + e$

Semi log

$Y = Loga_0 + a_1LogX_1 + a_2 Log X_2 + a_3 Log X_3 + a_4 Log X_4 + a_5 Log X_5 + a_6 Log X_6 + a_7 Log X_7+e$

Results Discussion

Table 1's result indicates that 48.5% of the dopters, were in the active age ranges of 30 to 40 years old. This indicates that they are risk-taking, gregarious adults who would have high interest in adoption. Older men over 50 made up a large portion (56.3%) of the non-adopters. The findings showed that the bulk of respondents in the age group are elderly individuals who are reluctant to

take risks, who prefer to keep to themselves, who are hesitant to make decisions about innovations, and who reject technologies because they have become accustomed to their rigid cultural norms and community standards (Ani, 2007). Additionally, as the result in Table 1 demonstrates, the majority of respondents (77.5%) who were adopters had some form of education, which facilitated and encouraged the adoption of innovations. Agwu (2004) asserts that a high degree of formal education had a negative impact on how shrewdly innovation was adopted. Education also plays a role in determining the effectiveness of innovation implementation. According to the table, 43.8% of those who declined (non-adopters) owned 3–4 ha of farm plots, whereas 47.5% of adopters were small-scale farmers with 1–2 ha of farm plots. According to the table, as adopters desire a high yield, the plot size affects the rate of acceptance and adoption (Akinola, 2002).

Multiple responses: Table 2 shows that 43.8% and 41.3% of the farmers learned about the adoption of improved rice varieties from contacts with friends, neighbors, and demo plots where information and advice are shared. Farmers saw the benefits of new, improved varieties from the demonstration plots that were brought to them, which supports Morris's (1991) observation that learning is facilitated by demonstration trials and that respondents find communication more persuasive and convincing when it is seen in practice. Table 2 demonstrates once more how only 6.3% of adopters obtained information from extension contacts, indicating inadequate extension delivery in Katcha LGA and hence low adoption of upgraded technology. According to Laogun (2005), farmers' acceptance of new ideas is influenced by the infrequency of extension contact visits and the distance from a source of information about how to use improved technologies. Table 3 indicates that , 46.3% and 28.8% of the farmers harvested 21–30 bags and 11–20 bags of paddy rice per hectare, respectively, in their farms. From their rice plots, 7.5% of the farmers harvested one to ten bags of paddy rice per hectare. The adoption of an enhanced rice variety was the cause of the exceptional paddy rice yield. This supports Joseph (1992) who found that adopting innovation increased agricultural productivity. According to the non-adopters' table, 12.5% and 11.3% of them received 31–40 bags and more than 40 bags of paddy rice per hectare, respectively. These responders' failure to embrace rice varieties with enhanced technology was the cause of the low yield. Because t-cal (2.579) is greater than t-tab (1.960) and the null hypothesis is rejected, Table 4 demonstrates that there was a significant association between the yield of enhanced rice variety adopters and non-adopters. The output of the adopters has significantly increased. An improved rice variety has drastically boost production of the adopters

Table 5 showed the impact of factors determining respondents' output on the adoption of improved rice varieties. The lead equation of best fit, double-log regression (Cob-Douglass), was chosen due to its significant t-value and R^2 (explanatory power/coefficient of multiple determination) from the regression. Value of 0.829 showed that the model's variables X1–X8 accounted for 82% of the variation in rice yield (Y), with the remaining 18% resulting from the exclusion of other explanatory factors that were not explained or were not captured by the variebles. The adoption index, age, farm size, and educational attainment were the variables that showed statistical significance. At the 1% level, the coefficient of land size (X1) was found to be positively related with the adoption of improved rice varieties and the yield that farmers in the Badeggi area were able to achieve. The substantial and positive relationship between farm size and production indicates that when farms grow, farmers become more invested in them and are more inclined to look for the information they need to adopt superior rice varieties and boost yield. The educational status coefficient (X6) was shown to be positive and significant at 10%. This suggests that as farmers' educational levels rise, so would their likelihood of adopting improved rice varieties and their output. This result is consistent with Agwu's (2004) findings, which show that the adoption of new technology is favorably and significantly influenced by higher levels of formal education and larger farms. The Adoption Index (X8) coefficient is significant at the 1% level, suggesting a positive and noteworthy correlation between farmer output and adoption. Therefore, the adoption of improved rice varieties is a crucial

factor that influences farmers' output; this suggests that when more improved rice varieties are adopted, farmers' yields or outputs will rise. The farmers' age-related coefficient (X3) has a negative value and is significant at 10%. This demonstrated that the age of farmers and their output were inversely correlated, with older farmers adopting fewer better rice varieties and producing less. In other words as farmers age, their acceptance of new technology declines.

