

EFFECT OF ACCESS TO MICROCREDIT ON PRODUCTIVITY AND PROFITABILITY OF CASSAVA FARMING IN OSUN STATE, NIGERIA

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ABSTRACT

The study examined the effect of access to microcredit on the productivity and profitability of cassava production. A multi-stage sampling procedure was used to obtain the data from 100 respondents. Primary data collected were analyzed using descriptive statistics, budgetary analysis and stochastic production frontier. Result showed that cassava farming in the study area was dominated by male farmers with about 81.3% and 82.7% for microcredit users, and non-microcredit users, respectively. It also revealed that few farmers (48%) had access to credit. The farm budgetary analysis revealed that the net profit per hectare were ₦68,719 for microcredit users and ₦68,298 for non-microcredit users. The distribution of the technical efficiency according to accessibility to credit showed that the microcredit users were little more technically efficient ($TE=0.9638$) than the non-microcredit users ($TE=0.9556$). The result showed that labour, farm size, and fertilizer significantly influenced technical efficiency among users while farm size, fertilizer, gender and extension visits significantly influenced technical efficiency among non-microcredit users. The study concluded that cassava production was more profitable and efficient among cassava farmers who had access to microcredit in the study area. The study recommended that cassava farmers should be encouraged with improved access to microcredit in order to boost their productivity and profit level in the study area.

Keywords: Microcredit, productivity, profitability and cassava production.

INTRODUCTION

Cassava (*manihot spp*) is an exceptional food and cash crop in different tropical countries in Africa, where it play a key role in the economy (Okoye *et al.*, 2016). It is a good source of carbohydrate, vitamins and minerals (Nweke, 2004; Salvador *et al.*, 2014). It could be processed into numerous forms such as *garri*, *fufu*, tapioca, cassava flour, chips, paper, pellets, adhesives and even used in pharmaceuticals companies (Salvador *et al.*, 2014). Also, the peels are used in organo-mineral fertilizers formulation (Ojeniyi, 2001). The Federal Government of Nigeria has placed emphasis on the production of cassava in all its environs. This could be ascribed to its different uses for more than 60 million people in Nigeria (Abdulahi, 2003; Ndubueze and Ekine, 2014). According to Rahji and Fakayode, (2009), small scale farmers in Nigeria have been the major producers of cassava and they have been increasing their production over the past 50 years. This has led diversion to commercial production which is

described as the cassava transformation (Nweke, 2004). In spite of their potential, the small scale farmers has consistently been faced with shortage of formal credit facilities which often prevent them from improving their productivity and net profit (Onu, 2003). Nwaru (2011) has described Agricultural credit as transferring of purchasing power from the owner to someone who is in need of it on a temporary basis with the willingness and ability to repay it back at a specified period with or without interest. This credit is in form of small loan giving to small scale farmers to help them engage in productive activity. However, studies (Odoemenem and Obinne, 2010; Ashaolu *et al.*, 2011; Zahra and Gulcan 2016) has shown that farmers with access to credit adopted more technologies than those who did not. This implied that availability of credit facilitates technology adaptation which could further improve their socio-economic condition and productivity. In light of the above mentioned, this study investigated the productivity and profitability differentials among

cassava farmers which had access to microcredit and those who did not have access to microcredit.

MATERIALS AND METHODS

Study Area

This study was carried out in Osun state, the state was carved out of the old Oyo state on the 27th August, 1991, by the then military administration. There are more than 200 towns, villages and other settlement in the state, which has a considerable number of highly urbanized settlements. The State is divided into three federal senatorial districts, namely, Osun East, Osun West and Osun Central. The state consists of 30 Local Government Area and one Area office (at Modakeke). The state has a total land area of about 9,250.92 square kilometers (3,571.8square miles) and a population of 3,416,059 comprising of 1,734,149 male and 1,682,810 females, according to the 2006 population and housing census of the Federal Republic of Nigeria. It lies between latitude 703010N and longitude 403010E with an altitude of 246 meters above the see level. The state is situated in the tropical rain forest with main seasons: the rainy season that runs between March and October, while the dry season occurs between November and February. The main rainfall ranges between 800mm in the savanna agro ecology to 1500mm in the rainforest belt. The annual mean temperature is about 200C. The state has a well drain loamy and clay soils which are very suitable for agriculture and one of the major crops being cultivated in the state is cassava.

Sampling procedures and sample size

A multi-stage sampling procedure was used to select the respondents. At the first stage two administrative zones were randomly selected and these were Ife and Iwo zone. The second stage involved random selection of one local government area (LGA) from each of the chosen administrative zone making a total of two LGAs. At the third stage a total of 10 communities were selected proportionately to sizes (depending on the number of the communities in each LGA) of the chosen LGAs. At the final stage, five cassava farmers were randomly selected from each community to make a total of 100 respondents. A well-structured and pre-tested questionnaire was used to elicit information from the respondents. The survey questionnaire captured information on the socioeconomic characteristics of the respondents, such as age, gender, household size, education, extension contact, credit access and farming experience. It also solicited information on technical factors such as labour, fertilizer, pesticides and farm size.

