Effects of Micro-Credit Acquisition on Rice Technologies Adoption in South East Nigeria

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Abstract: The study analyzed the effect of micro-credit acquisition for rice technology adoption in South-East, Nigeria. Both multi-stage and purposive sampling techniques were adopted in the collection of data from three hundred and sixty (360) farmer micro-credit beneficiaries. Data were analyzed using both descriptive and inferential statistics. The results of the analysis showed that socio-economic characteristics of rice farmer had significant (78%) effect on micro-credit acquisition for rice technologies adoption. The study also showed that the respondents acquired formal micro-credit mainly from Bank of Agriculture, Micro-finance Banks and Commercial Banks and informal micro-credit basically from Rotational Contributory Institution (Esusu) and cooperative societies for rice technologies adoption. The result revealed that a cumulative total amount of N60, 462,000 was obtained for rice technologies adoption in the area with total sums of N42, 323,400 and N18, 138,600 acquired from formal and informal micro-credit sources, respectively. The coefficient of determination (R^2= 0.608) indicated that micro-credit had strong effect on rice technologies adoption. Based on the findings, it was recommended that some of the stringent policies such as high interest rate, high transaction cost, collateral and excessive bureaucracy that inhibit farmers' access to micro-credit facilities should be properly addressed by Government and other stakeholders in order to increase farmers' access to credit *vis a vis* the adoption of technologies needed for enhanced rice output and productivity.

Key words: Micro-credit · Acquisition · Rice · Technologies · Adoption

INTRODUCTION

Rice is one of the most important staple foods for many households in Nigeria and its production has recently risen significantly. However, despite the rise in domestic production, the demand for rice far exceeds its local production leading to an increase in its importation up to the tune of US$160m in 2003 [1]. This is because the demand for rice is faster than any other staple food with its consumption broadening across socio-economic classes and more-so its production in Nigeria is dominated mainly by smallholder farmers who have dwindling capacity to access and procure inputs needed for growth and expansion due to their low level of income. This has led to the increase in the vicious circle of poverty among farmers in Nigeria. This is irrespective of the fact that Nigeria has the potential to be self-sufficiency in rice production among other stable food crop for feeding its teaming population, supply of raw materials and for exports. However, a number of constraints have been identified as limiting the growth of rice production in Nigeria and they include: policy inconsistency and instability, fluctuation in naira value, lack of fund, seed system and agronomic constraints such as disease, pest, water regime, weeds and low input supply [2].

The term micro-credit refers to small loans provided to those who have no access to formal financial institutions with the view of helping them to embark on a venture in order to cater for their welfare [3]. According to Ijere [4], credit generally can be described as a catalyst that activates all other factors of production and which makes unused capital functional for increased production. Who re-iterated that credit in the poor farmer's hand enables them to reap the economies of scale of production, discover new and cheaper products and creates demand where none exists.

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In spite of the broad importance micro-credit in rice technologies adoption, there seems to exist a dearth of empirical data on the influence of micro-credits acquired by rice farmers on rice technologies adoption in Southeast Nigeria. However, to address the problem, the study determined the effect of the socioeconomic attributes of the rice farmers on the amount of micro-credit acquired for rice technologies adoption; analysed the source, type and amount of micro-credit acquired and determined the effects of micro-credit obtained on rice technologies adoption.

Methodology: The study area is Southeast Nigeria which is one of the six geopolitical zones of Nigeria. The area occupies approximated land mass of 58,214.7 square kilometres and a total population of 16.4 million people [5]. It lies between longitude 6°50^I and 8°30^I E, latitude 4°30^I and 7°5^I N. A combination of purposive and multistage random sampling techniques was employed in the selection of 360 rice farmers in the area. The study employed both descriptive and inferential statistics to analyse the data collected.

