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Analysis of Discontinuance of Adoption of Improved Rice Production Technologies among Rural Farmers in Nasarawa and Plateau States, Nigeria

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Abstract

The study was conducted in Nasarawa and Plateau states, Nigeria, to analyse the discontinuance of adoption of improved rice production technologies among rural farmers. The population of the study consisted of all rice farmers in Nasarawa and Plateau States. A multistage sampling technique was employed to select 325 respondents, but a total of 310 (95%) of the rice farmers responded. A structured questionnaire was used to collect primary data. Data were analysed using both descriptive and inferential statistics. Respondents in the study area indicated that use of tractor (85.81%) and NPK fertilizer (83.23%) technologies had the highest discontinuance. It was found that there was a significant (0.000) difference in the effects of discontinuance on rice production in Nasarawa and Plateau States. A significant (asymptotic p value of 0.000) difference in the level of discontinuance of improved rice production technologies between Nasarawa and Plateau States was discovered. It was recommended that there should be proper education and enlightenment on the features of innovation by extension agencies/agents to prevent misuse and subsequent discontinuance. It was also recommended that socio-cultural variables of rice farmers should be seriously considered before formulating and disseminating improved technologies so as to curb discontinuance.

Keywords: Discontinuance, Rice Farmers, Improved Technologies, Extension Agents

Introduction

Rice (*Oryza sativa*) is perhaps the world's most important food crop being the staple food of over 50 percent of the world population, It is one of the major cereals, and has assumed cash crop status in Nigeria, especially in the producing areas, where it provides employment and income for more than 80% of the inhabitants as a result of the activities that take place along the production and distribution chains (Imolehin, 1991). Due to its increasing contribution to per capita calorie to Nigerians, the demand force has been increasing at a much faster rate than in any other African countries since 1970's (WARDA, 2001). Rice has become part of everyday diet of many in Nigeria. Nigeria has a potential land area for rice production of about 4.6 billion hectares. But, only 1.7 million hectares of 35% of the Nigerian total land mass is grown with rice (Imolehin and Wada 2000). The limited capacity of the Nigerian rice sector to meet the domestic demand has been attributed to several factors; notable among them is the declining productivity due to low adoption of improved production practices. This has caused a wide gap to exist between potential and actual yield per hectare (Oyekanni, *et al.,* 2008). Nwite, *et al.,* (2008) showed that adoption and sustained adoption of technologies and improved management practices should lead to substantial yield increase in rice production. However, contemporary observations show that while some adopted the improved practices and technologies, a reasonable number discontinued such adoptions as reported by Plateau State Agricultural Development Project (PADP) (2014). According to Rogers (2003), there are two main types of discontinuances namely, replacement and disenchantment. Replacement discontinuance is a decision to reject an idea in order to adopt a better idea that supersedes it. Disenchantment

discontinuance on the other hand is a decision to reject an idea as a result of dissatisfaction with its performance. Because of the contiguous nature of the two States under study, the comparison in discontinuance of rice production technologies of the two States is therefore imperative. The specific objectives of this study were to:

(i) determine and compare the level of discontinuance of improved rice production technologies among the respondents in Nasarawa and Plateau States;
(ii) determine and compare the effects of discontinuance of adoption of improved rice production technologies on rice production in Nasarawa and Plateau State;
(iii) compare the number of improved rice production technologies discontinued in Nasarawa and Plateau States.

Hypothesis of the Study

Ho There is no significant difference in the effects of discontinuance of improved rice production technologies on rice production in Nasarawa and Plateau States.

Methodology

Nasarawa State was created out of former Plateau State on 1st October 1996. The state is located in the middle belt zone of the country and lies between latitudes 7° and 9°N and longitude 7° and 10° E. it shares boundaries with the Federal Capital Territory, Abuja and five other states- Benue and Kogi States to the South and West; Kaduna and Plateau States to the North East, Taraba State to the South East and FCT to the North West. The State is comprised of 13 Local Government Areas (Nasarawa State Government, 2017).The soil texture of the two States are sandy, clay, loamy with small swampy areas. The climate is the tropical type-mixture of hot and cold weather. It has a mean temperature of 30°C and 40°C with an annual rainfall ranging between 131.73cm and 145cm. The months of December to February experience the North East trades winds (Harmattan). Rainy season is from April to October. The State has a projected Population of 2.9 million people (2015 projected figure at 3% exponential growth rate) (National Population Commission (NPC), 2019). The economy of Nasarawa State is predominantly agriculture based with most farmers practicing at subsistence level. The major agricultural products in the State include: yam, rice, cassava, maize, millet, sorghum, groundnut, melon, beniseed (sesame) etc. (Nasarawa State Government, 2017).

