Do Farmers Derive Returns From Cassava Production? Lessons from Imo State, Nigeria

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Abstract

One of the most significant root crops in Nigeria and mainly in Imo State is cassava. Evidently, throughout the past fifty years, both the area of land cultivated and yield per hectare have consistently increased. Nigeria has been leading as world's top producer of cassava for several decades, with an average output of 63,001,531 million tons and 8,737,846 ha of harvested land in 2022. This crop not only contribute to the share of agriculture in State and National economy, but possess a great potential in reducing pervasive food insecurity, unemployment and have comparative advantage to compete in a liberalized economy. Despite all this potential, not much has been empirically done to explain the economics of cassava production at households. Most empirical studies have focused mainly on the marketing of cassava, participation, and level of adoption of improved cassava technologies. It was against these backdrops that the study was undertaken. A multistage sampling procedure was used in the selection of respondents. The sample size comprised ninety (90) cassava farms. A structured questionnaire was the main tool for data collection. The data collected were analyzed using descriptive statistical tools, and gross income analysis. Result show that the mean age was 47.00 years. Greater proportions (73.33%) were female. Majority (76.67%) were married, with an average household size of 6 persons. The mean educational level and farming experience were 12 years and 28 years, respectively. Average farm size and annual farm income were 1.42ha and ₦500,500.00 ($1,203.65) respectively. Reasonable proportions (81.11%) were members of cooperative societies. Result shows that 25.10 tonnes of cassava were produced from 1.42h per farming session. Positive net farm return and return per capita invested were ₦288,503.33 ($693.82) and ₦3.64 ($0.0088) respectively. This is an indication that for every naira earned as revenue from the cassava production enterprise, 3.55 kobo is returned to the farmer as net farm income. Result further shows evidence of positive revenue from cassava production and has been a useful source of livelihood for farmers in the area. However, farmers identified inadequate production capital (98.89%) and limited availability of farmland (88.89%) as the constraints that negatively affect their production capacity. It was therefore recommended that farmers, particularly on their own, should judiciously pool productive resources together through a strengthened cooperative society group, as this would enhance bulk purchase/buying of cassava production inputs in the area. Moreover, effective agricultural policies and programmes should focus on granting farmers improved access to farmland and farm credit, as these would enable them to increase their production frontier and sustain the realization of huge returns over-time in the area.

Keywords: Cassava, Income, Profitability, Constraint, Imo State, Nigeria

Introduction

In Nigeria, root and tuber crops such as cassava (*Manihot spp.*) have a significant place in the economy (International Institute of Tropical Agriculture (IITA) (2021) and Nigeria Bureau of Statistics (NBS) 2021). These crops not only contribute to the share of agriculture in national economy, but possess a great potential and comparative advantage to compete in the liberalized economy [1]. Similarly, cassava is grown by almost every household in Nigeria and serves more as a major source of income especially for the increasing rural dwellers [2, 3]. Cassava is also identified as a promising crop for international trade, as demand for cassava derivatives, e.g. garri (a type of processed cassava), starch and tapioca doubled over the last two decades [4]. Presently, Nigeria is the world largest producer of cassava with an annual production capacity of 54 million tons of tuberous roots; being almost 19% of the total world production capacity of 215,344,296 million tons, a third more than Brazil and almost double the production capacity of Thailand and Indonesia respectively [5, 6]. In the second quarter of 2021, Cassava crop contributed to the 22.35 percent of the share of agriculture's contribution to the Gross Domestic Product (GDP) of Nigeria [6]. It also holds vast prospect and relative position to compete favourably in a more improved economy [4]. As a food crop, cassava has some significant inherent characteristics