The linear regression model that was used to realize objective i is expressed as:

$$MCA = \beta_0 + \beta_1 AG + \beta_2 GEN + \beta_3 HHS + \beta_4 LED + \beta_5 AFI + \beta_6 TAI + \beta_7 FS + \beta_8 FEX + \beta_9 MS + et$$

where;
MCA	=	Micro-credit acquisition
β_0	=	*Intercept*
β_1-β_8	=	Regression coefficients
AG	=	Age of rice farmer (years)
GEN	=	Gender of loan beneficiary (male = 0, female = 1)
HHS	=	Household size (total number of persons feeding from the farmer's pot/house)
LED	=	Level of education (number of years in formal schooling).
AFI	=	Annual income of the rice farmer from farm (naira)
TAI	=	*Annual income from rice farm plus income from non farming activities (naira)*
FS	=	Farm size (total size of rice farm cultivated by the farmer (hectare)
FEX	=	Farming experience (number of years spent in rice farming)

The model that was used to achieve objective iii is shown as:

$$RTA = \beta_0 + \beta_1 Ls + \beta_2 Ic + \beta_3 Cv + \beta_4 BTc + \beta_5 Fs + \beta_6 Rp + \beta_7 THi + et$$

where;
RTA	=	*Rice technologies adoption (level of rice technologies adoption)*
β_0	=	*Intercept*
β_1-β_7	=	*Regression coefficients*
Ls	=	*Size of loan (N)*
Ic	=	*Interest charged (N)*
Cv	=	*Value of collateral (N)*
BTc	=	*Borrowing transaction cost (N)*
Fs	=	*Farm size (N)*
Rp	=	*Repayment period (months)*
THi	=	*Total Household income (N)*
et	=	Stochastic error term

RESULTS AND DISCUSSION

Effects of Socio-Economic Characteristics of Micro-Credit Beneficiaries on Micro-Credit Acquisition: Table 1 examined the effect of socio-economic characteristics of micro-credit beneficiaries on micro-credit acquisition. The results revealed that the socio-economic attributes of the beneficiaries have significant influence on the acquisition of micro-credit in the area. This was justified from F-value of 138.960 which was significant at 1% level. Specifically, the coefficient of total annual income of the beneficiaries was positive and statistically significant at 1% (P = 0.01) level. This implied that increase in the beneficiaries' total annual income would lead to increase in the amount of micro-credit needed to maintain a supposedly increase in farm size due to higher income. The coefficient of annual farm income was found to be positive and statistically significant at 1% (P = 0.01) level. This means that higher a famer's annual farm income, the higher would be his access to micro-credit for rice technologies adoption. Though this result is in contrary to the *a priori* expectation, it corroborates the findings of Oyeyinka and Bolarinwa [6] that increase in income can lead to access to higher micro-credit facilities. The size of farm of a beneficiary has a direct relationship with the amount of micro-credit he acquires. The evidence of this is seen by the coefficient of farm size that was positive and statistically significant at 1% (P = 0.01) level. This implied that an increase in farm size is likely to

Table 1: Effect of Socio-economic Characteristics of Micro-credit Beneficiaries on Micro-credit Acquisition for Rice Technologies Adoption

Variables	Parameters	Coefficients	Std Error	t-cal
Constant	β_0	3.144	0.164	19.198*
Age	β_1	-0.001	0.001	-1.105*
Gender	β_2	0.000	0.012	0.024
Marital status	β_3	0.009	0.008	1.158*
Household size	β_4	7.000E-006	0.001	0.005**
Educational status	β_5	0.001	0.001	0.938**
Annual farm income	β_6	0.065	0.046	1.413*
Total annual income	β_7	0.279	0.033	8.367*
Farm size	β_8	0.089	0.009	10.365*
Farming experience	β_9	0.001	0.001	1.571
R		0.884		
R^2		0.781		
Adj. R^2		0.776		
Std Error of Estimate		0.09668		
F-ratio		138.960		
Durbin-Watson		2.032		

* & ** indicate significant at 1% and 5% respectively.

