FACTORS AFFECTING TECHNICAL EFFICIENCY OF CASSAVA FARMERS IN KWARA AND NASARAWA STATES, NIGERIA

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ABSTRACT

This study assessed the factors that affect technical efficiency of Cassava farmers in Kwara and Nasarawa States, Nigeria. The data for this research work were obtained through primary source by the use of structured questionnaire and interviewed schedules. Six ADP zones out of seven in Kwara and Nasarawa States were considered for this study. Multistage random sampling technique was used to select two hundred and fifty six (256) respondents for this study. Data obtained through the primary source were analyzed with the following analytical techniques descriptive statistics, gross margin analysis and multiple linear regression model. Majority (79.6%) of the respondents were within the age bracket of 18 to 55years and most (94.1%) of the respondents were male. Data revealed that most (97.7%) of respondents were married. Statistics, also shows that majority (82.7%) of the respondents possess one form of education or the other. Findings also indicated that 64.5% of respondents had household size that ranged from 1 to 10. Results further showed that most (94.5%) of the respondents owned farm size that ranged from 1 to 5 hectares. The study indicated that majority (65.2%) of the respondents did not have access to credit facilities in the study area. Results also indicates that majority (75.4%) of the respondents acquired land by inheritance. Majority (47.7%) of the respondents had 11 to 20 years of farming experience. Results also showed that most (71%) of the respondents did not belong to any cooperative society. Data indicates that most (64.1%) of the respondents do not have access to extension services. Cassava farmers obtained N178,765.19 per hectare as gross returns of production while the total costs per hectare was N 72,093.00, net farm income obtained was N106,672.19 and returns on investment was N 2.48. Findings also revealed that fertilizer (5.01), herbicide (1.89) farm size, (8.84), access to credit (2.62), educational level (2.40), years of experience (6.26) and extension contact (7.42) had the expected positive signs. This implies that a unit increase in these inputs will lead to increase in the output level of cassava, while cassava stem (0.19) had no significant effect on the output level of cassava famers in the study area. Shortage of extension services (100%) ranked first among the constraints faced by cassava famers in the study area. It iz recommended that there is need for Government and Non-Governmental Organization (NGO) to coordinate more research into latest varieties of cassava, production techniques to serve as extension packages since extension contact was found to affect the technical efficiency.
Keywords:

KEYWORDS:

Factors affecting, technical efficiency, cassava farmers.

INTRODUCTION

Cassava is a very important crop to the economy of Nigeria. It is estimated that about 30 million farmers grow cassava with average yields of about 11 metric tons per hectare and annual output exceeding 33.8 million metric tons (Food and Agriculture Organization, FAO, 2002; International Institute of Tropical Agriculture, IITA, 2005). Estimate of output in 2011 was over 52 million metric tons (FAO, 2012). Apart from being a source of food to about 200 million people in the sub-Saharan Africa, cassava can contribute to employment creation, income generating capacity, and food security for many households in Nigeria (Ogunleye and Ojedokun, 2014).

Cassava food products are the most important staples of rural and urban households in northern Nigeria. Estimates showed that the dietary calorie equivalent of

per capita consumption of cassava in the country amounted to about 238kcal (Cock, 1985). This is derived from the major cassava food forms of consumption such as gari, chip flour, fermented pastes and fresh roots. Cassava as a staple crop has become more popular in all locations and is fast overtaking the place of yam and other crops, increasing in gaining ground as an insurance crop against hunger. There is a strong demand for cheap food, especially cassava products within Nigeria (Ogunleye and Ojedokun, 2014). Since the mid-1980, real producer prices have increased as a consequence of devaluation of the naira, abolition of the commodity boards and import restrictions on selected foodstuff and animal feed. Consumers have shifted from expensive food such as meat, eggs, bread and rice towards locally-produced staples such as cassava, maize and yam, and farmers have responded by cultivating more of these crops. Significantly, cassava cultivation has increased in the last decade partly through the adoption of higher yielding varieties, but mostly through a boost in the area cropped with cassava (Nweke, 1994). Traditionally, cassava chips are the intermediate products in one of the pathways of flour production.

