APPRAISAL OF THE INVESTMENT VIABILITY OF SESAME ENTERPRISE AMONG SMALLHOLDER FARMERS IN BENUE STATE, NIGERIA

Essien, J., Biam, C. K. and Asogwa, B. C.
Department of Agricultural Economics, University of Agriculture, Makurdi,
Benue State, Nigeria
Corresponding Author's E-mail: jennyessien8@gmail.com **Tel.:** +2348134709585

ABSTRACT
The study appraised the investment viability of sesame production among smallholder farmers in Benue State, Nigeria. A multistage sampling technique was used to collect data from 264 sesame farmers. Benefit cost ratio (budgetary technique) was used to appraise the viability made in sesame production in 2015, 2016 and 2017 production season and ordered logistic regression model was employed to determine the factors influencing the level of investment. The level of investment was categorized into three levels as: high investment (>₦60,000), moderate investment (₦31,000- ₦60,000) and low investment (₦1,000- ₦30,000). The analysis of benefit cost ratio revealed that the viability of sesame in 2015, 2016 and 2017 production season stood at 0.66 with a viability interval of 34%. The analysis of the ordered logistic regression showed that access to credit, male gender, married farmers, market information, membership of cooperatives, farmer's age, household size, level of education and years of farming experience were positive and significant factors that influenced level of investment in sesame production. The study concluded that sesame production is profitable, thus a viable enterprise in the study area. It recommended that government should facilitate the availability of credit to sesame farmers at low interest rate as this would reduce the constraint of inadequate fund impeding smallholder farmers and thus, enhance high level of investment in sesame production.

Keywords: Appraisal, Investment, Sesame, Smallholder farmers, Viability.

INTRODUCTION

Sesame (*Sesamum indicum*), a tall annual herbaceous plant, belongs to the plant family Pedaliaceae, commonly called beniseed in Nigeria. It is an important oilseed crop believed to have originated from tropical Africa, where there is the greatest genetic diversity (Tiamiyu *et al*., 2013). The name sesame is used in literature worldwide. It is also known as "*simsim*" in East Africa, *Till* in India and *Gingely* in Sri-Lanka. The Hausa, Ibo, Yoruba and Tiv speaking tribes of Nigeria call it *Ridi, Isasa, Ekuku*, and *Ishwa*, respectively. Other tribes in Nigeria also have names for it. The original area of domestication of sesame is obscure but it seems likely to have first been brought into cultivation in Asia or India (Abu *et al*., 2012).

Sesame is an important crop to Nigerian agriculture. It is quite extensively cultivated, with a short harvest cycle of 90 -140 days and a pH range of 5.5 to 8.0. It yields in relatively poor climatic condition and is an important component of Nigeria's exports. It has over 15% margins in terms of value added compared to other cash crops, such as sheanut and palm kernel (Ikwuakam *et al*., 2016).

Sesame was first cultivated in the Middle Belt Zone of Nigeria in the late 1940s by the West Africa Oilseeds Mission mandate to investigate the possibility of the production of groundnut and other oilseeds. It later spread out to other parts of the country. The major producing areas in Nigeria are Nasarawa, Jigawa and Benue States. Other important areas of

production are found in Yobe, Kano, Katsina, Gombe and Plateau States. Both brown and white types of sesame are cultivated by smallholder farmers in Nigeria (Tiamiyu *et al*., 2013).

An available record shows that Nigeria exported 140,800 tons of sesame seed worth $1.39 million in 2010. It was also recorded that Nigeria earned ₦210 billion from the export of sesame products in the first half of 2012 (Tukura and Ashindo, 2019). The wide range of sesame seed markets is a great opportunity to earn foreign exchange for the country if its production potentials are exploited. The realization of the potential of sesame production in the acquisition of foreign currency for the country made increased production of the crop a prominent priority in the Agricultural Transformation Agenda of the Federal Government of Nigeria. To this end, farmers are being encouraged to produce sesame in all agro- ecological Zones of the country so as to meet the international demand for the commodity (Adole, 2012).

