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CONTRIBUTIONS OF MICROFINANCE INSTITUTIONS TO ECONOMIC EFFICIENCY OF CASSAVA FARMERS IN ABIA STATE, NIGERIA

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Abstract

The study examined contributions of microfinance institutions to economic efficiency of cassava farmers in Abia state, Nigeria. A multistage random sampling technique was adopted in collecting cross sectional data on a sample size of 240 respondents (120 MFI beneficiaries and 120 non beneficiaries). Primary Data was collected by administering questionnaire on cassava farmers. The result showed that economic efficiency of MFI beneficiaries was influenced by wage rate, price of fertilizer and adjusted Y (output), while wage rate, price of fertilizer and price of cassava cutting s are variables that influenced economic efficiency of non beneficiaries. The t – test analysis confirmed that MFI beneficiaries had higher economic efficiency advantage compared with non beneficiaries. It is recommended that government agricultural policy should take positive steps to reduce interest rate to encourage MFI efforts in providing the necessary platform to encourage higher efficiency in cassava production in Abia state, Nigeria.

Key words: *economic efficiency, microfinance institution*

INTRODUCTION

Microfinance in Nigeria is long operated as an informal sector arrangement. In the non – institutional markets, the activities of savings and acquisition of credits are done by individuals on their own or through person to person arrangement. The activities include self financing by relations, friends and well wishers, professional money lenders, jackpot, raffle and pool winning trust system of credit transaction. Institutional market on the other hand refers to any organizational or institutional arrangement that aims at mobilization savings and credit [28]. Found in this market are Rotating Savings and Credit Association (ROSCAS), thrift association, savings mobilization groups (which are traditionally called ESUSU, bam ago and adashi by different ethnic groups in Nigeria), daily savings or contribution organization, cooperative societies, religious organizations, social clubs and village or town unions. The informal system of advancing credit irrespective of the meager amount it generates remains the major source of finance for the poor who see the formal institution as being too bureaucratic costly and cumbersome [27].
Microfinance can play important roles in reducing poverty amongst farmers by promoting their productive use of farm inputs. Micro finance is particularly relevant in increasing productivity of rural economy, especially agriculture [11]. This can be done by creating opportunities for accessing micro-credits geared towards raising agricultural productivity among small farmers. Where there is economic growth microfinance has the capacity to transmit benefits of the growth more rapidly and more equitably through the informal sector [16]. Financial capital have been recognized as vehicles for economic development and to provide them, microfinance is necessary [25]. The

prominence of microfinance is built on the fact that it encourages diversified agriculture which stabilizes and perhaps increases size of farm operations and resource productivity.

In Abia state there is paucity of microfinance groups in the rural areas [1], or where they are present, their services to farmers cannot be ascertained as farmers productivity remains low [26]. Increase in productivity is directly related to production efficiency arising from not only the optimal combination of farm inputs but also from the state of credit availability [4; 5]. It is therefore necessary to ascertain the contribution of microfinance to economic efficiency of food crops especially cassava because of the economic advantage it has in the agricultural sector. Determining the efficiency of farmers according to [31] is very important from policy perspective. This is because in an economy where new and improved technologies are lacking, efficiency study can show the possibilities of raising productivity by improving efficiency without increasing the resource base or developing new technologies. Such studies will as well help to determine the under utilization or over utilization of factor inputs. Gains in efficiency of agricultural production, according to [16] are viewed as being necessary for economic growth and rural poverty alleviation.

Since Microfinance has remained strategic in financing the rural poor [9]. It has become necessary to evaluate the effect of microfinance on farmers who produce staple foods such as cassava. Some important natural and socio economic variables of farmers and microfinance institutions vary over time and geographic location. It is therefore necessary to periodically verify the performance of microfinance institutions with a view to revealing their strength and weaknesses as to remedy and reposition them for effective performance. This in turn will suggest ways for efficient delivery of services to farmers that guarantee improved productivity. Bio – fuel from cassava (as a raw material) seems to be the choice of many nations [15]. It is therefore important to improve the financing of the many small holder cassava producers for food and alternative uses.