which make it attractive especially to farmers in Nigeria. Firstly, it is rich in carbohydrates, especially starch, and consequently has multiplicity of end uses [7]. Secondly, it is available all the year round, making it preferable to other more seasonal crops such as grains, peas, beans and other crops for food security and lastly it is tolerant of low soil fertility and more resistant to drought [8, 9]. Cassava tubers are mostly processed into cassava flour (lafun). Cassava flour is dried and powdered form of cassava, garri is fried granulated form of cassava while fufu is fermented pounded form of cassava) in Nigeria [10]. Cassava can also be cooked or eaten, pounded and consumed in its raw form, most especially the sweet variety [11]. By implication, cassava has become a regular item in household diets in Nigeria [12]. In a similar vein, cassava potential for industrial utilization is yet to be adequately realized; with 84 percent of cassava production reportedly consumed as food and 16 percent utilized as industrial materials (United Nations Industrial Development Organization and Federal Government of Nigeria) [13]. Cassava production also moves the nation towards achieving its goals of food security generates employment and saves foreign exchange revenue through import substitution of fish and fish product [2]. As the human population increases and consequently food demand increases. Considering the fact that Nigeria and Imo State mainly has a large suitable land for cassava production, the potential of the cassava sector to meet the food demand of the increasing population cannot be questioned and over-emphasized. For the potential of this sector to be maximized, there must be a significant increase in stakeholders support for farmers. For cassava production, the absence of a solid estimate of the total economic cost and benefits are still scare. Even empirical evidence on the determinant of income from cassava production is still relatively shallow in the area. On the other hand, most empirical studies have focused mainly on participation and level of adoption of improved cassava technologies. It was on this backdrop that the study was undertaken. Specifically, the study described the socio-economic characteristics of cassava farmers in the study area, estimate the economics of cassava production and constraints farmers face in production.

Methodology

The State has three agricultural zones namely Orlu, Owerri, and Okigwe agricultural zones. Farming is the main occupation of the rural dwellers in the State. The farmers produce both root and tuber crops of which cassava are predominant. The sample for the study was drawn from cassava farmers in the study area. A multi-stage random sampling technique was adopted in the selection of respondents for the study. Firstly, three Local Government Areas (LGAs) were randomly selected from each of the agricultural zone (Orlu, Owerri and Okigwe) in Imo State. The three (3) LGAs selected from Orlu agricultural zone of the State were Njaba, Orlu and Ideato-North. Similarly, the three (3) LGAs selected from Owerri agricultural zone of the State included Ikeduru, Mbaitoli and Owerri North. In the same vein, Ihitte-Uboma, Onuimo and Ehime Mbano were the three (3) LGAs selected from Okigwe agricultural zone. Furthermore, three (3) communities were randomly selected from each of the sampled LGAs, selected from each of the three (3) agricultural zone of the State (Orlu, Owerri and Okigwe) to give a total number of twenty-seven (27) communities each from the area. Finally, four (4) households the three (3) LGAs selected from Owerri agricultural zone cassava farmers were randomly selected from each of the twenty-seven (27) communities to give a total sample size of one-hundred and eight (108) cassava farmers for the study. Ultimately, from the retrieved questionnaires, only ninety (90) individual responses were found useful. The list of cassava farmers in the communities, which forms the sample frame, was obtained from the zonal extension agents of Imo State Agricultural Development Programme (Imo-ADP) in the study area. Primary data was used for the study. Primary data was collected through the use of structured questionnaire and it was supplemented with oral interview in places where the respondents could neither read nor write. Descriptive statistics such as frequency distribution, percentages, mean and flow charts were used analyze the data so as to realize objectives. The objectives were modelled using the descriptive statistical tools, and gross income analysis.

