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PROFITABILITY ANALYSIS AND MANAGEMENT PRACTICES OF *MASAKWA* FARMERS IN YOLA LOCAL GOVERNMENT AREA OF ADAMAWA STATE, NIGERIA

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ABSTRACT

This study examined the profitability and management practices of *masakwa* farmers in Yola Local Government Area of Adamawa State, Nigeria. Data were collected from 114 randomly selected farmers from two villages in the local government area, with the aid of a structured questionnaire. The data's analytical tools include descriptive statistics and budgeting techniques. The result shows that 65% of the respondents are in their productive ages of 31-50 years. About 79% of the farmers cultivated less than 3ha of land, with a gross margin per hectare of N15, 075.14, a gross margin per naira invested of N2.35, and net farm income/ha of N14, 575.47. The study revealed that labour, organic matter and herbicide resources were over utilized, while seed usage was under utilized. This implies that the sustainability of Masakwa production largely depends on increase usage of seeds and reduction of the use of other resources. The major problems identified were low flooding from the River Benue, pests and diseases infestations, unattractive prices, grazers/cattle rearers and high transport fares. The study concluded by recommending improved cultural practices, availability of agro-chemicals to farmers and control of grazers on farms.

KEYWORDS: Profitability analysis, management practices, *Masakwa* farmers

INTRODUCTION

Sorghum or Guinea Corn (*Sorghum bicolar* L. Moench) is a staple food crop in northern Nigeria (Aba, 1997) and the in far South of Oyo and Ibadan. However, its production is concentrated in the Sudano-Guinea zone of the West Africa, semi-arid tropics. It is grown in all the countries stretching from Atlantic Ocean in the west to Chad and Central African Republic in the east. It is very important to the caloric food production of Burkina Faso, Chad, Gambia, Mali, Nigeria, Niger; and Senegal (Shetty and Fussell. 1992). In northern Nigeria millet and maize progressively replaces sorghum where the annual rainfall is less than 750mm (Mirchallum, 1996; Jongur, 2006)

Masakwa is a type of sorghum usually planted under residual moisture during the dry season, and practiced by the farmers in the north east zone of Nigeria, especially in Bama, Monguno and Ngala local government areas of Borno State and Yola and Fufore local government areas of Adamawa State (Curtis, 1966; Jongur, 2006) Nigeria with a total population of more than 140 million and growing at the rate of about 3% annually needs to sustainably increase food production in line with the population growth rate (Abalu, 1978; Aba, 1997; CBN, 2004).

The agricultural policy objectives of the Nigerian government under Obasanjo's regime (1999-2007) gave cognisance to the importance of agriculture in the area of food supply, foreign exchange earnings, employment generation and general economic development (Eugene, 2007). After successive administrations, the small scale Nigerian farmers' are yet to understand the direction of the government, let alone feel the impact of its agricultural policy. Some studies reveal that in the United States of America, a small farmer produces enough food for more than one thousand non-farmers with some surplus to export where as the reverse is the case in Nigeria (Sajo, 2005).

Generally, *masakwa* is grown as a sole crop in most *Masakwa* growing areas of Adamawa State Studies have shown that some *masakwa* farmers do cultivate other crops (e.g rice, maize and vegetables) on the bank of river Benue (Jongur, 2006) However, mixed cropping is known to be more profitable than sole cropping and consistent with farmers' food security objectives (Njoku, 1988). Therefore, efforts must be made by the government or its agencies to improve agricultural production in Nigeria through the intensification of improved *masakwa* cultivation. The study therefore examines the profitability and management practices of *masakwa* farmers in Yola local government area of Adamawa State Nigeria, with a view to improving the technical and economic efficiencies of production.

METHODOLOGY

Study Area

The study was conducted in Yola local government area of Adamawa State. The state has a total land area of about 38,741sq.km and is situated within the north east of Nigeria between latitude 7^0 and 10^0N and between longitude 11^0 and 14^0E (Uyanga, 1993; Adebayo and Nwagboso, 2005). Yola lies within the Benue valley and has an altitude of 185m above sea level. with an estimated population of 392,856 (NPC, 2006). Yola falls within the tropical climate with distinct wet and dry seasons. The dry season lasts for six months (November to April), while the wet season begins from May and ends in October The mean annual rainfall is 900mm (Jongur and Obidi, 2007). The state has an international boundary with the Cameroon Republic along the eastern side and shares common borders with Taraba State in the south and west, Gombe State in the North-west, and Borno State to the north

Sampling and Analytical Techniques

Primary data were collected with the aid of a structured questionnaire. The field survey was done in Yola local government area of Adamawa State The Area was purposively selected on the basis of being one of the prominent *Masakwa* producing areas in the State The sample size for the study was 114, selected randomly from a population frame of 1,180 farm families to give a sampling percentage of 9.66% The analytical tools employed for the study were descriptive statistics and farm budget techniques.

Descriptive Statistics

Descriptive statistics (i.e use of the measures of central tendency such as means, frequency distribution, percentage and ratios) were employed. Measures of dispersion (i.e variance and standard deviation) were also used. These tools were used to describe socio economic variables like age, farm size, education, household and farming experience (Jongur and Obidi, 2007).