Table 6 demonstrates that the majority of the adopters of improved rice varieties experience problems with insufficient improved seeds (60%) small farm sizes (58.8%), and technical know-how (43.8).Conversely, non-adopters declined to adopt due to inadequate communication regarding improved rice varieties, which included 51.3%, lack of access to better seed types (33.8%), and insufficient extension people to reach out to (28.8%). Regular visits by extension agents will provide farmers with an opportunity to receive guidance and education regarding the advantages of implementing better rice varieties, such as earlier maturity and increased output that will raise producers' income and, ultimately, their level of life.

Conclusion

The majority of people who chose enhanced rice varieties in the Katcha Local Government's Badeggi district were middle-aged, according to the report. The size of the farm, the level of education, and the adoption index are important factors that determine the yield of the producers on the adoption of improved rice varieties in the Badeggi area. Practical demonstration plots and sharing ideas with friends and neighbors are kept as information channels where rice producers receive knowledge on adoption of improved rice varieties. Adoption of improved rice varieties is hindered by a lack of seeds, small farms, lack of technical expertise, inadequate communication about improved varieties, and few extension contacts, among other issues. Better agricultural policy design that will create better communication channels, adequate and timely delivery of inputs, such as improved rice varieties, fertilizer and seeds, understanding of controlling pests and diseases, The adoption of rice and the output of the rice producers in the Badeggi area will be facilitated by hiring additional extension staff to facilitate more extension contacts and by offering loan facilities.

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Table 1: Socio-economic characteristics of farmers

Characteristics	Adopters (n =80)		Non – Adopters (n =80)	
Age (years)	Frequency	Percentage	Frequency	Percentage
<30	12	15.0	6	7.5
31 -40	39	48.5	12	15
41 – 50	21	26.50	17	21.3
>50	8	10.0	45	56.3
Education status				
No formal education	18	22.5	38	47.5
Primary	24	30.0	30	37.5
Secondary	25	31.25	09	11.3
Tertiary	13	16.25	03	3.8
Farm Size (hectare) < 1	0	0	0	0
1.1 – 2.0	38	47.50	17	21.3
2.1 – 3.0	29	36.25	21	26.3
3.1 – 4.0	08	10	35	43.8
>5	05	6.25	07	8.8

Source: Field survey, 2022

Table 2: Extension teaching methods from where adopters acquired their information on adoption of improved rice varieties in the study area (n = 80)

Teaching Methods	Frequency *	Percentage
Friends and neighbors	7	41.3
Radio	11	13.8
Extension contact	5	6.3
Demo (SPAT)	35	43.8
Personal contact farmers	13	15.0
Home and farm visit	33	8.8

Source: Field survey, 2022

Table 3: Paddy rice yield of adopters and non – adopters of improved rice variety (n = 80)

	Adopters		Non –adopters	
Yield (100kg/bag)	Frequency	percentage	Frequency	Percentage
1 – 10	6	7.50	24	30
11 – 20	8	10.00	28	35
21 – 30	37	46.30	19	23.8
31 – 40	23	28.80	5	6.3
>40	6	7.5	3	3.8
Total	80	100	80	100

Source: Field survey, 2022

Table 4: T – test result for yields of adopters and non – adopters of improved rice varieties

Rice varieties	N	Mean diff. (kg)	SD	SE	T cal.	DF	T tab.
Improved Vs local varieties	160	820.00	2844.37	318.011	2.579	79	1.960

Source: Computed from Field Survey, 2022

Table 5: Regression Estimates of Factors that Affect the Output of Rice producers in Badeggi area.

Variables	Regression coefficients	Standard error	T value
Constant	6.671	.292	22.821***
Land size (X_1)	1.226	.047	26.273***
Coop. memb. (X_2)	-.057	.061	-.939
Age (X_3)	-.176	.101	-1.744*
Household size (X_4)	.041	.039	1.060
No. of Ext. cont. (X_5)	-.037	.027	-1.340
Educ. Status (X_6)	.039	.020	1.937*
Farming Exp. (X_7)	.016	048	.338
Adoption index (X_8)	.332	.066	5.060***

*R Square 0.829; Adjusted R square 0.829; F - Ratio 91.294; Note: ***, ** and* means statistical significant at 1%, 5% and 10% levels, consecutively*.

Source: Computed from survey data, 2022

Table 6: Constraints affecting the Adoption of Improved Rice Varieties in Badeggi area (N = 80)

Problems	Frequency*	Percentage
Adopters		
Small farm size	47	58.8
Inadequate technical knowledge	35	43.8
Poor communication	23	28.8
Inadequate improved seeds	48	60.0
Inadequate credit facilities	25	31.3
Poor extension contact	29	36.3
Pest and disease infestation	21	
Non –adopters		
Ignorance about the improved varieties	41	51.3
Inaccessibility to improved varieties	27	33.8
Inadequate capital	19	23.8
Inadequate extension contact	23	28.8

Source: Field survey, 2022.

*__Multiple responses__