The gross income model and the formula was stated as follows;
Gross Income;
$GI = Q \times P$
Where Q = Quantity of cassava (Kg)
P = Unit price of cassava tuber (Kg)
Net Income is specified as
$NI = GI - (TVC + TFC)$
Where NI = Net Income (N)
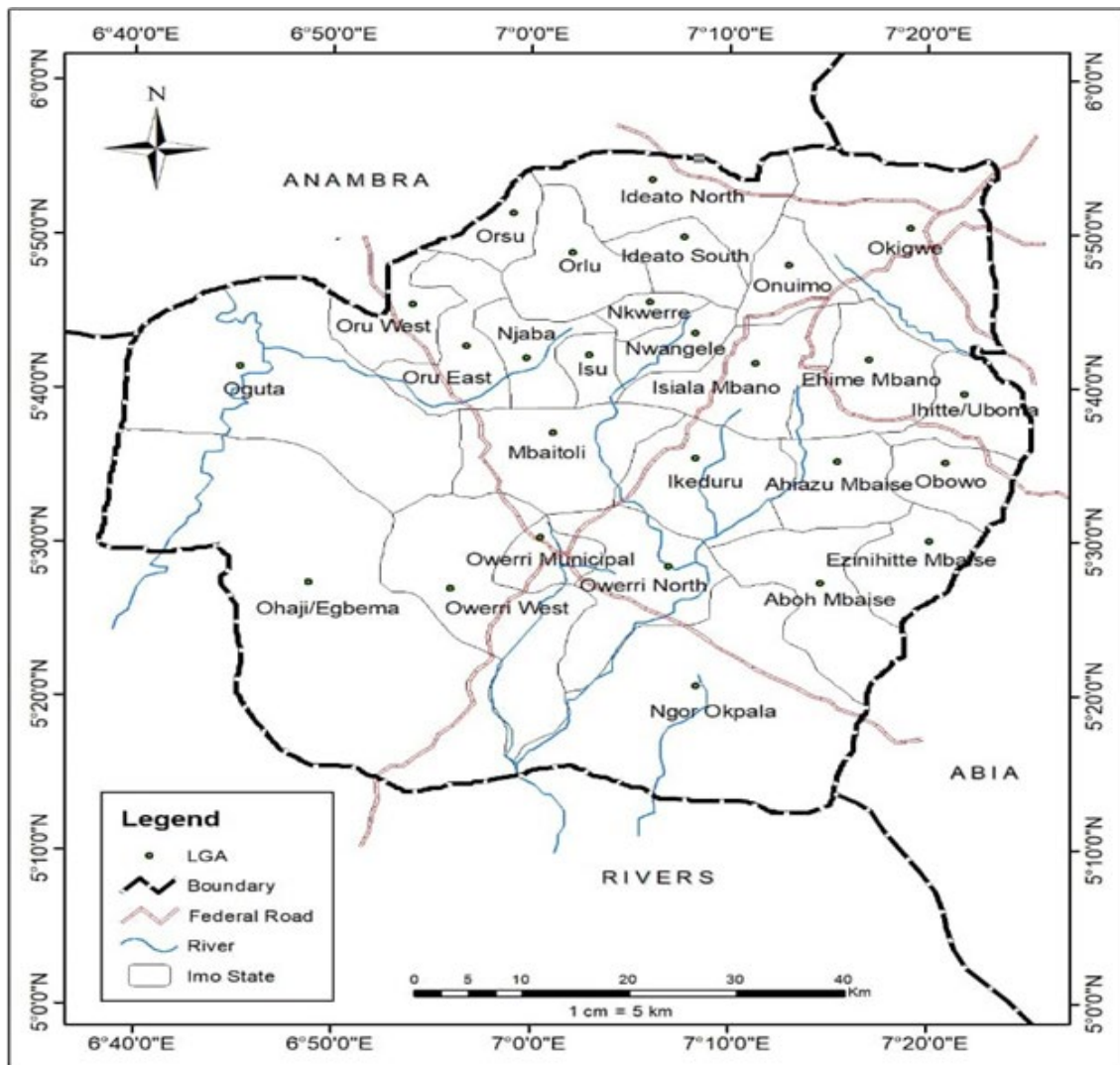GI = Gross Income
TVC = Total Variable Cost
TFC = Total Fixed Cost

Figure 1: Map of Imo State Showing the 27 LGAs (Department of Geography, Imo State University, Owerri, Nigeria)

Results and Discussion
Socio-Economic Characteristics of Cassava Farmers

Table 1 reveals that majority of the proportion (54.44%) of the farmers fell within the age bracket of 41-50 years. The mean age was 47.00 years. The farmers are still young and in their active age. The finding implies that these younger farmers are likely to adopt new farm innovations faster than the older ones in cassava production. The finding is in agreement with Emokaro and Oyoboh who opined that majority of farmers within the age range of 41 to 50 years are still in their active age, more recep-tive to innovation, more relatively efficient and could withstand the stress and strain involved in cassava production [8]. Table 1, indicates that greater proportion (73.33%) of the farmers were females while about 26.67% were males. The finding implies that both sex is involved in cassava production but females were dominant than males in the area. The result is in line with the findings of Ibekwe *et al.*, and Esiobu who reported that females constituted the greater proportion of those involved in cassava production [1, 14].