Investment in agriculture has been a major concern of the government of Nigeria and stakeholders at large, especially at this period of economic recession, increase in food prices, poverty and food insecurity (Okoruwa, 2014). Sesame is quite extensively cultivated in Benue State but there seems to be no known studies that have appraised the investment viability made in sesame production in the State. The study therefore seek to appraise the investment viability made in sesame production in Benue State in 2015, 2016 and 2017 production season and thus determine the factors that could enhance high level of investment in sesame production in the Study area. The broad objective of the study was to appraise the investment viability of sesame production in Benue State while the specific objectives were to: appraise the viability of sesame production and determine factors influencing the level of investment in sesame production in Benue State.

MATERIALS AND METHODS
The Study Area
The study was carried out in Benue State, Nigeria. The State lies within the lower Benue trough in the middle belt region of Nigeria with its capital in Makurdi. Its geographical coordinates are Longitudes 7º47′ and 10º 0′ East and Latitudes 6° 25′ and 8° 8′ North. It has a population of 4,253,641 and an average population density of 99 person per km² (NPC, 2006), which makes Benue State the 9th most populous State in Nigeria. It occupies a landmass of 34,059 square kilometers. The State is inhabited predominantly by the Tiv and Idoma people. Other ethnic groups include Igede, Etulo, Abakwa, Jukun, Hausa, Akweya and Nyifon. The State is made up of 23 Local Government Areas (LGAs) and classified into three agricultural zones: A, B and C. The data for this research were collected from primary sources using a well-structured questionnaire administered to selected farmers in the sampled Local Government Areas of Benue State, with the assistance of extension workers from Benue State Agricultural and Rural Development Authority (BNARDA).

Sampling Techniques
A multistage sampling technique was used to select 264 respondents. The study adopted the stratification of the State into three (3) agricultural Zones (A, B and C) by BNARDA. In the first stage, two (2) Local Government Areas from each Zone were purposively selected based on the high concentration of sesame producers. In the second stage, two sesame producing communities were purposively selected from each of the LGAs. In the third stage, using proportional allocation of 20% (0.2) across board, a total sample size of 264 respondents was obtained from the sampling frame obtained from BNARDA (2012).

Table 1: Sample Size Selection Plan

Zones	LGA	Community	Sampling frame	Sample size (20%)
A	Logo	Ayilamo	130	26
		Ugba	120	24
	Ukum	Kyado	80	16
		Ayati	100	20
B	Guma	Gbajimba	125	25
		Daudu	95	19
	Gwer- east	Taraku	120	24
		Ikpayongo	110	22
C	Obi	Ito	115	23
		Adum East	100	20
	Ohimini	Ochobo	90	18
		Idekpa	135	27
Total			**1320**	**264**

The data collected for the study was analyzed using both benefits cost ratio (budgetary technique) and ordered logistic regression model. The Benefit Cost Ratio (Budgetary Analysis) model was used to determine the viability of sesame production in the study area. A project with a BCR greater than 1 is a profitable project. The model is expressed as follows:

$$\frac{\sum_{t=1}^{n}\frac{Bt-Ct}{(1+\dot{\imath})t}}{\sum_{t=1}^{n}\frac{Ct}{(1+\dot{\imath})t}} \qquad \dots(1)$$

where;
Bt = benefits in each year
Ct = costs in each year
t (time) = 1,2,3,..,n
n = number of years
ɨ = interest (discount) rate