Chips made from cassava are being industrially converted to alcohol in one of Nigeria's foremost alcohol manufacturing companies. The demand for cassava products by the manufacturing industries as raw material is on the increase in Nigeria (Federal Agricultural Coordinating Unit, 1993). Cassava production in Nigeria has started witnessing a remarkable progress in genetic improvement. About 24 varieties that give good yields of roots in 12 – 15 months of growth are already developed. Research is on-going presently to obtain early types (six to nine month), with resistance to spider mites and mealy bugs. Biological control measure is being adopted to take care of damage caused by mites and mealy bugs are ongoing and supplemented by genetic enhancement. In Nigeria, the Stored Products Research Institute has also provided some latest means of storing cassava. These include packaging in boxes with a moist medium, pit storage, packing roots in plastic, waxing and storing in the house as well as on plat forms in the open (National Root Crops Research Institute, 1997).

The quest and the intervention by the government of Nigeria over the years to include cassava as one of the crops to boost the economy of the country have not yet yielded the expected results. No doubt, research has led to increases in the output of cassava over the last two decades, mainly as a result of increases in the area of land cultivated and improvements in the production efficiency through high-yielding, disease and pest-resistant cultivars (IITA, 2005). In spite of this, cassava production is still characterized by high levels of variability and cyclical gluts, which are due mainly to the inability of markets to absorb supplies (IITA, 2005). Thus, output fluctuates from year to year to reflect the variation in the prices of the commodity.

The aim of the study is to analyze the factors that affect technical efficiency among cassava farmers in the study area. The specific objectives are to: describe the socio-economic characteristics of cassava farmers in the study area, estimate the costs and returns among cassava farmers, identify the factors that affect the technical efficiency among cassava farmers and identify the constraints faced by cassava farmers in the study area.

METHODOLOGY

This study was conducted in Kwara and Nasarawa States of North Central Nigeria. The area is located between Latitudes 06°30′to 11°20′N and Longitudes 02°30′E (Shuaib *etal,* 1997). Majority (77%) of population in the region are rural dwellers and mostly participated in one form of agricultural enterprises or the other (Shuaib *et al,* 1997). The area is characterized by two major seasons, namely, dry and wet seasons. The wet season ranges from April to October while dry season ranges from November to March (Nigeria Meteorological Agency, 2008). The rainfall per annum ranges from

1000 to 1500mm with the average of 187 to 220 rainy days with average monthly temperature ranges from 21°C and 37°C. The vegetation of the region consists of the forest savannah, southern guinea savannah and the northern guinea savannah. Geographically, the zone is characterized by varying landforms such as extensive and swampy features which are common in the lowland areas which occur in the areas along the valleys of Benue and Niger rivers, deep valleys, large hills, mountains and plateaus. Soil and weather patterns are favourable for the production of wide spectrum of agricultural food, industrial and cash crops of difference types. The major crops grown in the North Central Nigeria include rice, millet, maize, sorghum, cassava and yam. The population of Kwara State as of 2006 census was 2.37 million, agriculture is the main source of economy, citizens also engaged on business and civil service, it has land mass area of 36,825,km^2. Nasarawa State has population of 2,040,112million, with land mass area of 27,117km^2, agriculture is the mainstay of its economy, and some others partake in patty business and civil service (National Population Commission, 2006).

A Multistage sampling techniques was used to drawn the sample size for this study. Kwara State is divided into four agricultural zones (A,B,C and D) and Nasarawa State is divided into three zones (Southern, Central and Western). In the first stage, three zones (B, C and D) out of four were purposive selected in Kwara State while in Nasarawa State all the three zones were considered which gave a total of six zones. The second stage involved the random selection of one Local Government Area each across the six zones in the study area. In the third stage, three communities from each of the selected LGAs were randomly selected which gave a total of eighteen communities. At the fourth stage, 10% of the cassava based crop farmers were proportionately sampled from each community to serve as sample size of two hundred and fifty six (256) for this study. Primary data were collected with the use of structured questionnaire. The questionnaire were administered to the respondents by the researcher who was assisted by well-trained enumerators. Data were collected on input and output such as quantity of cassava produced (in tons), revenue from output (in Naira), size of land cultivated (in hectares), labour input (in man day), interest charge on borrowed capital, rent on land, quantity of planting materials (in kg), herbicides used (in litres), number of extension contact, insecticide (in litres), and fertilizer (in kg). Information were also elicited on the socio-economic characteristics of respondents such as age, gender, educational level, house-hold size, and years of experience in cassava production. Data collection covered the period of February, 2017 to May, 2017.The following analytical techniques was used, frequency distribution tables, percentage, arithmetic mean, variance and standard deviation was used to achieved objectives i and vi.

