

**LOAN REPAYMENT AND CREDIT WORTHINESS OF CASSAVA
FARMERS UNDER *KENECHUKWU* MICROFINANCE IN ENUGU NORTH
AGRICULTURAL ZONE OF ENUGU STATE, NIGERIA**

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ABSTRACT

The determinant to loan repayment and credit worthiness of cassava farmers under Kenechukwu Microfinance in Enugu North Agricultural zone of Enugu State, Nigeria was studied. The specific objectives are to describe the socioeconomic characteristics of the respondents, identify the factors influencing the loan repayment and ascertain the credit worthiness of the respondents in the study area. One hundred and twenty cassava farmers that borrowed money from the microfinance were randomly selected using multi stage random sampling technique. A well-structured questionnaire and interview scheduled were employed to collect the data. Percentages responses was used to describe the socioeconomic characteristics of the respondents. The multiple regression analysis and discriminant analysis were used to identify the factors influencing the loan repayment and ascertain the credit worthiness of the respondents in the study area. The determinant factors to loan repayment in the study area were educational level (0.2038984), off- farm income (0.0765740) and distance from the bank to farmers' house(-0.2167944) .Furthermore, factor affecting credit worthiness of the farmers were educational level, farm size, off-farm income and distance from bank.. The need to ensure farmers' access to educational programmes, land for genuine farmers and off- farm activities were recommended.

Keywords: Loan repayment, credit worthiness, cassava farmers, microfinance bank, discriminant analysis

INTRODUCTION

Cassava is an important food security crop that thrives under harsh weather conditions, and a wide range of soil types with minimal management (Ume and Kaine, 2021). Empirical studies show that 500 million people in developing nations and about 300 million in the tropical countries depend on cassava for energy sources (Adewoye and Sawyeer, 2016) Onunka Ume, Okoroafor, and Edeh, 2020, Okoye, Okoye and Ume, 2021). Apart from carbohydrate content, cassava product is rich in vitamins (mostly vitamins B and C), essential minerals and low in protein (Okoye,*et al*; 2021).

However, the nutrient composition of cassava depends on the variety, age, and prevailing environmental condition including soil characteristics (Adewoye and Sawyeer, 2016). Cassava is produced in the tropical and sub-tropical countries current global production of about 215,436,496 tons (Ume and Mbah, 2022). Globally, Nigeria is the largest producing nation with annual output of 54,831,600 tons in 2022, which represented 20.3%, of the world production (Onunka, *et al*; 2020). Despite the important of cassava (human and Industrial uses) and all efforts by government in boosting its production (through funding the nation's National Root Crop Research Institute (NRCRI), programs and policies) and nongovernmental organization such as IITA in providing improved technologies and technical assistants, yet the domestic production cannot meet the demand by her populace. Ume and Mbah,(2022) reported that Nigeria needed about 28.3 million metric tonnes of fresh cassava root planted annually to meet the country's demand for cassava by-products and derivatives. The resultant effect is imports of the cassava products by successive Nigeria governments, amounting to billions of Dollars to meet the nation's annual need (Afolabi, 2010, Ume, Ezeano and Obiekwe, 2018, Kaine, and Ume, 2023).

Despite the importance of credit to agricultural development, most farmers in many developing countries of the world have short supply to it according to literatures (Benard, 2011, Alihero, 2012, Afolabi, 2010). The death in access to credit according to Afolabi, (2010) could be primarily associated with the inability of the farmers, particularly poor resource ones to provide the mandatory collaterals as required by the lending institutions. This situation has been very disincentive to agricultural transformation and its (agriculture) contribution to nations' Gross Domestic Product (GDP) especially among agrarian States.

To abate the aforesaid scenario, microfinance bank was established with features of smallness of loans advanced and or savings collected, absence of asset-based collateral, and simplicity of operations compare to formal institution such as commercial banks (Ume, *et al*; 2018). However, because of the absence of collateral in credit assessment, problem of high loan default rate becomes common, with unpalatable consequences, including low credit delivery and sustainability to small scale enterprises, high interest rate and high credit processing cost (Meyer, and Nagarajan, 2006, Adeyemo, 1982; Aja, Eyo and Ofen, 2014).