Table 1: Socio-Economic Characteristics of Cassava Farmers

Age (years)	Frequency	Percentage (%)	Mean (X)
30-40	12	13.33	
41-50	49	54.44	47.00 years
51-60	22	24.44	
61-70	7	7.78	
Total	90	100.0	
Sex	Frequency	Percentage (%)	
Male	24	26.67	
Female	66	73.33	
Total	**90**	**100.0**	
Educational Level	**Frequency**	**Percentage (%)**	
No formal education	4	4.44	
Primary	24	26.67	
Secondary	56	62.22	12 years
Tertiary	6	6.67	
Total	**90**	**100.00**	
Marital Status	**Frequency**	**Percentage (%)**	
Married	69	76.67	
Single	14	15.56	
Widowed	7	7.78	
Total	**90**	**100.0**	
Farming Experience (Years)	**Frequency**	**Percentage (%)**	
01-10	7	7.78	
10-19	11	12.22	28 years
20-30	47	52.22	
31-40	20	22.22	
41-50	5	5.56	
Total	**90**	**100.00**	
Household Size (Number of Persons)	**Frequency**	**Percentage (%)**	
1-5	14	15.56	
6-10	76	84.44	7 persons
Total	**90**	**100.00**	
Access to Credit	**Frequency**	**Percentage (%)**	
Access	76	84.44	
No-access	14	15.56	
Total	**90**	**100.00**	
Membership of Cooperative	**Frequency**	**Percentage (%)**	
Member	73	81.11	
Non-member	17	18.89	
Total	**90**	**100.00**	
Extension Contact	**Frequency**	**Percentage (%)**	
1-2	71	78.89	
3-4	19	21.11	2 visits per month
Total	**90**	**100.0**	
Average Annual Farm Income (N)	Frequency	Percentage (%)	
100,001-300,000	13	14.44	
300,001-500,000	22	24.44	
500,001-700,000	49	54.44	₦650,000.00 ($1,203.65)
700,001-900,000	6	6.67	
Total	**90**	**100.00**	
Source: Field Survey Data, 2022			

Entries in Table 1 also shows that majority (62.22%) of the farmers had secondary education. The finding implies that approximately 95.56% of the farmers had trainings in formal educational institutions which no doubt increases their literacy levels. It is also expected that the higher level of education will contribute significantly to decision making and efficient allocation of resources of the farmers. Exposure to higher level of education is positively and significantly related to allocation of productive inputs of the farmer [15]. Result in Table 1 shows that majority (76.67%) were married. The implication of the finding is that cassava production in the area is an enterprise of married individuals, who are seen to be responsible according to societal standards [10]. This finding supports the result of Esiobu who opined that married farmers tend to have easy access to production variables such as land and large family size which are traditionally owned and provided by household heads (husbands) to compliment family labour to enhance production, reduce the cost of hired labour and relative efficiency of the household farmers [16]. Result of farming experience is shown in Table 1 and it shows that about 52.22% had between 20-30years of farming experience. The mean farming experience was 28.00 years. The implication of the finding is that the farmers had reasonable years of farming experience which no doubt will enhance their decision making in efficient allocation of productive inputs in cassava production. The studies of Onubuogu and Esiobu reported that experience in agribusiness enhances performance and improve efficient allocation of productive resources of the farmer [17]. Table 1 also shows that about 84.44% had a household size of 6-10. The mean household size was 7.0 persons. The implication of the findings is that farmers in the area have sizeable household size which is expected to increase their access to farm labour. This findings support the result of Simpa et al., who reported that large household size is a proxy to labour availability, ensure ease allocation of resources and reduce the cost of hired labour [18]. Table 1 outcome also reveals that greater proportion (84.44%) have access to farm credit. The finding implies that majority of farmers have access to credit facilities to ensure efficient allocation of resources and enhance their agricultural production in the area. The result of the farmer's distribution based on membership of cooperative is shown in Table 1. It shows that greater proportion (81.11%) of the farmers in the area belong to one form of cooperative society or the other, while about 18.89% of the farmers do not belong to any cooperative society. The finding implies that majority of cassava farmers have access to credit facilities through the cooperative society to which they belong, to enhance their production, boost their productivity and relative efficiency in the area. Outcome in Table 1 also show that greater proportion (81.11%) of the farmers in the area belong to one form of cooperative society or the other. The finding implies that majority of cassava farmers have access to credit facilities through the cooperative society to which they belong, to enhance their production and boost their productivity in the area. The result further shows that reasonable proportion (78.89%) of the farmers received 1-2 extension visits per month. The mean number of visits per twenty working days (21) was 2.0 times. The finding implies since farmers in the study area are poorly visited by extension agents to ascertain their farming problems, know where they need assistance and pass across to them any new/improved agricultural practices to enhance their relative efficiency, this situation could pose a negative effect on their relative efficiency and cassava production in the area. The study of Chukwu et al., argued that extension contact enhance farmer's production and promote their knowledge on modern farming methods [19]. The mean annual farm income was ₦650,000.00 ($1,203.65) while the monthly farm income was estimated to be ₦500,500.00 (130.89USD). The finding implies that the farmers have a relatively high farm income which is above the monthly national minimum wage in the area. The finding implies that farmers have a relatively high monthly farm income. The studies of Olaoye et al., asserted that farmers with higher farm income will perform better than those with low farm income since fish production requires reasonable among of fund [20].