Early studies on efficiency by [14] focused primarily on efficiency using deterministic production function with parameters computed using mathematical programming techniques [19]. They however noted that the approach had inherent limitations of the statistical interpretation of parameters estimating efficiency due to inadequate characteristics of the assumed error term. The stochastic frontier approach developed independently by [2; 21] overcame this deficiency and this model as used in this study has been used in determining farm level economic efficiency with cross sectional data [17]. The study objective was to determine the difference between the economic efficiencies of cassava farmers who are beneficiaries and non beneficiaries of MFI.

Theoretical framework.The flexibility and ability to closely marry economic concepts with modeling reality has made stochastic frontier very popular. According to [14], Technical Efficiency (TE) is associated with the ability of a firm to produce on the Isoquant frontier, while Allocative Efficiency (AE) refers to the ability of a firm to produce at a given level of output using the cost minimizing input ratios. Economic Efficiency (EE) is the capacity of a firm to produce a predetermined quantity of output at a minimum cost for a given level of technology [7]. Farrell's methodology had been applied widely, while undergoing many refinements and improvements. And of such improvement is the development of stochastic frontier model which enable one to measure a firm's level of technical and economic efficiency using maximum likelihood estimate (a corrected form of ordinary least square – COLS). [2; 21] were first to propose stochastic frontier production function and since then a lot of modification had been made to stochastic frontier analysis. The model used in this paper is based on the one proposed by [6] in which the stochastic frontier specification incorporates models for the technical inefficiencies effects and simultaneous estimate all the parameters involved in the production and cost function model. Following the pioneering but independent works by [2; 6]. The stochastic frontier production function can be written as

$Yi = F (Xi;\beta) \exp(Vi - Ui) \quad i = 1, 2 \ldots.n$ …eqn (1)

where Yi represents the value of output, which is measured in (₦); Xi represents the quantity of input used in the production. The $Vi^{'s}$ are assumed to be independent and identically distributed random errors, having normal N (O, σ^{v2}) distribution and independent of the $Ui^{'s}$. The $Ui^{'s}$are technical inefficiency effects, which are assumed to be non – negative truncation of the half normal distribution N (O, σ^{u2}). The technical efficiency of individual farmers is defined in terms of the ratio of observed output to the corresponding frontiers output, conditional on the level of input used by the farmers. Hence the technical efficiency of the frontiers output, conditional on the level of input used by the farmers. Hence the technical efficiency of the farmer can be expressed as:

$TE = Yi / Yi^* = f (Xi;\beta) \exp (Vi - Ui) / f(Xi;\beta) \exp Vi = \exp(-Ui)$ …eqn(2)

Where Yi is the observed output and Y* is the frontiers output. The TE ranges between 0 and 1 that is od" Ted" 1. The corresponding cost frontier of cob – Douglas functional form which is the basis of estimating the economic efficiencies of farmers is specified as follows:

$Ci = g(Pi;\alpha) \exp (Vi + Ui) \quad i = 1,2\ldots n$ ...eqn(3)

where Ci represents the total input cost of the ith farmer; g is a suitable function such as the cob –Douglas function; Pi represents input prices employed by the ith farm production and measured in naira(₦); α is the parameter to be estimated; Vi^s and $Ui^s$are random errors and assumed to be independent and identically distributed truncations (at zero) of the N (μ_i, σ^2) distribution. μ_i provides information on the level of allocative efficiency of the ith farmer. The allocative efficiency of individual farmer is defined in terms of the ratio of the predicted minimum cost (Ci*) to observed cost (Ci) that is $AEi = Ci^*/ Ci = \exp (\mu_i)$. Hence allocative efficiency ranges between zero and one also.