Budgeting Techniques: Gross Margin Analysis: This is the difference between the Gross Farm Income (GFI) and the Total Variable Cost (TVC).

$GM = GFI - TVC$ .....(1)

Where GM = Gross Margin, GFI = Gross Farm Income, TVC =Total Variable Cost.

(b) Net Farm Income: It is the difference between the Gross Margin (GM) and Total Fixed Costs (TFC).

$NFI = GM - TFC$.....(2)

Where NFI = Net Farm Income, TFC = Total Fixed Cost and GM is as previously defined. This tool was used to achieve objective ii of the study. Objective iii was achieved through the use of multiple linear regression model. The implicitly functional form is specified as:

$Y = f(X_1X_2,X_3,X_4,X_5,X_6X_7X_8$.....$X$ ei.....(3)

Where

Y = Mean technical efficiency

X_1 = Fertilizer (kg)

X_2 = Cassava stem

X_3 = Access to credit (Dummy variable, 1 for yes, 0 otherwise)

X_4 = Extension visit (Number of times)

X_5 = Farm size (ha)

X_6 = Years of farming experience (Number of years)
X_7 = Educational level (years of spent in school)
X_8 = Herbicide (litres)
ei = Error term

RESULTS AND DISCUSSION

The socio-economic characteristics of respondents such as age, gender, marital status, educational level, household size, farm size, access to credit, method of land acquisition, years of farming experience, membership of cooperative and extension contact were analyzed using simple descriptive statistics are presented in Table 1: The majority (79.6%) of the respondents were within the age bracket of 18 to 55years. Only 23.4% of them were above 55 years. This is an indication that most of the Cassava farmers in the study area were in their productive years. This situation may have a positive effect for the labour supply in the study area, as agricultural production require able-bodied active individuals, as the issue of the labour supply to some extent may not constitute a major constraint to production activities of cassava farmers in the study area. This study agrees with the results of Onuk *et al* (2017) in their study of economics of maize-cowpea intercropping production in Kokona Local Government Area of Nasarawa State that labour supply was not a problem as most of Cassava farmers were in their economic active age. Cassava production was dominated by males (94.1%) against females (5.9%) in the study area. This could be as a result of strenuous nature of cassava production activities which is too stressful for female. This findings is in agreement with the study of Ebewore *et al* (2013) that yam production is labour stressful which only males can bear. Most (97.7%) of respondents were married while 2.3% were single. This explains how individuals contribute directly or indirectly to household food security and national food supply sustainability. Also it could improve their efficiency level, if there is togetherness in day-to-day operation and decision making. This study concurs with the study of Anzaku *et al.* (2016) that marital status play a vital roles in farm firm. To increased production and productivity education as a human capital asset is needed. Majority (82.7%) of the respondents possess one form of education or the other. only 17.3% accounting for non-literate. Adoption of new technologies that could lead to increase in efficiency of cassava farmers, education is important. This results agrees with the findings of Onuk *et al* (2017) that education have positive influence on adoption of innovation that will lead to increase in the output of cassava farmers. The majority (64.5%) of respondents had household size that ranged from 1 to 10. 29.7% of the respondents fall within the range of 11 to 20 while 21 to 30 accounted for 4.3%. Only 1.5% of them had household size that is above 30. Labour supply for Cassava production for small-scale producers are usually partly or wholly from household. This indicates that cassava farmers would not face the constraint of labour supply, because household would serve as source of labour to lead to increase in sustainable farm level practices among cassava farmers in the study area. This findings agree with the findings of Vihi *et al* (2017), that large household size play vital role in labour supply which increases production. Most (94.5%) of the respondents owned farms that ranged from 1 to 5 hectares, while only 5.5% of the respondents had 6 to 10 hectares of farm land in the study area. Given the small nature of their holdings, cassava farmers were predominately small-scale producers. This is in consonance with the findings by Tsado *et al* (2010) that portrayed similar sizes of land for a millet farmers in Wushishi Local Government Area, Niger State, Nigeria. Majority (65.2%) of the respondents did not have access to credit facilities. while 34.8% of the respondents had access to credit in the study area. This may likely affect cassava farmers who would likely operate at inefficiency level, because they have no funds to adopt improved technologies. As stated by Tijani *et al* (2017), that lack of access to credit affects the production