Plateau State is located in the North Central. It came into being in 1976 with administrative headquarters in Jos. The State which is structured into 17 Local Government Areas and consists of over forty ethno-linguistic groups. The State has projected human population of 4.2 million people (2015 projected figure at 3% exponential growth rate) (NPC, 2019), with land area of about 26,899 km^2. It is located between latitude 9°10'N and longitude 9°45'E. The State is bounded by Nasarawa State in the South-west, Taraba State in the South-east, Bauchi State in the North-east and Kaduna State in the North-west (Plateau State Government, 2017). Though situated in the tropical zone, it has a temperate climate type with an average temperature of between 18°C and 22°C. Harmattan winds caused the coldest weather between December and February with temperature range of 15°C to 18°C. The warmest temperatures usually occur in the dry season months of March and April. The State have two distinct weather conditions, viz; the dry season, which lasts from November to February and rainy season that lasts from March to October. The annual rainfall varies from 1317.50 mm to 1460 mm. Agriculture is the major economic activity in Plateau State. Crops grown include potatoes, maize, rice, beans, cotton, Shea-nuts, cowpeas, sugarcane, onions, pepper and ginger, tobacco and coffee. Cattle, sheep and

goats are reared by its inhabitants (PADP, 2014). Population of the study consisted of all rice farmers in Nasarawa and Plateau States. A total of three hundred and ten respondents were selected using a multistage sampling technique. Firstly, two States were purposively selected because of their contiguous nature. Secondly, Nasarawa State was stratified into southern, central and western (Nasarawa State Agricultural Development Project (NADP) 2012) and Plateau State was stratified into northern, central and southern (PADP, 2014) but only the southern zones were considered for this study because of their level of rice production. Thirdly, two blocks each were purposively selected based on their comparative advantage in rice production (NADP, 2012; PADP, 2014). Fourthly, three cells each were purposively selected. Using a proportional allocation of 10%, a total sample size of three hundred and ten respondents selected.
Data were collected from primary sources with the use of a structured questionnaire. Data for this study were analysed using percentages, frequency and mean as well as student's t-test and Mann-Whitney (U) Test.

Results and Discussion
The pooled results (Table 1) of discontinuance of improved rice production technologies revealed that majority of respondents discontinued use of tractor (85.81%), NPK fertilizer (83.23%), Nerica seed variety (82.26%), compared to only 24.19% of the farmers that discontinued herbicide application. The breakdown showed that for Nasarawa State farmers discontinued Nerica seed variety (86.11%), use of tractor and NPK fertilizer (83.33%) compared to respondents'(26.11%) that discontinued herbicide application. On the other hand majority (96.92%) of respondents in Plateau State discontinued Faro seed variety use of tractor (89.23%), use of NPK fertilizer (83.08%), Nerica seed varieties (76.92%) and ITA seed variety (61.54%) as against use of herbicide 21.54% that recorded the least discontinuance among the respondents. The result indicates high rate of discontinuance which portends a dangerous trend to food security. Empirical studies suggest that rice yield increased tremendously with the adoption and continued use of rice improved technologies. The result is in consonance with that of Imarhiagbe, *et al.,* (2015) that discovered high level of discontinuance among respondents in Edo State. Similarly, Bello, *et al.,* (2012) reported high level of discontinuance of use of tractor and NPK fertilizer among rice farmers in Nasarawa State

Table 1: Distribution of Respondents on the Basis of Discontinuance of Improved Rice Production Technologies Promoted in Nasarawa and Plateau States.

Technologies	Nasarawa State (n=180)		Plateau State (n=130)		Pooled (n=310)	
	Freq.	%	Freq.	%	Freq.	%
Nerica variety	155	86.11	100	76.92	255	82.26
Faro variety	36	20.00	126	96.92	162	52.26
ITA variety	100	55.56	80	61.54	180	58.06
Herbicide	47	26.11	28	21.54	75	24.19
NPK	150	83.33	108	83.08	258	83.23
Tractor	150	83.33	116	89.23	266	85.81