Costs, Return and Profitability of Cassava Production (Naira)

The result of the farmer's distribution based on costs and return of cassava production is compiled in Table 2. The result revealed that greater proportion (90.76%) of the cost was recorded in the total variable cost. About 58.41% of the variable cost was from cassava stem cuttings, approximately 12.31% of the variable cost was recorded in fertilizer input while about 6.21% of the variable cost was recorded in miscellaneous expenses. In a similar way, about 2.46%, each of the total variable cost was utilized in land preparation, planting operation, weeding operation, harvesting operation, and fertilizer application while 1.53% was spent on transportation. Moreover, several studies on cassava production in Nigeria have confirmed that the cost of labour input is the most important of all cost components incurred in cassava production [21-24]. The contribution of the fixed cost was relatively low compared to the variable costs incurred in production. The fixed cost contributed approximately 9.19% of the cost involved in cassava production in the area. The study of Ikuemonisan and Akinbola; Kolapo et al., also confirmed that fixed cost the least cost incurred in cassava production in Nigeria [25, 26]. The return on capital (ROC) invested was found to be N3.64. It could be inferred that for every naira invested, there is 3.64kobo returns for cassava production in the area. The result also revealed that the total revenue (TR), gross margin (GM) and net farm income (NFI) were N369, 730.00, N295, 980.00 and N288, 503.33 respectively. The finding also shows that net return on investment (NROI) (profitability index) was N3.55, which implies that cassava production is a profitable enterprise and would yield more output/income when invested in a larger scale and efficiently managed in the area. This also implies that for every naira earned as revenue from the cassava production enterprise, 3.55kobo returned to farmer as net farm income. The result obtained implies that cassava production is profitable, hence confirmed the evidence of the finding of Ameh et al.,; Angba and Iton who revealed that cassava production is profitable and that farmers would realize good yield as well as income after sales when efficiently and effectively managed [27, 28]. The finding also suggests that cassava production is a profitable and lucrative venture. These figure could yield more income if production scale is enhanced in the area and maybe beyond. The implication of the findings is that when efficiently, effectively, carefully and heavily invested and managed cassava production is capable of producing good output/yield as well as reasonable

net return over time to any agribusiness entrepreneur. However, poor relative efficiency of farmers has also been identified as one of the factors militating against cassava production in Nigeria [1].