MATERIALS AND METHODS

This study was carried out in Abia State Nigeria. Abia is a state located in the South Eastern zone of Nigeria. The state was chosen for the study because of its agrarian disposition and endowment in food crop production. The state is endowed with land suitable for growth of various tropical crops including cassava. In the state it has been observed that major Clients of Microfinance Institutions (CMFI) are mostly cassava farmers [1]. The climate is essentially tropical humid with average annual rainfall of 229.20mm distributed evenly throughout its wet season, which covers a period of seven months (April to October).Diurnal temperature varies between 27^0C and 31.9^0C. Its annual rainfall range is 1500-2600mm on a mean elevation of 122m above sea level [24]. Abia state is located between longitudes 7^0 23' E and 8^0 02' E and latitudes $5^0$47' N and $6^0$12' N [23]. It is bounded by Enugu state in the North, Rivers state in the South, Akwa Ibom and Cross River states in the East and Imo State in the West.

Abia state was created on 22nd August, 1991 out of the then Imo state and has its capital at Umuahia. The state covers a total land area of 7677.20 square kilometers, with a total population of 2,833,999 persons made up of 1,434,193 or 55.0% males and 1,399,806 or 45.0 % females [22]. The state has 17 Local Government Areas (LGAs) clustered in three 3 agricultural zones namely Aba, Ohafia and Umuahia zones. The constituent LGAs of the zones are as follows:

1.Ohafia Agricultural Zone: Arochukwu, Bende, Isuikwuato,Ohafia and Umunneochi Local Government Areas.

2.Umuahia Agricultural Zone: Ikwuano, Isiala-Ngwa South, Isiala- Ngwa North, Umuahia North, Umuahia South Local Government Areas and Osisioma Ngwa.

3.Aba Agricultural Zone: Aba North, Aba South, Obingwa, Ugwunagbo, Ukwa East and Ukwa West Local Government Areas.

About Seventy five percent (75.0%) of the state population live in rural areas and engage in agricultural production [13] producing food crops which include Cassava, Yam, Rice, Plantains, Maize, Melon, Pepper, and vegetables. Some cash crops grown in the state include Cocoa, Rubber, Cashew and Oil Palm [1].

Sampling Technique

This study adopted multi- stage random sampling method in selecting the respondents for the survey. First, random sampling method was adopted in selecting two (2) Local Government Areas (L.G.As) from each of the three (3) agricultural zones. From Ohafia zone (Ohafia LGA, Bende LGA), From Umuahia zone (Umuahia LGA, Isiala Ngwa South LGA) and from Aba zone (Ukwa East LGA, Ugwunabo LGA). This gave a total of six (6) local government areas.

The list of all Microfinance Institutions was obtained from each local government area office. The composite formed a sampling frame used in selecting MFIs (banks). A simple random sampling was used in selecting three (3) MFIs from each of the six Local Government Area selected. Thus a total sample of 18 MFIs were selected and involved in the study. These MFIs are as follows: from Ohafia zone- Ohafia Microfinance Bank (MFB), Arochukwu MFB, Abiriba MFB, Uzuakoli MFB, Umuneochi MFB and Abia State University MFB; from Umuahia zone central, Umuchukwu MFB, Decency MFB, Ovuma MFB, Ohha MFB, Chibueze MFB and LAPO MFB. While from Aba zone we chose Ukwa MFB, Ecosal MFB, Easygate MFB, Ugwu MFB, Swift MFB and Umuike MFB.

The list of small scale cassava farmers who are beneficiaries of services of MFIs was obtained from the chosen MFIs through the assistance of the MFB managers. This formed a sample frame for a simple random selection of credit beneficiaries of MFIs credit. Six cassava farmers were randomly selected equally from each MFIs this gave one hundred and eight (108) cassava farmers MFI loan beneficiaries. Cassava farmer Non – beneficiaries in the selected local government areas were listed with the assistance of Abia ADP staff in the agricultural zones. This second list was subjected to Simple Random Sampling (SRS) and one hundred and twenty (120) cassava farmer non beneficiaries of micro finance institution loan were also randomly selected from the composite sampling frame provided by the MFIs and ADP offices in each of the agricultural zones. This gave a sample of 240 farmer MFI loan beneficiaries and non beneficiaries in the state. The non beneficiaries were included in the analysis to serve as control group for meaningful comparison.