efficiency. The majority (75.4%) of the respondents acquired land by inheritance, 12.9% acquired by lease, 5.5% accounted for community land, while 3.9% of the respondents acquired land by purchased. Only 2.3% of the respondents acquired land by rented. This depicts incidence of land fragmentation, as farmers could have access to land in small holdings. It may likely lead to increase in inefficiency. Most (47.7%) of the respondents had 11 to 20 years of farming experience, 26.9% of them had 21 to 30 years of farming experience and 21.5% had 1 to 10 years of farming experience. Only 3.9% of the respondents that had farming experience that ranged from 31 to 40 years. The numbers of years a farmer has spent in production of crop is indicative of the practical knowledge the entrepreneur had acquired in farming. This has positive effect for boosting cassava farmer efficiency level. This result agrees with the view of Edeoghon *et al* (2008), that experience play a vital role by increases the farmer efficiency in agricultural practices. The majority (71.1%) of the respondents did not belong to any cooperative society. Only 28.9% of cassava farmers are members. As indicated by the statistics, most of the respondents in the study area are not members of cooperatives and may not have access to funds. Cooperative societies provide assistance for their members in terms of credit to enhance productivity and adoption of new techniques. This corroborated the findings of Chiekeze (2009) that the majority of cassava farmers do not have access to credit because they do not belong to cooperative society. Most (64.1%) of the respondents had access to extension services. Only 35.9% of the cassava farmers in the study area do not have access to extension services. Access to regular and adequate extension services are bases for adopting improved technologies by cassava farmers. This agrees with FAO (2001), that extension contact could enhance agricultural interest and people involvement in development.

Table 1: Shows the distribution of socio -economics characteristics of respondents in the study area

Variables	Frequency	Percentage (%)
Age		
Less than 25	3	1.2
25-35	24	9.4
36-45	50	19.5
46-55	119	46.5
Greater than 55	60	23.4
Total	**256**	**100**
Gender		
Male	241	94.1
Female	15	5.9
Total	**256**	**100**
Marital status		
Married	250	97.7
Single	5	2.3
Total	**256**	**100**
Educational level		
Primary	69	26.9
Secondary	80	31.3
ND/NCE/SH	49	19.1
University	14	5.4
Adult Education	3	1.2
Quranic	15	5.9
None of the above	26	10.2
Total	**256**	**100**
Household size		
1-10	165	64.5
11-20	76	29.7
21.30	11	4.3
31 above	4	1.5
Total	**256**	**100**
Farm size		
1-5	242	94.5
6-10	14	5.5
Total	**256**	**100**
Access to credit		
Yes	89	34.8
No	169	65.2
Total	**256**	**100**
Methods of land acquisition		
Inheritance	193	75.4
Community land	14	5.5
Rented	6	2.3
Lease	33	12.9
Purchased	10	3.9
Total	**256**	**100**
Years of experience		
1-10	55	21.5
11-20	122	47.7
21-30	69	26.9
31-40	10	3.9
Total	**256**	**100**
Membership of cooperate		
Yes	74	28.9
No	182	71.1
Total	**256**	**100**
Extension contact		
Yes	164	64
No	92	35.9
Total	**256**	**100**

Source: Field Survey Data, 2017

The profitability assessment of cassava production in the study area was done using Gross Margin (GM) analysis. The estimated costs and returns of cassava farmers are presented in Table 2. The total variable cost in cassava production was N71,479.77 per hectare, comprising of 39.2% of labour cost, 7.4% cassava cuttings, 5.2% of herbicides cost, 13.9% of fertilizer cost and transportation cost accounted for 33.5%. The fixed costs of cassava production per hectare was N613.23, comprising of 0.2% of hoes while 0.3% accounted for axes and cutlass each respectively. The total cost of production for a typical cassava farmers was N72,093.00 per hectare. It is clear from the analysis that cassava production needs large capital in order to increase the profitability level of the cassava farmers as well as increasing the sustainable farm level practices in the study area. The average gross returns obtained by cassava farmers was N178,765.19 per hectare. The net farm income was N106, 672.19 per hectare. The return per naira invested was N2.48. This implies that cassava production is profitable in the study area. This study agrees with the findings of Okoye *et al.* (2010) that the production of cassava was profitable in South-Eastern Nigeria.