Nigeria is not exceptional in the issue of low credit repayment among clients of microfinance banks, leading to liquidation of many of these banks. Anigbogu,*et al*; (2014) related the low loan repayment to high interest rate, price fluctuation of farm produce, diversion of credit to non-farm uses, inadequate monitoring of clients and production and marketing risks.

Nevertheless, for the micro finance bank to perform effectively in the faces of abovementioned problems, the need to detect the credit worthiness of the client, i.e. detection of good and bad borrowers. Prior to loan disbursement. This measure could assist in amongst decision to extend or not of credit by the lenders as result of valuation of each borrower's financial performance and for determining the amount and kind of supervision needed (Acha, 2012; Nawai and Shariff, 2013; Nasir, 2013). The specific objectives of this study are to describe the socioeconomic characteristics of the respondents, examine the determinants to loan repayment and ascertain the credit worthiness of the respondents.

METHODOLOGY

Study Area

Enugu North agricultural zone of Enugu State, Nigeria is located between latitudes 6° 31' and 7° 6' North and longitude 6° 54' and 7° 54' North East. The zone has population figure of 1,190,908 persons according to National Population Commission (NPC), (2006). It has land area of about 3,404km². The zone has boundary with Benue and Kogi States in the North, Enugu East Agricultural Zone, and Anambra State South and East respectively. It has Enugu West Agricultural Zone in the West. The zone has average temperature and relative humidity of 24⁰C and 68% respectively. It comprises of Igbo-Etiti, Igbo-Eze South, Igbo-Eze North, Nsukka, Udenu and Uzo-uwani Local Government Area (LGAs). The zone is agrarian with people still engage in off- farm income such as civil service, petty trading, vulcanizing, driving, carpentry and mechanics.

Sample Size and Sampling Technique.

In the first stage, the list of cassava farmers that benefited from Kenechukwu Microfinance bank was collected. In the second stage, twelve farmers were collected from each of the six Local Government Areas that that make up the zone. This brought the total number of respondents to one hundred and twenty farmers.

Method of Data Analysis

A structured questionnaire and oral interview schedule were used to elicit and collect information from the sampled farmers.

Method of Data Analysis

The Percentages responses, multiple regression analysis and discriminant analysis were used to describe the socioeconomic characteristics of the respondents, identify the factors influencing the loan repayment and ascertain the credit worthiness of the respondents in the study area.

The multiple regression models is implicitly stated: $Y = (X_1 + X_2 + X_3 + X_4 + X_5 + X_6 + X_7 + X_8 + \dots + X_n) \dots \dots \dots (1)$

Y= Amount of loan Repaid (N); X₁ = Age of farmers (years), X₂ = Education (Number of years of schooling), X₃ = Off-farm income(N), X₄ = Distance to the bank(Km), X₅ = Access to extension (Dummy) X_n = Error Term. The variables chosen was based on empirical studies.

Four functional forms of the multiple regressions were employed in order to select the one that has provided the best fit. The functional forms tried were:

Linear function;

$$Y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + e_i \dots \dots \dots (4)$$

Double log function:

$$\ln(y) = \ln b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + e_i \dots (2)$$

Semi log:

$$Y = \ln b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + b_5 \ln x_5 + e_i \dots \dots (3)$$

Exponential function;

$$\ln Y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + b_5 x_5 + e_i \dots \dots \dots (4)$$

The choice of the best functional form was based on the magnitude of the R^2 value, the number of significant variables, size and signs of the regression coefficients as they conform to *a priori expectation*.

Discriminant analysis was used in classifying farmers into the same set of independent variables in estimating the loan repayment equation into two mutually exclusive and exhaustive categories. Using loan repayment values as basis, small holder beneficiary farmers are categorized into two groups. The first group consist of farmers who had repaid less than 50%, the second group had repaid at least 50%. The farmers that can repay up to 50% of their loan (credit worthy), while those that cannot repay less than 50% are taken as non-credit worthy. The variables used in the classification were gender, borrowers' age, educational level in years, distance from bank, loan – asset ratio, off – farm income, extension Services, farm size, and outstanding loan – asset ratio.