The result of the t-test as shown on table 2 shows that the t-ratio was statistically significant ($t=2.305$, $p<0.001$) at 1% level of significance. It implies that the effects of discontinuance on rice production in Nasarawa State were higher than that of Plateau state. Consequently, the null hypothesis that there is no significant difference in the effect of discontinuance of improved rice

production technologies on rice production in Nasarawa and Plateau States was rejected and the alternate hypothesis accepted. The result further confirms that there is significant difference in the effect of discontinuance of improved rice production technologies on rice production in Nasarawa and Plateau States. The results revealed that mean yield difference before and after discontinuance by respondents in Nasarawa State was 241,306kg which was higher than Plateau State mean yield of 153,031kg of rice. This indicates a loss of average annual rice yield of 241,306kg and 153,031kg by rice farmers in Nasarawa and Plateau States respectively as a result of discontinuance of adoption of improved rice production technologies. It also shows that farmers in this area need to sustain the adoption of improved rice production technologies in order to curb their losses improve productivity and profitability levels. The loss indicated in the result was expected looking at the high rate of discontinuance recorded in the study. However, efforts should be made by rice farmers in increasing their rice yield by sustaining the adoption of improved rice production technologies which have the potential to improve nutrition, boost food security and enhanced income. Birla (2013) posits that the best way to increase agricultural productivity is by replacing the old method of farming with a modern and more efficient technique of cultivation. Guest *et al.,* (2011) found that adoption and continued adoption of Nerica seed variety helped farmers raise household per capital income by average of 46.00 percent. Adoption and continued used of improved rice production technologies is a tool needed to improve sustainable and profitable food production, improve productivity and food security.

Table 2: T test Showing Difference in Effects of Discontinuance on Rice Production in Nasarawa and Plateau States (n =310)

State	N	Mean	St.Dev	Mean Dif.	T. Value	Df.	Significance.
Nasarawa	180	214.306	140.365	88.275	2.306	179	.000
Plateau	130	153.031	186.694				

*Significant at 1% level of significance

The result in Table 3 shows that Z value was -11.274 and an asymptotic P-value of (2-tailed) of 0.000, since the p-value is less than 0.01, it is significant at 1.0 percent level of significance. Therefore the null hypothesis was rejected. It implies that there was significant difference in the number of technologies discontinued between rice farmers in Nasarawa and Plateau States.
Specifically, the result shows that Plateau State had higher (28267) discontinuances than Nasarawa State and the result is consistent with Table 1 which indicates higher number of discontinuances in Plateau State than Nasarawa State. This difference may be as a result of rice farmers preferences of the rice technologies available to them as none of these technologies were discontinued at the same time by the farmers. The difference in the number of discontinuance may also suggest the variations in the socioeconomic characteristics of these farmers, this is because adoption behaviour of a farmer can greatly influence his decision to discontinue or otherwise. A farmer adopted planting of a corn variety but not the related ideas of fertilizer and herbicide, his corn yields were even lower than if he had not adopted any of the ideas. This leads to discontinuance of the technology immediately, because the farmer did not adopt the whole package, thus it affects the number of discontinuance of the technology in that area (Silverman and Bailey, 1961). Generally, high discontinuers have less education, low socioeconomic status, less change agent contact, and the like, but this is not the case with this result as Plateau State farmers had higher level of education, higher income and social status yet, they had higher discontinuances which were contrary to *a priori* expectations. It therefore suggests that other

factors may then be responsible for the higher differences in discontinuance by rice farmers in the area. The result agrees with Rogers' (2003) assertion that discontinuance could be rational or irrational as they are with adoption. VanTongeren, (2003) found significant difference in discontinuance of improved technologies among rice and wheat farmers and attributed the difference to socioeconomic factors.

Table 3: Mann-Whitney Test Showing Difference in Discontinuance of Improved Rice Production in Nasarawa and Plateau States (n =310)

Nasarawa State		Plateau State	
N_1	£ R_1	N_2	£ R_2
180	19938.00	130	28267.00

Z= -11.274
Assymptotic (P) Sig, (z tailed) =0.000

*Significant at 1% level of significance

Conclusion and Recommendations

The study concludes that there exists a significant difference in the effects of discontinuance on rice production in Nasarawa and Plateau States, with Nasarawa State recording higher effects than Plateau State. There was significant difference in the number of technologies discontinued between rice farmers in the two States. Plateau State had higher number of discontinuances than Nasarawa State, which indicates a higher level of discontinuance of improved rice production technologies in Plateau States.

Based on the conclusion of this study, the following were recommended:

1. The socio-cultural variables of rice farmers should be seriously considered by researchers and extension agencies/agents before formulating, packaging and disseminating improved technologies so as to avoid discontinuance associated with complexity and cultural barriers.
2. There should be proper education and enlightenment on the features of innovation by extension agencies/agents to prevent misuse and subsequent discontinuance.
3. Government and other voluntary organizations should collaborate to fund and equip research agencies, especially those involved in improved rice production technologies these will help in reducing the high rate of discontinuance.

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