Table 2: Average Costs and Returns per Hectare of Cassava Production in the Study area

Costs and returns (ha)	Amount (?)	% of total cost
(A) Variable costs		
Labour	28,236.96	39.2
Cassava cutting	5,324.73	7.4
Herbicides	3,747.11	5.2
Fertilizer	10,016.80	13.9
Transportation	24,154.17	33.5
Total variable costs	71,479.77	99.2
(B) Fixed costs		
Hoes	174.33	0.2
Axes	211.29	0.3
Cutlass	227.61	0.3
Total fixed costs	613.23	0.8
(C) Total costs	72,093.00	100
(D) Gross Returns	178,765.19	
(E) Net farm incomes	106,672.19	
(F) Returns on investment	2.48	

Source: Field survey data, 2017

The distribution of technical efficiency of cassava production is presented in Table 3. From the result, 0.39% of the respondents had a technical efficiency level that is less than 0.61 while 91.41% of the respondents had technical efficiency level that ranged from 0.61 – 0.90. Only 8.20% of the respondents accounted for 0.91 – 1.00 of technical efficiency level. Furthermore, 0.6048 and 0.9516 was obtained as minimum and maximum mean efficiency, respectively. The technical efficiency ranged between 0.6048 and 0.9516 with an average mean of 0.8536. The remaining 0.1464 is an indication that there is room for enhancing technical efficiency and reducing inefficiency of cassava farmers. This level of technical efficiency relates to yam production in Niger State, Nigeria with high values of technical efficiency of 0.9510 (Ojo *et al*, 2009).

Table 3: Frequency Distribution of Respondents According to Technical Efficiency in the Study Area

Efficiency level	Frequency	Percentage
<0.61	1	0.39
	3	1.17
0.71 – 0.80	43	16.80
0.81 – 0.90	188	73.44
0.91 – 1.00	21	8.20
Total	256	100.00
Minimum efficiency	0.6048	
Maximum efficiency	0.9516	
Mean technical efficiency	0.8536	

Source: Field survey Data, 2017

Multiple linear regression model was used to examine the factors that affect technical efficiency among cassava farmers in the study area. The results is presented in Table 4. The estimated parameters with positive signs indicates that variables contributes positively to increase the efficiency level while negative sign is the reverse. The fertilizer (X_1) had expected positive sign and significant at 1% probability level. This implies that a unit increase in fertilizer will lead to increase in technical efficiency level among the cassava farmers in the study area. This may explain why the increase in fertilizer leads to increase in efficiency level, because if the farmer used more fertilizer it may increase the output level of the cassava farmer. Furthermore, the coefficients of access to credit, extension contact, farm size, years of farming experience, educational level and herbicide also had expected positive signs and were significant at 1%, 5% and 10% probability levels respectively. This is an indication that a unit increase in access to credit, extension contact, farming experience, farm size, educational level and herbicide could influence the technical efficiency level among cassava farmers in the study area. This study is in conformity with Mgbada *et al.* (2016) in their study of sustainable agricultural practices and its determinants among cassava farmers in South-East Nigeria.

Results in Table 4, further revealed that 56% of variation of technical efficiency level among cassava farmers were caused by the explanatory variables included in the multiple regression model. While 44% was not explained by the explanatory variables. The F-value was 2.03 and significant at 5% probability level, this implies that there is significant relationship between technical efficiency and selected explanatory variables.

Table 4 : Multiple Regression Results of factors that affect Technical Efficiency among Cassava Farmers in the Study Area.

Variables	Parameters	Coefficient	Standard Error	T- value
Constants		68.007	115.940	5.58
Fertilizer	X_1	-88.772	131.643	5.01***
Cassava stem	X_2	6.750	2.380	0.19
Access to credit	X_3	1.210	1.075	2.62***
Extension contact	X_4	-4.286	12.979	7.42***
Farm size	X_5	5.92	4.051	8.84***
Years of experience	X_6	-2.302	0.000	6.26***
Educational level	X_7	8.87	7.52	2.40**
Herbicide	X_8	0.15	0.08	1.89*
R^2				0.56
F-Value				2.03**

Source: Field Survey Data, 2017.