Information on cassava output was also captured using the survey questionnaire. The proportionality factor used in the selection of cassava farmers was defined as:

$$X_i = (n/N) * 10 \quad (i)$$

where X_i = number of cassava farmers to be sampled from a LGA, n = number of registered cassava farmers in the particular LGA (list obtained from local agriculture extension officer), N = sum total number of cassava farmers in the two LGAs.

Analytical techniques

Descriptive statistics

Descriptive statistics (means, standard deviation, frequency count and percentages) was used to describe the socio-economic and demographic characteristics of the farmers in the study area using frequency counts, percentages, means and tables.

Budgetary analysis

Budgetary analysis was used to compare the level of profitability among the respondents. It was calculated using the formulas below:

Net income model

The net income model used was as expressed as below in equation (ii)

$$NI = (TR - TVC) - TFC \quad (ii)$$

Where; NI = Net income in Naira/ha, TR = Total Revenue in Naira/ha, TVC = Total Variable Cost in Naira/ha, $TR - TVC$ = Gross Margin in Naira/ha, TFC = Total Fixed Cost in Naira Cost function estimation model for cassava was expressed as in equation (iii) below

$$TC = TFC + TV \quad (iii)$$

where: TC - Total Cost in Naira/ha, TFC - Total Amount on Depreciation on Fixed Assets in Naira/ha, TVC - Total Variable Cost in Naira/ha

Revenue and net profit estimation model

The revenue model used was expressed as follows:

$$TR = TQ \times P \quad (iv)$$

Where: TR = Total Revenue in Naira/ha, TQ - Total output of cassava in Kg, P - Price per Kg of cassava in Naira Net Profit model was expressed as in equation (v)

$$TR - TC \quad (v)$$

where: TR - Total Revenue in Naira/ha and TC - Total Cost in Naira/ha.

Technical efficiency (stochastic frontier production function)

This analytical tool was used to determine the productivity and effect of access to microcredit on the productivity of the respondent. The Cobb-Douglas frontiers production function which was defined as in equation (vi):

$$\ln Y_{ij} = \beta_0 + \beta_1 \ln X_{1ij} + \beta_2 \ln X_{2ij} + \beta_3 \ln X_{3ij} + \beta_4 \ln X_{4ij} + \beta_5 \ln X_{5ij} + (V_{ij} - U_{ij}) \quad (vi)$$

The subscripts i and j refer to the jth farmers and jth observation respectively in all cases. Where: In - Natural logarithms, Y - Cassava outputs (kg/ha), X1 - Labour used (Man-days), X2 - Farm size for cassava (ha), X3 - Quantity of fertilizer used (kg/ha), X4 - Members of association, X5 - Total cost ((naira (₦)/ha), $\beta_1 - \beta_5$ - coefficients of parameters to be estimated, β_0 - Technical efficiency level, V_{ij} - Systematic random error that accounts for measurement error and other factors that are not under the control of the farm household and U_{ij} Asymmetric non-negative random error component that measures technical inefficiency effects The inefficiency model estimates which was jointly used with the stochastic frontier model in order to determine the factors that contribute directly to technical efficiency in all the groups examined was stated in equation (vii) $U_{ij} = \alpha_0 + \alpha_1 Z_1 + \alpha_2 Z_2 + \alpha_3 Z_3 + \alpha_4 Z_4 + \alpha_5 Z_5$ (vii) where: Z1 - Farming experience (years), Z2 - Household size (no), Z3 = Education (years), Z4 - Gender (male - 1, others - 0), Z5 - Extension visit (yes -1, No - 0), $\alpha_1 - \alpha_5$ parameters to be estimated.

RESULTS AND DISCUSSION

Socio-economic characteristics of cassava farmers

The socioeconomic distributions of the cassava farmers showed that majority (82.0%) of the respondents were male (Table 1). This implied that males were more committed to cassava

production than their female counterparts. This result confirmed the findings of Yakasai, (2010) which reported that cassava production was a male dominated enterprise. The average age of the farmers in the study area was 50years. This implied that the farmers were in their active age. Majority (88.0%) of the respondents were married with household size of between 6 to 8 members. It could be inferred that majority of the cassava farmers were expected to have some forms of financial commitment to their family members. This should influence their agricultural practices in terms of productivity and the level of profit. The results further showed that farmers in the study area have farm sizes of between 2 to 5 hectares. This implied that the cassava farmers in the study area were smallholders. The results also showed that majority (83.0%) of farmers in the study area had some forms of education. Thus, they were expected to be able to interpret, understand and use available resources and technology to boost their level of cassava production. The average farming experience was 20years in the study area. This implied that the farmers have many years of farming experience; hence adopting modern farm practices among the farmers in the study area should not be difficult. Majority (89.8%) of farmers also engaged in other farm enterprise through which they also generate additional income.