Data Collection

Data for this study was obtained from primary source. Primary data was collected through field survey using a pre- tested structured questionnaire. The researcher with the help of some extension staff of the ADP administered the questionnaire in the 3 agricultural zones of the state. In addition 8 enumerators who are indigenes of the areas were trained and assisted in data collection.

Cross sectional socio-economic survey was conducted on the selected cassava farmers ((both beneficiaries and non beneficiaries of MFI loans). Information collected included volume of loans received from microfinance banks in naira, volume of deposits (savings) made in microfinance banks in naira, number of training and advisory services received, access to information and technology services rendered by microfinance banks to the farmers, amount of microcredit used for cassava production, microcredit processing periods, microcredit processing cost, interest rate, total amount of loan repaid, amount of microcredit diverted to other uses as well as problems encountered in cassava production, output of cassava in kg, the cassava cultivated area of the land (hectares), total labour (household/hired labour) used in man-days, fertilizer used in kg (or bags i.e. 50kg/bag), value of other agrochemicals used (naira); and some farmer specific variables like household size, educational status of the household head, experience of the head of cassava farmer household in years among others.

Model Specification

The study used the stochastic frontier regression model following maximum likelihood approach, and the Cobb Douglas functional form in particular; t test and the test of difference between means of factors. The model to be chosen allowed for the test of the presence of technical efficiency while accepting random shocks.

The stochastic frontier production function according to [10] is stated as follows:

$Y_i=X_i, \beta+ (V_i - U_i)$,............ (1)

where:

Y_i = the logarithm of the cassava output of the i^{th} farmer;

X_i = Vector of (transformed input quantity) of the i^{th} farmer;

β = Vector of unknown parameters estimates;

V_i= is the usual symmetric noise associated with random variable which are not under the control of the farmer (such as rainfall, natural hazards) and which are assumed to be iid~N (O, σ_v^2) and independent of the U_i, which refers to negative random variables assumed to account for the technical inefficiency in cassava production and often assumed to be iid~ N (O, σ_v^2).

The parameters estimate (β) and the variance of the parameters in term of

$\delta^2 = \delta v^2 + \delta u^2$ and $\gamma = \delta u^2/ \delta^2$ would be obtained through a maximum likelihood estimation procedure.

The Cobb Douglas logarithm model for clients of microfinance institution (CMFI) that was estimated in this study is defined as follows:

$$InY_i = \beta_0 + \sum_{j=1}^{4} \beta_j InX_i + \sum_{i \geq j=1}^{4} \sum_{k}^{4} \beta_j kInXj_i InXk_i + (V_i - U_i) \quad [12]\ldots (2)$$

where:

lnY = Natural logarithm of Quantity of cassava harvested by farmer (kg);

lnX_1 = Natural logarithm of Total land area planted with cassava (ha);

lnX_2 =Natural logarithm of Total labour (household and non- household) used in cassava production (man days);

lnX_3 = Natural logarithm of Quantity of fertilizer used on farm (kg);

lnX_4 =Natural logarithm of Cassava stems planted (in bundles); A bundle of cassava stems (equivalent to 50 cassava stems);

lnX_5 = Natural logarithm of Amount of borrowed funds invested (₦)

Technical efficiency determinant model for CMFI

$$\mu_i = \delta_0 + \sum_{j=1}^{11} \delta_j M_{ji} \quad \ldots (3)$$

where:

δs are unknown scalar parameters to be estimated;

M_1 = Total amount of micro loan used in cassava production (Naira);

M_2 =Total amount of deposits (mobilized savings + equity contribution) used in cassava production (Naira);

M_3 = Training and advisory services (Number of times);

M_4 = Membership of group / co operative (number of groups to which farmer belongs);

M_5 = Access to insurance policy (1 for access to insurance policy, otherwise=0);

M_6 = Microfinance access (accessed=1, otherwise=0);

M_7 = Age of the household head (years);

M_8 = Household size (in number);

M_9 = Experience of the head of household in cassava production (years);

M_{10} = Educational level of the head of household (years);