The discriminant analysis can be represented as;

$$D_o = b_0 + b_1 Z_i + b_2 Z_i^2 + b_3 Z_i \dots b_n Z_n \dots \dots \dots (5)$$

Z_i s derived by the formula;

$$Z = X_{ij} / X_i \dots \dots \dots (6)$$

$Z_i = i^{th}$ = Individual discriminant score or the contribution of the explanatory variable to the determinant score (D)

D_i = Total discriminant score, $X_{ij} = i^{th}$ is the individual values ofindependent variables

$b_{..}$ = the discriminant coefficient for ...variable, X = Mean values of independent variables

$\hat{\sigma}$ = Standard deviation of independent variable, Let the individual scores, Z_1 be a function of each of each of explanatory variable, that is

$$Z_i = b_0 + b_1 x_1 + b_2 x_2 + \dots b_n x_n \dots \dots \dots (7)$$

The classification procedure is as follows

If $Z_i = Z_{crit}$, classify individual i as belong to group 2(Credit worthy farmers), and $Z_i > Z_{crit}$, classify the individual i as belong to group 1(non- credit worthy farmers), The classification boundary is the locus of point where

$$b_0 + b_1x_1 + b_2x_2 + \dots + b_nx_n = Z_{crit} \dots \dots \dots (8) \text{ (Onyenucheya and Ukoha, 2007).}$$

Test of Hypothesis

The hypothesis tested was: all the discriminant function coefficient are equal to zero

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Farmers;

The socioeconomic characteristics influencing farmers’ loan repayment ability is shown in Table 1

Table 1: Distribution of Respondents According Farmers’ Socioeconomics Characteristics

Variable	Frequency	Percentage
Age		
<29	10	8.3
30 – 39	41	34.2
40 – 49	52	43.3
< 50	17	14.2
Educational Level		
No Formal Education	8	6.3
Primary Education	13	43.3
Secondary Education	47	39.2
Tertiary Education	52	10.8
Extension Services		
Access	64	53.3
NoAccess	56	46.7
Distance to Lending agency		
Near	30	25
Far away	90	75
Off farm Income		
Access	80	66.3
No Access	40	33.7

Source: Field Survey, 2021

Table 1 reveals that 42.5% of the respondents in the study area fell within the age of less than 40 years. This age bracket is usually able-bodied and energetic individuals to enhance their farm output and increasing their loan repayment propensity (Ume *et al.*, 2018). Also, 6.7% did not have any form of formal education, while 93.3% had one form of western education to the other.

Educational attainment enhances farmers' ability to understand, accept and evaluate new innovations for high output and prompt repayment of the loan to accrue (Aja, *et al*; 2014). Moreover, 53.3% of the respondents had access to extension services, while 46.7 % had not. Extension services facilitate in farmers' loan repayment worthiness through boosting their production by enhancing their access to improved production technologies and technical assistant (Onyenucheya and Ukoha 2007). Furthermore, 66.3% of the farming household heads engaged in off- farm income employment, whereas the remaining 33.7% do not. Farmers with access to off-farm income generating income that could be used to repay their loans in case of uncertainties in their farm outputs compare to their counterpart (Eze, 2003).

Table 2 Factors influencing Farmers' Loan Repayment Ability.

Variable	Linear	Semi-log	+Double log	Exponential
Constants	2.3467801 (6.13)***	3.098298 (5.97)***	0.210920 (5.06)***	5.239065 (7.72)***
Age	0.3537570 (-1.69)	0.3325786 (-2.73)**	- 0.5782482 (-2.29)**	0.1832229 0.227)
Education	0.4747535 (4.36)***	-0.3038985 (4.63)***	0.3876902 (4.11)***	-0.1001869 (-3.42)***
Off-farm income	0.20960933 (0.69)	0.1765740 (2.77)**	0.3295770 (0.20)*	-0.4253021 (-0.27)
Distance to bank	-0.2139917 (-0.49)	-0.2167944 (1.91)*	-0.2161257 (-1.49)*	-0.40190455 (-3.08)***
Extension Services	-0.2864323 (-0.72)	0.3020032 (0.98)	0.1390999 (2.28)**	0.2501258 (2.57)**
R ²	0.5662	0.6209	0.8814	0.4356
F-Value	7. 07***	9.48***	9.85***	5.78***