The ordered logit regression model was used to determine the factors influencing the level of investment in sesame production in Benue State. The ordered logit regression model is implicitly expressed as:

$$Y (\leq j) = \ln \frac{P(Y \leq j / X)}{P(Y \geq j / X)} \qquad \dots (2)$$

It then means that;

$$Pr (Y \leq j) = \ln \left[\frac{\sum Pr (Y \leq j / X)}{1 - \sum Pr (Y \leq j / X)} \right] \qquad \dots (3)$$

j = 1, 2, 3

The model is explicitly expressed as:

$$\text{Log } Y = \alpha_j + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots.. + \beta_9 X_9 + e \qquad \ldots(4)$$

where;
Y = level of investment in sesame production, which is categorized into (above ₦60,000 invested) high level of investment, (₦31,000 – ₦60,000 invested) moderate level of investment and (₦1.00 – ₦30,000 invested) low level of investment.
α = threshold
$\beta_1 - \beta_9$ estimated parameters
X_1 = Sex (Male = 1, Female = 0)
X_2 = Age (years)
X_3 = Marital status (Married = 1, Single = 2, Divorced = 3, Widowed = 4)
X_4 = Household size (Number)
X_5 = Level of education (years)
X_6 = Farming experience (years)
X_7 = Access to credit (Yes = 1, No = 0)
X_8 = Market information (Yes =1, No = 0)
X_9 = Membership of cooperatives (Yes = 1, No = 0)
E = error term

RESULTS AND DISCUSSION
Factors Influencing the Level of Investment in Sesame Production in Benue State

The results of the estimates from the ordered logit regression model for factors influencing the level of investment in sesame production are presented in Table 2. From Table 2, the level of investment was categorized into three namely: high, moderate and low of investment, coded as I, 2 and 3, respectively. The pseudo R^2 of 0.560 indicates that 56% variation in the dependent variable is explained by the explanatory variables included in the model. The results show that male gender, marriage, access to credit, access to market information, membership of farmer's cooperatives, age, household size, education and farming experience were positive and significant factors that influenced level of investment in sesame production. From the findings male gender was significant at 5% level. This implied that sesame farming is male dominated. The findings could be attributed to the exclusive right of male children to inherit family land than their female counterpart and the tedious nature of sesame farming. Thus, the more the accesses to farm land by male farmers, the more the investment.

Marriage influenced level of investment positively by 1%. The fact could be that farmers who are married provide family labour needed to carry out tedious and time consuming operations on the farm. Access to credit influenced level of investment by 10%. The result was in agreement with the findings of Adole (2012), who found that access to credit enhanced the level of investment in sesame production, since capital is needed for the purchase of inputs used for production. Findings from the analysis revealed that access to market information influenced level of investment by 10%. This implied that, the more the information on the market situations obtained by farmers in sesame production, the more their level of investment.

The results revealed that membership of farmers cooperatives positively influence level of investment by 1%. The findings could be attributed to fact that sesame farmers through the formation of cooperatives could easily access loan and other farm inputs from the government. The result shows that age of farmer influenced sesame level of investment by 10%. This implied that aged farmers acquired more level of experience over the years that when applied

enhanced level o investment. The result is in agreement with the findings Abu *et al*. (2012), who found that the more the advance in age of farmers, the more the farming experience, the more their level of investment.

Table 2: Factors the Influenced the Level of Investment in Sesame Production

Variables	Marginal Effect of Dependent Category		
	High Investment	**Moderate Investment**	**Low Investment**
Sex			
Female	0.2916702 (1.32)	0.4724185 (1.42)	0.2359112 (2.39)**
Male	0.3835304 (2.43)**	0.4467935 (1.35)	0.1696762 (1.03)
Marital Status			
Married	0.9099997 (2.54)***	0.4697886 (1.05)	0.3081847 (0.65)
Single	0.2220267 (1.26)	0.4728429 (2.05)**	0.2390115 (1.29)
Divorced	0.1485803 (1.04)	0.4299479 (1.39)	0.4214718 (2.58)***
Widowed/ Widower	0.2881456 (0.43)	$2.4×10^{-7}$ (0.22)	$3.63×10^{-8}$ (0.11)
Access to Credit			
None Access	0.4670794 (1.39)	0.8209621 (1.25)	0.2602799 (1.02)
Access	0.4743029 (1.98)*	0.654192 (0,51)	0.2119585 (1.35)
Access to Market Information			
None Access	0.2253128 (0.59)	0.4705246 (0.11)	0.3041535 (2.56)***
Access	0.4826901 (1.99)*	0.397396 (0.87)	0.1199136 (1.13)
Membership of Cooperatives			
None Member	0.4570674 (1.35)	0.3558557 (1.45)	0.3870761 (2.05)**
Member	0.4603815 (13.61)***	0.1940337 (0.65)	0.3455848 (1.07)
Age	0.2962997 (1.96)*	0.4743919 (1.25)	0.22996201 (0.55)
Household Size	0.2962068 (8.25)***	0.4738168 (1.32)	0.2356656 (0.58)
Education	0.2970971 (1.70)*	0.4745083 (0.87)	0.2292868 (1.03)
Farming Experience	0.4741523 (10.57)***	0.2952125 (1.28)	0.230889 (0.59)
Number of Observation	264		
LR Chi^2 (11)	20.22		
Prob > Chi^2	0.000		
Pseudo R^2	0.560		
Log Likelihood	-271.08		