Table 2: Estimated Costs, Return and Profitability Analysis of Cassava Production/Naira

Items	Average Cost (N)	Quantity	Unit	Total Value (PxQ) (N)	Percentage (%)
A. Revenue					
Cassava tuber	12,200.00	25.1	Tones	306,220.00	
Cassava stem	730.00	87.0	Bundles	63,510.00	
Total Revenue	---		---	369,730.00	
B. Variable Cost					
Cassava stem cutting	730	65.0	Bundles	47,450.00	58.41
Land preparation	1,000.00	2.0	Man hour	2,000.00	2.46
Fertilizer	5,000.00	2.0	Bag	10,000.00	12.31
Transportation	**250.00**	**5.0**	Km	1,250.00	1.53
Planting operation	**1,000.00**	**2.0**	Man hour	2,000.00	2.46
Fertilizer application	1,000.00	2.0	Man hour	2,000.00	2.46
Weeding operation	1,000.00	2.0	Man hour	2,000.00	2.46
Harvesting operation	1,000.00	2.0	man hour	2,000.00	2.46
Miscellaneous cost	5,050.00	---	---	5,050.00	6.21
Total Variable Cost				73,750.00	
C. Fixed Costs					
Depreciation Equi ments (machetes, hoes, wheelbar-row)	5,275.67	---	---	5,275.67	6.49
Depreciation on Land	1,550.00	1.42	Ha	2,201.00	2.70
B. Total Fixed Cost				7,476.67	
D. Total Cost (TFC+TVC)				81,226.67	100.00
Net farm income [A-(B+C)]	**288,503.33**	----	----	288,503.33	
Gross Margin	295,980.00				
Return on Capital Invested	3.64				
Net Return on Investment	3.55				
Source: Field Survey Data, 2022; **Depreciation on equipment was calculated using the Straight Line Depreciation Method (SLDM)**					

Constraints in Cassava Production

The results of the cassava farmers distributions based on the constraints of cassava production efficiencies is displayed in Figure 1. The results show that about 98.89% of the farmers complained of inadequate production capital. This could be attributed to high cost of inputs used in production. Inadequate fund hinders farmers from getting the necessary resources and technologies which assist them to produce efficiently and remain in production [1].