Source: Field Survey, 2021. *, **, and *** implies significant at 10%, 5% and 1% respectively

Based on statistical criterion, Double log was carefully chosen. The coefficient of the determination (R²) was 0.8814, which infers that 88.14% of the variations in the model were as result of all the explanatory variables included in the model, while the remaining 11.86% were due to error term. The coefficient of age of the farmer had positive relation with loan repayment and statistically significant at 5% probability level. The finding of Welderufael; *et al*; (2015) coincided to the above statement. They reported that aged farmers are usually risk averse, less adoptability and feeble to carryout tedious and strenuous farming activities with resultant effects of low farming horizons and high odds of low loan repayment. Also, the coefficient of educational level was positive coefficient, inferring that higher educational attainment could connote greater chances of loan repayment. The finding of Aja, *et al*; (2014) harmonized to aforesaid statement. They reported that educational accomplishment enhances individual's' capacity to access, appraise and comprehend new production methods, hence ensuing in higher likelihood of non - default.

Furthermore, the distance from the bank to the farmer’ farm or residence had positive sign, indicating that farmers that their residence are located near to the lending agency have greater odds of repaying their loans more promptly, as they are usually subjected to thoughtful supervision by bank officials. In contrary, Eze, (2003) reported negative sign of the coefficient. He reported that poor logistics and weather roads could constitute a communication hindrance among the two parties (borrowers and lender).

Determinant of the Credit Worthiness of the Respondents using discriminant function

At this juncture, farmers were classified into credit worthy and non - credit worthy groups according to level of loan repayment. Farmers that repaid at least 50% of the borrowed loan is classified as being credit worthy, while less than 50% are non-credit worthy ones. In line with this grouping, 47 farmers were classified as credit worthy, while 73 farmers were non- credit worthy. The estimated centroid for non-credit worthiness cassava farmers was estimated to be 0.6079, whereas 0.7996 for credit worthy farmers. This denotes that credit worthy farmers usually have composite score that is high, while low for non-credit worthy farmers.

Table 2 Standard Canonical Discriminant Function Coefficients

Variable	Discriminant Function
Gender	-0.223
Age	-0.341
Educational Level	0.482
Distance from Bank	0.476
Loan – Assert ratio	0.031
Off – farm income	0.391
Extension Services	0.130
Farm Size	0.027
Outstanding loan – Asser ratio	-0.009

Source; Field Survey, 2021

Table 3 Tests of significances of the discriminant Functions Coefficients

Tests	Coefficients
Canonical Correlation	0.5908
Wilks Lambda	0.6008
Chi Square	36,797
D.F	8

Source Field Survey, 2021 DF = Degree of freedom

The credit worthiness of the cassava farmers was addressed here using discriminant function This could be related to the fact that the model comprises virtually all important information in estimating the preferred function, as it (model) had high canonical correlation and low Wilk Lambda values as indicated in Table 3. Chi square test was used to test of significances of the canonical coefficient at 5% and 36.797 value was gotten with the tabulated value (t_{tab}) of 18.946 being realized. The null hypothesis is accepted. This is to the fact that the calculated chi square is greater than the tabulated. This implies goodness of fit for all discriminants function coefficients incorporated in the model.