M_{11} = Health status of the household (1 for sick, 0 otherwise);

The technical inefficiency of individual farm was determined as ratio of the observed output (Yi) to the corresponding frontier output (Yi*) given the available technology. That is,

$TE = Y_i / Y$ ... (4)

$= f (X_i, \beta) + \exp (V_i – U_i)/f (X_i, \beta) +V_i$ … (5)

$= \exp (-U_i)$ such that $0 \leq TE \leq 1$ … (6)

Estimates of the parameters for the stochastic frontier production function model was obtained using the computer program, FRONTIER version 4.1, written by [10] in which the variance parameters are in terms of

$\sigma^2 = \sigma v^2 + \sigma u^2$ and $\gamma = \sigma u^2 / \sigma^2$

Tests of hypotheses for the parameter of the frontier model was carried out using the generalized likelihood ratio statistic, λ, defined as

$\lambda = -2\ln$ … (7)

Where L(Ho) is the value of the likelihood function for the frontier model, in which the parameters that are stated by the appropriate hypothesis, H_0, will be imposed; and L (H_1) is the value of the likelihood function for the general frontier model.
The generalized likelihood ratio has approximately a chi-square (or mixed chi square) distribution. The degree of freedom was the number of restricted parameters which was equal to the difference between the parameters estimated under H_1 and H_0 if the null hypothesis is true. That is if the estimated chi-square is less than the table value, we accept H_0 but reject if otherwise.
For Economic efficiency functional form, the stochastic frontier cost function is defined thus:

$C = F(Wi, Yi:\alpha) \exp Vi - Ui \quad I = 1,2...n$ ---(8)

where:
C = Minimum cost associated with cassava production
W = Vector of Input prices
Y = Cassava output
α = Vector of parameters
Vi –Ui = Composite error term
Substituting a farm's input prices and quantity of output in equation 9 yields the economically efficient input vectors. The cost measures can then be used to compute the economic efficiency indices.
Using Sheppard's Lemma the following equation was obtained

$\frac{\partial C}{-\partial Pi} = Xi(W,Y;\boldsymbol{\alpha})$ --- (9)

This is a system of minimum cost input demand equations [7]. Substituting a farm's input prices and quantity of output in equation (9) yields the economically efficient input vector Xc. With observed levels of output given, the corresponding technically and economically efficient costs of production was equal to Xii P and Xie, respectively. While the actual operating input combination of the farm was Xi P. The cost measures were used to compute the economic efficiency indices as follows:

EE= (Xie.P)/(Xi.P) --- (10)

However the efficient production was represented by an index value of 1.0 while the lower values indicated a greater degree of inefficiency. Using the method by [7] which was based on the work of [18], u was estimated as

$E(ui/\varepsilon i) = \frac{бλ}{1+\lambda^2} \frac{f^*(\varepsilon i\lambda/б)}{1 - F^*(\varepsilon i\lambda)} - \Sigma i\lambda$ ….(11)

where:
f* (**εiλ/б**) and F* (**εi λ**) are normal density and cumulative distribution functions respectively,
λ= бu / бv
ε= *V*i - *U*i and When **εi, б** and **λ** estimates, are replaced in equation (11), it provided estimates for *u* and *v*. The term V was symmetric error, which accounted for random variations in output due to factors beyond the control of the farmer e.g. weather, disease outbreaks, measurements errors, etc. The term *u* was a non negative random variables representing inefficiency in production relative to the stochastic frontier. The random error *v*i was assumed to be independent and identically distributed as N(o, v2) random variables independent of the *u* is which are assumed to be non negative truncation of the N(o,u2) distribution (i.e. half normal distribution) or have exponential.
In this study the empirical model for the Cobb –Douglas cost frontier function was thus:

$\ln C = \alpha_o + \alpha_1 \ln W_1 + \alpha_2 \ln W_2 + \alpha_3 \ln W_3 + \alpha_4 \ln W_4 + \alpha_5 \ln W_5 + Vi - Ui$ -- (12)

where:
Wo = Constant term

W_1 = Wage rate
W_2 = Price of fertilizer
W_3 = Land rent
W_4 = Price of cassava cuttings
W_5 = Output (Y*)

Using the same model for technical inefficiency, and same parameter to be estimated.