Note: *** significant at 1% level, ** significant at 5% level and * significant at 10% level.

The study observed that cassava farmers encountered constraints in their cassava production activities. The constraints faced in the study area are presented in Table 5. The results reveal that shortage of extension service (100%) ranked first. This implies that most of the cassava farmers do not have access to latest information on cassava production which could affect their sustainable farm level practices in the study area. On the other hand, lack of access to credit and price fluctuation (99.2%) ranked second. This indicates that absence of credit and unstable prices affect cassava production significantly. Inefficient markets for outputs (98.4%) and invasion of farm by grazing animals (98.1%) ranked third and fourth, respectively. This is an indication that an inefficient market for output and invasion of farm by grazing animals were the major factors that hinder the production efficiency of cassava farmers. Theft (96.9%), incidence of pest and diseases (96.5%) and lack of control of inputs supply (96.1%) ranked fifth, sixth and seventh, respectively. Poor producers price (95.7%) and insufficient transportation facilities (95.7%) ranked eighth. This indicates that cassava farmer production activities could be hampered due to the importance of transportation facilities and producers prices. This result agrees with the findings of Abdullahi *et.al* (2017) that transportation facilities are important factors that influence youth performance in agriculture as an enterprise. Results further revealed that change in government (95.3%), lack of insurance facilities (94.1%), high cost of inputs (92.2%) and inadequate storage facilities (91%) ranked ninth, tenth, eleventh and twelfth respectively. It is clear from the result that cassava farmers face the many major problems which could also affect their production efficiency level. Ill-health (78.9%), incidence of drought (74.6%) and insufficient improved cassava cuttings (60.2%) ranked thirteenth, fourteenth and fifteenth, respectively. Results also showed that communal conflicts (51.2%), incidence of flood (35.2%), insufficiency of labour (26.9%) and insufficient farm land (7.8%) ranked sixteenth, seventeenth, eighteenth and nineteenth, respectively. The low ranking of communal conflict, incidence of flood, insufficient of labour and insufficient farm land could be due to the fact that cassava farmers in the study area have several means of curtailing them. This findings concurs with Tsado *et.al* (2010) in their study of sustaining extension activities in yam production in Yagba Local Government Area of Kogi State, Nigeria.

Table 5: Percentage Distribution of Respondents According to the Constraints Faced in Cassava Production

Constraints	Frequency	Percentage	Rank
Shortage of extension service	256	100%	1
Lack access to credit	254	99.2%	2
Price fluctuation	254	99.2%	2
Inefficient market for output	252	98.4%	3
Invasion of farm land by grazing animals	251	98.1%	4
Theft/ pilfering	248	96.9%	5
Incidence of pest and disease	247	96.5%	6
Lack of control of input supply	246	96.1%	7
Insufficient Transportation facilities	245	95.7%	8
Poor producer price	245	95.7%	8
Change in Government policies	244	95.3%	9
Lack of insurance facilities	241	94.1%	10
High cost of inputs	236	92.2%	11
Inadequate of storage facilities	233	91.0%	12
Ill-health	202	78.9%	13
Incidence of drought	191	74.6%	14
Insufficient improved cassava stems	154	60.2%	15
Communal Conflict	131	51.2%	16
Incidence of flood	90	35.2%	17
Insufficient labour supply	69	26.9%	18
Insufficient farm land	20	7.8%	19
	4309*		

Source: Field Survey Data, 2017

CONCLUSION AND RECOMMENDATION

Based on result of this study, it is concluded that cassava production in Kwara and Nasarawa States is of small-scale nature considering the hectarage devoted to the crop by the cassava farmers. The study also indicated that cassava farmers were not fully technical efficient.

Cassava production was found to be a profitable enterprise in the study area. Therefore, there is need to encourage

practicing and prospective entrants into the business by making production resources available and accessible to the practicing farmers. This will enhance production, reduce widespread poverty, create job opportunity and better the lives of the citizenry.

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