Budgetary analysis result

The result of the budgetary analysis was presented in Table 2 below. The result showed the level of profitability among the two groups of cassava farmers in the study area (microcredit users and non-microcredit users). The total variable cost per hectare which consists of cost of planting, weeding, fertilizer, thinning, harvesting, transport, and marketing were very high for cassava farmers with access to microcredit (₦131,177.00) compared to those without access to microcredit (₦88, 437.00). This difference could be traced to access to microcredit for the farmers.

Table 1. Socio-economic characteristics of cassava farmers

Variables	Farmer with access to microcredit	Farmers without access to microcredit	All samples
Male (%)	81.3	89.6	82.0
Age (years)	50.0	50.0	50.0
Married (%)	89.6	86.5	88.0
Farm size (hectares)	3.5	2.0	3.5
Literacy level (%)	91.7	75.0	83.0
Household size (nos)	7.0	7.0	7.0
Year of farming experience (years)	20.0	20.0	20.0
Engagement in other enterprises(%)	87.5	92.0	89.8

Source: Field Survey, 2017

Table 2: Estimated average cost and profitability of farmers that have access to microcredit and those without microcredit.

Variable	Farmers with access to microcredit (₦/ha)	Farmers without access to microcredit(₦/ha)	All Samples (₦/ha)
Total Revenue(TR)	199,896.00	156,735.00	177,452.00
Variable cost			
Planting	26,167.00	21,087.00	23,525.00
Weeding cost	35,948.00	21,454.00	28,411.00
Fertilizer	10,313.00	5,615.00	7,870.00
Thinning	9,604.00	5,702.00	7,575.00
Harvesting cost	32,854.00	22,019.00	27,220.00
Transport cost	9,229.00	7,029.00	8,085.00
Marketing cost	7,063.00	5,531.00	6,266.00
Total variable cost	131,177.00	88,437.00	108,952.00
Gross Margin	68,719.00	68,298.00	68,500.00
Total Cost	146,177.00	103,437.00	123,952.00
Net Profit	53,719.00	53,298.00	53,500.00

Source: field survey, 2017

This implied that cassava farmers who had access to microcredit invested more on their cassava enterprise as compared to those without access to microcredit. This result confirmed the findings of Miguel (2007), Balogun *et al.* (2011) and Taiwo (2012) which all argued that access to microcredit strengthens the productive assets of the farmers by enabling the them to secure adequate investment capital which could be used to further invest in productivity-enhancing technologies such as fertilizer, better tools, among others. The total revenue for the farmers with access to microcredit (₦199, 896.00) was higher than the farmers without access to microcredit (₦156, 735.00). This could be traced to the level of investment made on cassava enterprise by those who had access to microcredit as compared with those who did not have access to microcredit. This probably accounted for more output per unit area among those who had access to microcredit. The total cost for the microcredit group is higher ₦146,177.00 and could not minimize cost as cassava is a low input- high yielding crop which does not require much variable input such as fertilizer before it produces effectively unlike other crops. This high variable cost among farmers which had access to microcredit helped to maximized the average gross margin (₦68, 719.00) and the net profit (₦53,719.00) gotten from each production compared with those who did not have access to microcredit which had average gross margin (₦68,298.00) and net profit of ₦53,298.00 which have little difference compare with the microcredit group.

Results of the productivity analysis

The results of the productivity analysis using the stochastic frontier production function (SFPF) estimation as obtained from Frontier 4.1 software were presented in the Table 3. The maximum likelihood (ML) ratio test of the model was used to measure its overall fitness. The estimated values of sigma squared, gamma, log likelihood function LR test and

mean efficiency gave further information on the efficiency of the explanatory variables on cassava production. The significance of the sigma-squared at 5% level in the two groups indicated a good fit and correctness of the specified assumption of the distribution of the composite error term. The mean technical efficiencies (TEs) for the all samples, cassava farmers with access to microcredit and those without access to microcredit was found to be 96.25%, 96.38%, 95.56% respectively. This indicated that the efficiencies of the input used were very high and that the technical efficiencies of the groups could be increased by 3.75%, 3.62%, and 4.44% respectively. Adjusting from the mean of all the groups, it was obvious that all the groups were close to the point of profit maximization but the microcredit users was a little closer to profit maximization hence; that group was more technically efficient than others. This result agreed with the findings of Ambai, (2013) who posited that access to microcredit among farmers could lead to increase efficiency. The coefficients for labour, farm size, fertilizer, were significant and positive for the all samples at 5% level of significance. This result implied that a percentage increase in labour, farm size and fertilizer would increase the output by 68.97%, 287.69% and 35.68% respectively for all samples. The coefficients of membership in association was also significant but had negative relationship. Total cost had a positive significant relationship with the output at 10% level of significance. This implied that a percentage increase in total cost would increase the output level by 2.5% for all samples. For non-users of microcredit, the coefficients of farm size and fertilizer were positive and significant at 5% level of significance and this implied that an increase in farm size and fertilizer would increase the output by 16.27%, and 37% respectively.