Comparison was analyzed using paired t- test

RESULTS AND DISCUSSIONS

Sources of Economic Efficiency (MFI microcredit beneficiaries)

The cob-Douglas cost frontier result presented in Table 1.0 shows that the coefficient for variable inputs such as wage rate for labour, price of fertilizer and adjusted Y (output) had the desired positive signs.

Table 1.Maximum Likelihood Estimates of Economic Efficiency of Cassava Farmer MFI Credit Beneficiaries by Stochastic Frontier Production Function

Variables of Cobb- Douglas Frontier Model	Parameters	Estimates (MFI microcredit Beneficiaries)
Constant	β_0	10.359*** (23.549)
Land rent for Area of land of cassava cultivated	β_1	-0.039 (-1.029)
Wage rate for Labour used in cassava cultivation	β_2	0.073** (2. 131)
Price of fertilizer	β_3	0.090*** (2.925)
Price of cassava cutting bundle	β_4	-0.301 (-0.722)
Adjusted Y(Output)	β_5	0.142** (2.529)
Inefficiency function		
Constant	δ^0	0.0386 (0.301)
Total Microloan used (M_1)	δ^1	2.569 (3.423)***
Total amount of deposit (M_2)	δ^2	-0.077** (-2.672)
Training and advisory service(M_3)	δ^3	0.138*** (3.141)
Membership of group(M_4)	δ^4	-0.066 (-0.812)
Access to Insurance (M_5)	δ^5	0.199 (0.290)
Level of microloan accessibility(M_6)	δ^6	-2.780E-05*** (-7.776)
Age (M_7)	δ^7	-0.103 (-0.721)
Household size(M_8)	δ^8	-3.109E-06 (-2.466)
Farming experience(M_9)	δ^9	0.011 (0.030)
Educational level(M_{10})	δ^{10}	0.001 (0.033)
Health Status(M_{11})	δ^{11}	-0.792* (-1.934)
Diagnostic statistics		
Sigma – squared	r^2	1.137*** (4.162)
Gamma	R	0.990*** (203.637)
Log likelihood function	LLF	-26.739
Likelihood ratio test	LRT	136.609
Mean technical efficiency	MTE	0.808

Source: Field Survey, 2014.Figures in parenthesis are t - ratios
*, **, *** Significant at 10.0%, 5.0%, and 1.0% levels respectively

The coefficients for wage rate, price of fertilizer and adjusted Y (output) which were positive and significant at 5.0%, 1.0% and 5.0% levels of probability respectively implies that increasing the wage rate, price of fertilizer and adjusted Y (output) by 1.0% would increase total cost of production by 0.073, 0.090 and 0.142 respectively.

The value of these coefficients indicates the importance of these variables in the cost structure of the farmers.

The Inefficiency Model shows that the total microloan used and training/advisory services are negative and highly significant at 1.0% level of probability showing an indirect relationship with economic efficiency. This is however against *a priori* expectation which uphold that microloan and training/advisory services positively influence economic efficiency [12], this implies that microloan used and training /advisory services may not be regarded as a factor causing economic inefficiency in the study area. The coefficients for total amount of deposit, level of microloan access and health status were positive and significant at 5.0%, 1.0%, and 10.0% level of probability respectively indicating a direct relationship with economic efficiency. The volume of deposit made by farmers in a credit institution according to [29] have been shown to be a sure means to getting microcredit and as such can positively influence a farmer's economic efficiency. Also the level of microloan access shows that many cassava farmers had high level of microloan access and as such responded to *a priori* expectation that postulated that high level microloan access have direct influence on economic efficiency [20]. More so, the healthier a farmer is the better his productive capacity to engage in farming activities increases [8]

The variance (r^2) of 1.356 for MFI microcredit beneficiaries is statistically significant and different from zero at 1.0% level. This indicates a good fit and correction of the specified disturbance assumption of the composite error term. The variance ratio (r) is estimated to be very high at 99.03. This suggests that 99.03% of discrepancy between the observed and the frontier output are due to economic inefficiencies. The result of the diagnostic statistic suggests the presence of one sided error component and confirms the relevance of stochastic parametric economic production function and maximum likelihood estimation.