increase the amount of micro-credit to be sought by the beneficiary. This conformed to *a priori* expectation that a higher farm size entails more organizational and operational activities hence more expenses that would need more financial backings. This finding is in agreement with the findings of Tasie *et al.* [7] which inferred that the coefficient of farm size was positive and significant at 1% (P = 0.01) level. The coefficient of marital status was positive and statistically significant at 1% (P = 0.01) level. This means that an individual who is married is more likely to take decision to acquire more micro-credit that will enable him/her adopt appropriate technologies needed for enhanced rice production. Again, the coefficient of household size was positive and statistically significant at 5% (P = 0.05) level, implying that increase in a farmer's household size can lead to increase in his quest to acquire more micro-credit to increase the adoption of technologies in order to increase rice output and productivity so as to cater for the welfare of the increased household size. The finding is in tune with the opinions of Olagunju and Adeyemo [8] that the availability of family labour depends on the number of household members. The educational status of a beneficiary was found to be positively related to the decision to acquire micro-credit in order to enhance the adoption of technologies necessary for improved rice productivity. This was evidenced by the educational attainment of the beneficiaries that was positive and statistically significant at 5% (P = 0.05) level. This implied that, as the level of education of an individual increases, his capacity in terms of knowledge and skill to borrow increases.

Source, Type and Amount of Micro-Credit Acquired: Results of the analysis (Table 2) showed that two major sources of micro-credit exist; formal and informal sources. The study also revealed that the major formal micro-credit sources were Bank of Agriculture (BOA), Microfinance Banks and Commercial Banks. This could be due to the government interventions and standardized nature of these institutions in the area. This justified the finding of Ogen [9] that Nigerian Agricultural and Cooperative Bank has been established in 1973 as Federal Government's efforts to enhance agricultural production in Nigeria through the provision of credits to the farmers. The analysis of the distribution of informal micro-credit sources indicating that most of the beneficiaries acquired loan from rotational contribution (*Esusu*) and cooperative societies could be due to wide outreach nature of both institutions in the zone. This result synchronized with the finding of Akinbode [10], who reported that 40% of rice farmers patronized corporative societies as they were encouraged by Government to join cooperative societies in order to access some Government programmes and schemes that will alleviate their poverty.

The results showed that the highest amount (N15, 279, 297) acquired from formal sources were from Bank of Agriculture and this was followed by a total of N11, 511, 965 and N11, 031, 188 that were acquired from Microfinance Banks and Commercial Banks, respectively. Equally, the highest amount (N7,300, 265 and N5, 496, 835) acquired from the informal sources were from Esusu and cooperative societies, respectively. The dominancy of fund acquired from Esusu and cooperative societies is not surprising as several studies including that of Akpan *et al.* [11] reported that farmers especially those in the rural areas have been advised to form cooperative societies in order to ensure information sharing, risk education and increased awareness of credit facilities. The study also revealed that a cumulative total amount of N60, 462,000 was obtained for rice technologies adoption in the area with total sums of N42, 323,400 and N18, 138,600 acquired from formal and informal micro-credit sources respectively. The higher amount being acquired by micro-credit beneficiaries from formal than the informal micro-credit institutions could be due to availability of more funds within the formal micro-credit sources than the informal sources. This result corroborated Yaqub [12], who argued that though there has been an existence informal over the years in providing credits to small scale entrepreneurs including farmers, they are only able to service a negligible proportion of them due to their low financial strength.

Table 2: Sources, Types and Amount of Micro-Credit Acquired for Rice Technologies Adoption

Sources	Types	Frequency	Percentage	Amount obtained (N)
Formal micro-credit (180)	Micro-Finance Bank	49	27.2	11,511,965
	Bank of Agriculture (BOA)	65	36.1	15.279,297
	Commercial Bank	40	22.2	11,031,188
	Ministry of Agriculture	13	7.2	2,750,950
	State Credit Cooperatives	5	2.8	650,730
	Donors Agencies	8	4.5	1,099,270
	Sub-Total			42,323,400
Informal Micro-Credit (180)	Rotational Contribution (Esusu)	63	35.0	7,300,265
	Unregistered cooperative societies	45	25.0	5,496,835
	Money Lenders	34	18.9	2,234,650
	Friends/Relatives	21	17.7	1,850,000
	Family/Town Meetings	17	9.5	1,256,850
	Sub-Total			18,138,600
	Grand Total			60,462,000

Table 3: Effect of Microcredit on Rice Technology Adoption

Variables	Parameters	Coefficients	Std Error	t-cal
Constant	β_0	30.578	2.763	11.068*
Size of loan disbursed	β_1	5.962E-005	0.000	4.035*
Interest charged	β_2	-6.058E-006	0.000	-0.230**
Value of collateral	β_3	1.323E-005	0.000	1.338
Borrowing transaction cost	β_4	-0.000	0.000	-3.079*
Farm size	β_5	1.082	0.437	2.476**
Repayment period	β_6	0.552	0.231	2.386**
Total household income	β_7	2.000E-006	0.000	1.442*
R		0.739		
R^2		0.608		
Adj. R^2		0.596		
Std Error of Estimate		1.553		
F-ratio		34.591		
Durbin-Watson		1.553		

* & ** indicate significant at 1% and 5% respectively.