Table 3: Maximum- likelihood estimates of farmers that have access to microcredit, farmers without access microcredit and all the sampled farmers.

Variables	All samples			Farmers without access to microcredit			Farmers with access to microcredit		
	Coefficients	Standard error	t-value	Coefficients	Standard error	t-value	Coefficients	Standard error	T-value
Efficiency factors									
Constant term	18167.760**	16.0736	1130.2843	28133.9840**	1.0187	27617.7030	17729.817**	31.7172	558..9962
Labour	68.9715**	083.7773	3.75299	-10.0264	8.4827	-1.1820	146.7873**	21.7178	6.7588
Farm size	287.6912**	13.04712	22.0502	1690.2736**	1.1199	1509.3133	-26.4418	82.7196	-0.3197
Fertilizer	35.6822**	11.4498	3.1166	37.3082**	15.4413	2.4161	16.03013**	7.7749	2.0688
Members of association	-82.6615**	19.2786	-4.2877	-1346.1190**	1.0509	-1280.9491	-2612.6403**	60.4630	-43.2106
Total cost	0.02510***	0.0150	1.6922	0.02028	0.0234	0.8677	0.0120	93.8816	1.2816
				Inefficiency factors					
Constant term	-1.8810	7.7611	- 0.2426	0.00223	1.0003	0.0023	15.3709	17.7506	0.8659
Farming exp.	138.3610***	82.3869	1.6794	-2.7457	27.2101	-0.1009	151.4898	164.3207	0.9219
Household size	-171.8787	295.4108	0.5818	-14.8176	128.7806	-0.1151	-1057.7980	1216.6487	-0.8694
Education	-483.0853	702.3951	0.6878	-0.2632**	2.7902	-9.4345	-19822.9990	2279.9671	-0.8694
Gender	82.7657	338.9141	0.2442	0.1954**	2.1522	9.0804	371.0005	426.7641	0.8693
Extension visit	53.75635	201.6692	0.2666	0.0922**	1.3512	6.8243	372.3289	428.2570	0.8694
				Diagnostic statistics					
Sigma-squared	98516719**	1.0001	985166698	112017510**	1.3512	112017510	46492069.0000**	1.0002	46484448.0000
Variance ratio(gamma)	0.00067	0.0008	0.8448	0.03292	0.14697	0.2240	0.1262	0.1313	0.9612
LR Test	0.3.1403			0.03454			0.9467		
Log likely hood function	-1058.9931			-554.8148			-0.4906		
Mean efficiency	0.9625			0.9556			0.9638		

Source: field Survey, 2017 *** Significant at 10%, ** Significant at 5%,* Significant at 1%.

The result of microcredit users showed that the coefficient of labour and fertilizer had a positive significance at 5%. This implied that increase in this variable input would increase the output by 6.76% and 2.07% respectively. This result confirmed the findings of Atagher *et al.* (2014) which reported that increase in input used could affect the level of output among cassava farmers. For the inefficiency variables, coefficients of farming experience had a positive relationship with the level of efficiency and significant at 10% confidence interval for the all samples. The implication was that the more experience the farmer had on the cassava farming, the more efficient the would become in his allocation available resources. The coefficients of education had a negative relationship with farmers' level of efficiency and significant at 5% level of confidence interval for farmers without access to microcredit. The coefficients of gender and extension visits had a positive significance at 5% level of significance. These results confirmed the findings of Yuguda *et al.* (2013) and Owoeye *et al.* (2018) on the socioeconomic factors influencing productivity and efficiency of cassava farmers in Nigeria.

CONCLUSION

This study concluded that cassava production in the study area was dominated by male farmers with relatively small farm sizes. The cassava farmers who had access to microcredit were more efficient and were able to make more investment into their farm business. As a result, they were able to make more profit compared to their counterparts which had no access to microcredit. The result of budgetary analysis indicated higher variable cost for farmers with access to microcredit which translated to the use of more of the improved technologies like fertilizer and other inputs. Generally, findings from this study showed that cassava production was a profitable enterprise in the study area. It was recommended that cassava farmers in the study area should be encouraged with adequate access to microcredit in order to improve their productivity and profit level.

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