Sources of Economic Efficiency (Non Credit farmer Beneficiaries of MFI)

The result presented in Table 2.0 showed that the coefficients for land rent, wage rate, price of fertilizer and cassava cuttings were positive. The positive coefficient for land rent and wage rate were both significant at 10.0% level of probability each. This implies that increasing the land rent and wage rate by 1.0% will lead to corresponding increase in the total cost of production by 0.072 and 0.102 respectively. Meanwhile, the positive coefficient for price of fertilizer and price of cassava cutting bundles were both significant at 1.0% level of probability each. This implies that increasing the price of fertilizer and the price of cassava cuttings bundle by 1.0% would increase the total cost of production by 1.663 and 5.012 respectively.

The inefficiency model shows that access to insurance and level of microloan access are positive and significant at 10.0% and 5.0% probability level showing a direct relationship with economic efficiency. While the coefficients for age, household size and education are negative and significant at 1.0%, 5.0% and 1.0% probability levels respectively. The implication is that the older a farmer becomes, the more he or she is unable to combine his or her resources in an optimal technology [17]. Most of the farming household in the area had large household sizes and such have a very high tendency of diverting microcredit to consumption purposes other than productive purposes thereby influencing economic efficiency negatively, this is in tandem with [3] that large family sizes have indirect effect on economic efficiency. However, the lack education of may not be regarded as a factor causing economic inefficiency.

The variance (r^2) of 0.125 was statistically significant and different from zero at 5.0%

level. This is an indication of a good fit and correctness of the specified distribution assumption of the composite error term. The variance error estimate for non credit farmer beneficiaries of MFI is high at 83.56%. This suggest that 83.56% of discrepancies between the observed and the frontier output are due to economic efficiency, this result confirms the work of [17; 30] who got a similar outcome in their study.

Table 2.Maximum Likelihood Estimates of Economic Efficiency of Non MFI credit Cassava Farmer Beneficiaries by Stochastic Frontier Production Function

Variables of Cobb- Douglas Frontier Model	**Parameters**	**Estimates (Non credit beneficiaries)**
Constant	β_0	10.716*** (21.788)
Land rent for Area of land of cassava cultivated	β_1	0.072* (1.616)
Wage rate for Labour used in cassava cultivation	β_2	0.102* (1.663)
Price of fertilizer	β_3	0.030*** (5.012)
Price of cassava cutting bundle	β_4	0.010*** (4.827)
Adjusted Y(Output)	β_5	-0.038 (-1.409)
Inefficiency Function		
Constant	δ^0	0.0973 (0.234)
Total Microloan used (M_1)	δ^1	-0.122 (-0.900)
Total amount of deposit (M_2)	δ^2	-0.018 (-1.409)
Training and advisory service(M_3)	δ^3	-0.019 (-1.139)
Membership of group(M_4)	δ^4	0.048 (1.343)
Access to Insurance (M_5)	δ^5	-0.877* (-1.744)
Level of microloan accessibility(M_6)	δ^6	-0.258** (-2.445)
Age (M_7)	δ^7	0.054*** (7.735)
Household size(M_8)	δ^8	5.761E-05** (15.380)
Farming experience(M_9)	δ^9	0.002 (0.017)
Educational level(M_{10})	δ^{10}	0.010*** (8.574)
Health Status(M_{11})	δ^{11}	4.678E-05 (1.164)
Diagnostic statistics		
Sigma – squared	r^2	0.126** (2.244)
Gamma	r	0.836*** (9.328)
Log likelihood function	LLF	16.476
Likelihood ratio test	LRT	25.32
Mean technical efficiency	MTE	0.706

Source: Field Survey, 2014.Figures in parenthesis are t- ratios
*, **, *** Significant at 10.0%, 5.0%, and 1.0% levels respectively