Effects of Micro-Credit Obtained on Various Rice Technologies Adopted by Rice Farmers: Micro-credit when accessed is utilized in the adoption of appropriate rice technologies needed for optimum production and productivity of rice. Some of the micro-credit variables that affect farmers' adoption of rice technologies were size of loan disbursed to farmers, total household income, repayment period, borrowing transaction cost, farm size, interest rate charged and value of collateral. The results of the multiple regression analysis showed that the amount of micro-credits obtained have influence on the adoption of various technologies needed for enhanced rice production (Table 3). Individual analysis showed that the coefficient of loan size was positive and statistically significant at 1% (P = 0.01) level. This implied that size of loan acquired has positive influence on the level of technologies adopted by farmers for rice production. Thus, an increase in the volume of loan acquired will lead to increase in the level of technological packages to be adopted by a farmer to enhance his output and productivity. This finding is justified as a farmer who acquired a reasonable amount of micro-credit would be able to adopt some important rice technologies such as fertilizer, agro-chemicals and other capital intensive technologies in order to boast his/her rice output and productivity. Interest charged by micro-credit lenders was found to have an inverse relationship with the level of technologies adopted by farmers as was attested by its coefficient being negatively signed and statistically significant at 5% (P = 0.05) level. This implied that if the amount of interest charged by a lender on a loan disbursed to a farmer is high, the actual amount to be utilized by such individual farmer in the adoption of technologies will reduce, thereby leading to decrease in farm output and productivity. This is in line with *a priori* expectation as increase in interest rate could reduce the amount of loan to be acquired by a farmer for rice technologies adoption. The coefficient of farm size was positive and statistically significant at 5% (P=0.05) level, implying that increase in the size of farm of an individual farmer can result to increase in the level of technologies to be adopted for rice production. This is in tune with the a priori expectation as increase in farm size **w**as expected to increase the level of adoption of appropriate rice technologies. This finding corroborates Weber and Musshoff [13] reported that most agricultural technologies need a certain amount of land in order for its adoption to be successful.

The repayment period was found to have influence on the level of technologies adoption for rice production. This was exemplified by the coefficient of repayment period being positive and statistically significant at 5% (P=0.05) level. This implies that the longer the loan repayment, the higher the level of rice technological

packages an individual farmer can adopt to enhance the output and productivity of rice. This finding is justifiable as Ayanda and Ogunsekan [14] in their earlier findings found that majority (74.7%) of the farmers strongly opposed to short payback periods as most of the arable crops like rice, yam, cassava, cowpea etc, require a minimum of seven months to mature. Total household income was also found to be positively and statistically significant at 1% (P = 0.01). This implies that as total income of an individual farmer increases, the level of the technological packages he/she can adopt also increases. The a priori expectation is thus met, as increase in the amount of micro-credit obtained *vis a vis* increase in the total income would lead to increase in the level of adoption of technologies needed for enhanced rice productivity and output.

CONCLUSION AND RECOMMENDATIONS

The study revealed that micro-credit has strong effect on adoption of rice technologies in South-East, Nigeria. This was shown by the levels of rice technologies adopted by farmers for rice production in the zone that were influenced greatly by most of the micro-credit variables such as size of loan disbursed, total household income, repayment period and farm size. Also the result of the analysis showed that the socio-economic attributes of the beneficiaries have significant effect on the amount of micro-credit acquired for rice technologies adoption. Based on the findings, it was recommended that some of the stringent policies such as high interest rate, high transaction cost, collateral and excessive bureaucracy that inhibit farmers' access to micro-credit facilities should be properly addressed by Government and other stakeholders in order to increase farmers' access to credit *vis a vis* the adoption of technologies needed for enhanced rice output and productivity.

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