This constraint makes most of the farmers unable to be fully relatively efficient and attain large scale production. Moreover, due to the high cost of inputs and inadequate production capital achieving economics of scale by the cassava farmers in the study area becomes completely impossible. The study of Olanrewaju et al., reported similar findings in constraints of cassava farmer's production efficiency [24].
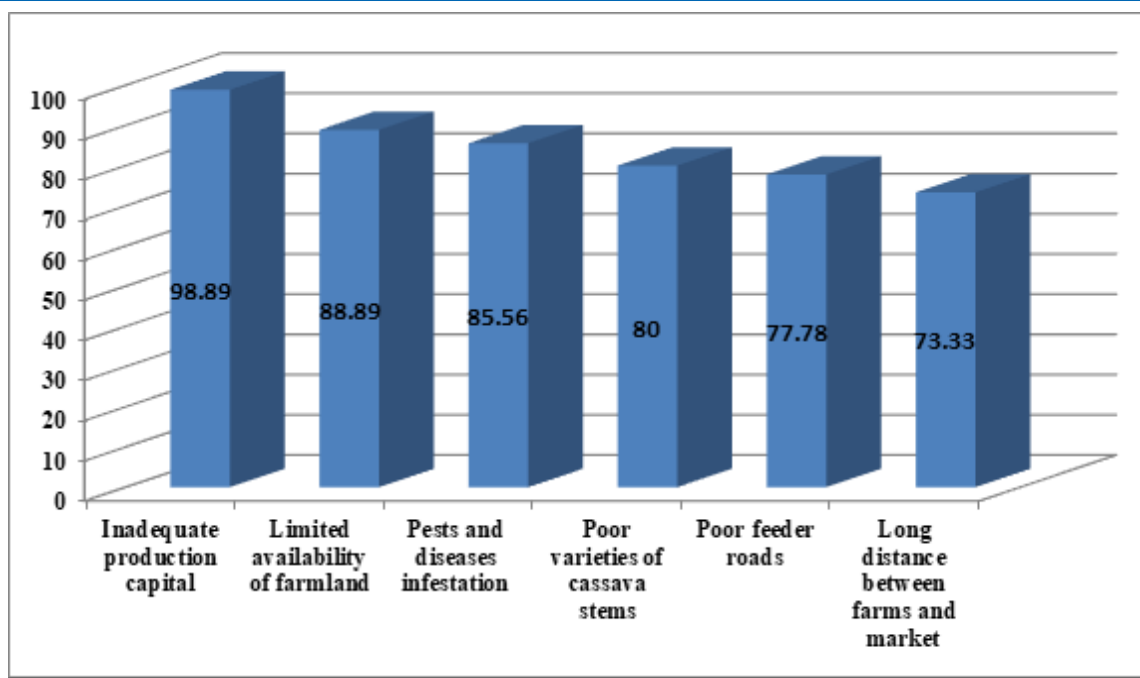
Approximately, 88.89% identified limited availability of farm land. This could be attributed to land tenure system predominant in the area or due to the increasing population. The study of Esiobu reported that large farm size increases agricultural production and improves farmer's relative efficiencies [1]. This implication of the findings is that farmers might have several cassava production methods to practice in the study area but limited farm size would continue to compel them to intensively farm on a small plot of land hence decreasing efficiencies of resource use. Moreover, about 85.56% and 80.00% complained of incidence of pests and diseases infestation and poor varieties of cassava stem cutting respectively. The incidence of pests and diseases infestation could be attributed to poor and adulterated pesticides and plant disease control agro-chemicals available in market area. It could also be attributed to poor breed of cassava stems which are not resistant to pests and diseases. Furthermore, poor feeder roads and long distance between farms and market were identified by about 77.78% and 73.33% of the farmers respectively. Poor feeder roads left most of the farmers unable to get the needed productive inputs to the farm on time while long distance between farms and market makes most of the farmers to resort to farm gate sales after harvest thereby losing greater proportion of their produce to exploitative and dubious middlemen in the area. Often times, farmers are compelled if not forced to sell their produce at a very low price to avoid huge wastage or total loss and this reduces their production efficiency. Ultimately, there is no doubt that these constraints are responsible for poor cassava production the study area. Fighting these problems will be vital in promoting commercial cassava production in the area and beyond.

Conclusion and Recommendation

Cassava production is significant to Nigeria's economy in terms of provision of income, employment, foreign exchange earnings and bridging pervasive food insecurity. Conclusively, result shows that 25.10 tons of cassava were produced from 1.42ha of farmland. Positive net farm return and return per capita invested were ₦288,503.33 ($693.82) and ₦3.64 ($0.0088) respectively.

This is an indication that for every naira earned as revenue from the cassava production enterprise, 3.55 kobo returned to farmer as net farm income. Result shows evidence of profitability of cassava production and has been a useful source of livelihood for farmers in the area. Findings provided evidence that cassava production is efficient and lucrative in the area. Regrettably, farmers identified inadequate production capital and limited availability of farmland as the constraint that negatively affects their production capacity [29-139].

Recommendation

i. It was therefore recommended that farmers particularly on their own should judiciously pool productive resources together through strengthened and stable cooperative society group as this would enhance their profitability in cassava production positively in the area.

ii. Moreover, effective agricultural policies and programmes should focus on granting genuine cassava farmers improved access to farmland and farm credit as these would enable them increase their production and realize huge profit positively in the area.

iii. It is also important the government at all level should identify genuine fish farmers and provide them with productive input as this would reduce the high cost of cassava productive input in the area.

iv. Effective cassava policies should be directed to the establishment of cassava processing mill, provision of credit facilities, and provision of adequate infrastructural facilities and intensification of extension services.

v. Government should provide good feeder roads so that this cassava produce can be transported easily and cheaply into areas where they are not produced.

vi. Farmer's socio-economic characteristic was found to be one of the factors of profitability. Therefore, farmers education level, access to extension services and credit should be improved drastically by the farmers themselves and the stakeholders

vii. Agencies of government and other non-governmental organization (NGOs) and International organizations concerned with

agricultural development should make efforts to improve on the supply and availability of improved agro-chemical, improved cassava stem and improved fertilizer to enhance greater usage by farmers.

Acknowledgement

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