The result of the ranges of the frequency distribution of economic efficiency estimates for the farmers is shown in Table 3.0. The table revealed that the economic efficiency estimates of microcredit beneficiaries ranges from 0.405 – 0.964 and the mean economic efficiency is 0.829. The estimates shows that for an average microcredit beneficiary to attain the utmost level of economic efficiency in cassava production, whereas, the economic efficiency estimates for non microcredit beneficiaries ranges from 0.126 -0.951 with a mean of 0.750. In this case, for the average non microcredit beneficiary to attain the level of utmost economic efficiency in the sample the farmer would need to experience a cost saving of 21.100 (1 – 0.750/0.951) percent.

Meanwhile, the least economically efficient cassava farmer for the microcredit beneficiary will have an economic efficiency gain of 57(1 – 0.405/0.951) percent if the farmer is to attain efficiency level of utmost economic efficiency in the study area, while, the case of non credit beneficiary is estimated to be 83.200 (1 – 0.126/0.750) percent.

Table 3.Estimates of Economic Efficiency Ranges for Microcredit Beneficiaries and Non Credit Farmer Beneficiaries

Economic Efficiency Level	**Microcredit Beneficiaries**	**Percentage**	**Non Beneficiaries**	**Percentage**
≤0.20	-	-	3	2.50
0.21 – 0.30	-	-	1	0.83
0.31 – 0.40	1	0.88	3	2.50
0.41 – 0.50	2	1.75	6	5.00
0.51 – 0.60	8	7.02	9	7.50
0.61 – 0.70	5	4.39	11	9.17
0.71 – 0.80	13	11.40	28	23.33
0.81 – 0.90	43	37.72	27	22.50
0.91 - 1.00	42	36.84	32	26.50
Mean	0.829		0.750	
Minimum	0.405		0.126	
Maximum	0.964		0.951	

Source: Field Survey, 2014.

Table 4 revealed the paired t – test analysis for economic efficiency of microcredit beneficiaries and non microcredit beneficiaries. The table showed that the mean for microcredit beneficiaries was 82.851 while that of non microcredit beneficiaries was 74.98. This result shows a mean deviation of 7.876 and t – statistic of 3.854 at a significant level of 1.0%.The implication is that there is a significant difference in the economic efficiency of the two groups of farmers. Thus the microcredit beneficiaries displayed higher economic efficiency than non microcredit beneficiaries.

Table 4.Paired t – test Analysis for Economic Efficiency of microcredit Beneficiaries and non credit farmer Beneficiaries

Variable	**Mean**	**Std Deviation**	**Mean Deviation**	**T- Statistics**
MFI beneficiaries	82.851	12.363	7.876	3.854***
Non beneficiaries	73.975	18.191		

Source: Field Survey Data, 2014.

CONCLUSIONS

The research focused on the contributions of microfinance institutions to economic efficiency of cassava farmers in Abia state, Nigeria. Cobb-Douglas production frontier cost function was estimated by Maximum Likelihood (ML) estimation to obtain ML estimates and inefficiency determinants. The parameters obtained were found to be asymptotically efficient and consistent. The diagnostic statistics confirmed the superiority of stochastic production cost function. More MFI farmer related variables determined economic efficiency among the farmers. The MFI services beneficiaries were found to be more economically efficient in cassava production with a mean of 82.851 than farmers who were non beneficiaries with a mean of 74.98.

Based on this research it is recommended that government agricultural policy can take positive step to reduce interest rate to encourage MFI effort as a veritable platform that can positively influence economic efficiency in cassava production in Abia state, Nigeria.

Taking of insurance policies encouraged farmers to have great confidence in their production activities. Government extension outfit can encourage more cassava farmers to take up arable crop protection policies with the Nigeria Agricultural Insurance Cooperation (NAIC) or any insurance agency with specialty in agriculture.

Extension intervention efforts in policy formulation can focus on bridging the gap in supply of farm inputs such as fertilizer and cassava cuttings as this is strategic in cost efficient production of cassava.

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