Note:*, **and ***denote z-test significant at 10%, 5% and 1% level, respectively. Values in parenthesis represent z-statistics
Source: Field Survey, 2017

The results also show that household size and farming experience were positive and significant at 1%, while formal form of education was positive and significant at 10%. The influenced of education on the level of investment could be attributed to the fact education plays a major role in the easy adoption of new innovation which can influence yield and productivity (Nyiatagher and Ocholi (2015).

Viability of Sesame Production
The result of the benefit cost ratio for the viability of sesame production in 2015, 2016 and 2017 production season (Table 3) revealed that average net present value per hectare of sesame production in 2015, 2016 and 2017 production season stood at ₦65491.6692 with minimum of ₦–51850.00 and maximum of ₦156705.00. The negative net present value

obtained by some farmers implies that some sesame farmers are inefficient in their input combination and cost minimization. However, the positive average net present value indicates that sesame production in the study area is viable and profitable. The analysis also revealed that average cost- benefit ratio stood at 0.66 with 0.64 being most frequent. This implies that on the average, the discounted cost is about 64% of the total discounted benefit, which indicates that sesame farming in the study area is a viable project with an average viability interval or profitability of 0.34 or 34% over the discounted investment. Hence, a cost of 66% invested in sesame production in the study area would yield a benefit of 100%. The result agrees with the finding of Abu *et al.* (2011) who found that sesame production is a profitable enterprise. Fertile soil available in the study area as well as long years of farming experience of farmers is likely to be the contributing factors.

Table 3: Estimates of Viability of Sesame Production in 2015, 2016 and 2017 (n = 264)

Estimators	Total Present Value of Loans	Total Present Value of Costs	Total Present Value of Loan and Costs	Total Present Value of Benefits
Mean	50241.6061	109610.2281	128522.4677	194014.1369
Median	48630.0000	110800.0000	120500.0000	188100.0000
Mode	25200.00	85000.00	85000.00	169000.00
Std. Deviation	25100.89469	17259.98587	36507.44404	40578.76852
Minimum	19380.00	64000.00	64000.00	121700.00
Maximum	100510.00	152000.00	231370.00	370250.00
	Net Present Value	**Cost Benefit Ratios**		
Mean	65491.6692	0.66		
Median	66500.0000	0.64		
Mode	62500.00	0.40		
Std. Deviation	26978.23217	0.13		
Minimum	-51850.00	0.40		
Maximum	156705.00	1.43		

Source: Field Survey, 2017

CONCLUSION AND RECOMMENDATION

The study appraised the investment made in sesame production in Benue State. It was concluded that sesame production is profitable, hence, a viable enterprise that could serve as an investment opportunity for individual investors and corporate organizations who are willing to key into the agricultural sector of the economy. The profits from sesame enterprise translate to increased household size and consumption, increased aggregate demand and bring about sustainable development. It was recommended that Government should facilitate the availability of credit to sesame farmers through promotion of credit cooperative, as this will reduce the constraint of inadequate funds to majority of the sesame farmers in the study area.

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