Table 4; Pooled within group correlation between the canonical discriminant Function and Discriminating Variables

Variable	Correlation Coefficient
Gender	0.346
Age	-0.451
Educational Level	-0.654
Distance from Bank	0.146
Loan – Asset ratio	-0.227
Off – farm income	0.521
Extension Services	-0.212
Farm Size	0.317
Outstanding loan – Asset ratio	-0.072

Source; Field Survey, 2021

The coefficients of gender, distance to the bank, off – farm income, educational level and farm size had direct association to cassava farmer borrower as indicated in Table 4 being grouped as credit worthy ones. The effects of the aforesaid factors increase with the higher the value of their coefficients. In addition, the negative sign of the coefficient of age could infer that aged farmer is usually feeble to perform farming activities leading to meagre farm outputs to dispose to offset his /her loan. The finding of Oladeed and Oladabo; (2008) did not concur to above relationship. They reported that youthful farmers are usually credit worthy, as they are often pioneering and able-bodied individuals to generate high income through acquiring high farm outputs to service or offset their debts.

Furthermore, the negative sign identity of extensive services as reported by Ume, *et al*; (2018) could be associated to wide ratio of extension agents- farmers in most countries in sub-Saharan Africa. The effect is most farmers do not enjoy the services of extension agents, leading to low farm productivity and low propensity to service their debts, they added. Also, the negative signs of the coefficients of loan – asset ratio and outstanding loan - asset ratio imply high loan defaulting rate, especially when such variables coefficients are high. Hence, such farmers borrowers are classified as belonging to non – credit worthy group.

Table 5 shows the classification performance of the discriminant function. The effectiveness of the discriminant function in classifying farmers into credit worthy and non – credit worthy depends on the rate of the functions being employed. Literatures show that functions with high rates are often preferred as they have more predictive power

Table 5; Classification Performance of the Discriminant Function.

Actual group	No of Cases	Predicted Group	Membership
Group 1		1	2
Non - credit worthy farmers	73	57	13
Sub File group 1		78.08%	21.29%
Group 2			
Credit worthy farmers	47	12	38
Sub file group 2		19.15%	8085
Under group cases	0	0	0
Sub files of under group cases	0	0	0

Source; Field Survey, 2021

The classification performance of the function was predicted using a sample of 120 cassava farmers. Given that the power of the model lies in its ability to classify correctly, then the higher the rate, the better its predictive power of the function. Based on credit worthiness parameters, it was originally found that 70 farmers were non-credit worthy farmers, while 47 were Credit worthy farmers. The above classification of farmers was validated through discriminant analysis using a set of 10 variables that were hypothesized to discriminate between the two groups of loan repayment farmers. On the application of the model, 73 and 47 cassava farmers were found to be relatively non-Credit worthy and Credit worthy farmers respectively. This result is in conformity with Olarinde (2007) and Oluwatayo and Omowunmi (2015) who had different prediction of group membership after the application of the model. The possibility of miscalculation error could be easily be abated as result of high classification performance of the function, 79.5% as obtained in the work. The result is comparable to Onyenucheya and Ukoha, (2007), who had 75.6% and Eze, (2003) who reported 75%.

CONCLUSION AND RECOMMENDATIONS

The following conclusions were deduced, educational level, off-farm income, extension services and distance to the bank affected loan repayment by cassava farmers in the study area. Additionally, the farmers' credit worthiness were influenced by gender, distance to the bank, off – farm income, educational level and farm size. As well, the classification performance of the discriminant function showed that 21.29% of the 73 farmers that recognized to be credit worthy were non-credit worthy, whereas 19.15% of 47 farmers approved to be non- credit worthy were credit worthy. Based on the results, the following recommendations were made:

1. The need for government agencies concerned to strengthen the national policies on education such as the universal basic education, adult education and nomadic education.
2. Farmlands should be made available to genuine farmers through re-examining land use Act of 1990 by government agencies concerned.

3. Extension services affected rate of loan repayment by the farmers. The success of the extension services could through among others enhancing the frequency of extension agents' contact with the farmers.
4. The coefficient of off-farm income affected rate of loan repayment. To that effect, farmers should be encouraged to diversify some of their resources outside agriculture to reduce risks and uncertainties associated with agriculture and as well as to have multi stream of income.
5. The need for regular supervision of the borrowers by the bank staff should be ensured in order enhance their clients' rate of loan repayment.
6. Result from this study has shown that gender affected loan repayment rate in the study area. Therefore, policies and programmes that would favour women in the redistribution of agricultural inputs should be put in place.

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