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Farm Budgeting Technique

The net farm income was used to determine the profitability of Masakwa production as used by Jongur (2006) as follows:-

1. Net farm income (NFI) = Gross margin (GM) - Depreciation of fixed inputs.
2. Gross margin (GM) is the difference between the gross farm income (GI) and the total variable cost (TVC) (Olukosi and Erhabor, 1988; Jongur, 2006).

GM = GI-TVC.

RESULTS AND DISCUSSION

Socio-economic characteristics

Age distribution of respondents: The average age of the farmers was 46 years and majority of them were in their productive years of 31-50 (Table 1). The inference drawn from the study is that Masakwa production is in the hands of middle aged brackets as nearly 64.92% of the sampled population.

Table 1: Socio-Economic Characteristics of Respondents

Variables	No. of Farmers	Percentage	Cummulative %
Age Group (Years)			
20-30	2	1.75	1.75
31-40	28	24.56	26.31
41-50	46	40.36	66.67
51-60	24	21.05	87.72
61 and above	14	12.28	100
Total	114	100	
Farm Size (ha)			
Under 1	32	28.07	28.07
1.1-2.0	28	24.56	52.63
2.1-3.0	30	26.32	78.95
3.1-4.0	10	8.77	87.72
4.1-5.0	8	7.02	94.74
5.1 and above	6	5.26	100
Total	114	100	
Level of Education			
No Formal education	4	3.51	3.51
Koranic/Bible Education	24	21.05	24.56
Primary School	20	17.54	42.10
Secondary School	34	29.83	71.93
Tertiary	32	28.07	100
Total	114	100	
Household Size			
1-5	26	22.81	22.81
6-10	36	31.58	54.39
11-15	28	24.56	78.95
16 and above	24	21.05	100
Total	114	100	

Source: Survey Data,2006/2007

Table 2: Socio-Economic Characteristics of Respondents

Farming Experience (Years)			
1-10	6	5.26	5.26
11-20	52	45.62	50.88
21-30	32	28.07	78.95
31-40	6	5.26	84 21
41 and above	18	15.79	100
Total	114	100	
Sex			
Male	98	85.96	85.96
Female	16	14.04	100
Total	114	100.00	
Major Occupations			
Employed	32	28.97	28 07
Self-employed	76	66.67	94.74
Unemployed	4	3.51	98.25
Going to School	2	1.75	100
Total	114	100	
Land Tenure *			
Inheritance	38	31.15	31 15
Purchase	10	8.20	39.35
Leased	48	39.34	78.69
Borrowed	26	21.31	100
Total	122	100	

* Multiple Responses

Source: Survey Data ,2006/2007

Table 3 Input-output level for Masakwa

Variables	Maximum	Minimum	Mean/Farm/ha
Land (ha)	32	0.5	2.7
Seeds (kg/ha)	200	3.3	7.58
Family Labour (Man hrs/ha)	2263.46	59.16	64.46
Hired labour (man-hrs/ha)	1065.16	27.84	30.34
Total labour(man hour/hectare)	3328.62	87	94.8
Organic manure (kg/ha)	73.18	1.34	6.82
Herbicide (litres/ha)	27.53	0.0	1.02
Total fixed cost (N/ha)	900	200	600
Depreciation (on hoes, rakes, cutlasses)			
Yield (kg/ha)	30,100	555	976.56

Source: Survey Data, 2006/2007

Table 4 Average Costs and Returns to *Masakwa* Production

Variables	Unit Price (N)	Unit/ha	Value (N/ha)
Yield (kg)	22	976.56	21484.32
Seed (kg) (s)	25	6.5	162.50
Labour (man-hrs) (L)	50	95	4,750.0
Organic manure (kg) M	0.70	5.5	3.85
Herbicides (litres) H	850	1.05	892.50
Other Costs (N) O			600

Total variable costs (TVC) = S+L+M+H+O

= 162.50 + 4,750 + 3.85 + 892.50 + 600 = 6408.85

Gross Margin (GM) = Gross returns (GR) -TVC

= 21484.32-6408.85 = 15075.47

Fixed Costs = (N) Total Depreciation (on hoes, axes, rake) = 500.00

Gross margin per naira invested = $\frac{GM}{TVC} = \frac{N15075.47}{6,408.85} = 2.35$

Net farm income (NFI) = Total Gross Margin-Fixed cost (FC)

= 15075.47-500 = 14,575.47

Net farm income per naira invested = $\frac{NFI}{TVC+FC} = \frac{N14575.47}{6408.85+500} = \frac{14,575.47}{6908.85} = 2.11$

Note: Man-hrs/day = N50 x 8 = N400/day used in computation

Source: Survey Data, 2006/07

Table 5 Estimated *Cobb-Douglas* function for *Masakwa* production

Variables	Coefficient	T- Values
Constant	12.209*	2.97
Farm Size (X_1)	3.388*	2.80
Seed (X_2)	1.7512*	4.96
Labour (X_3)	0.05414	0.65
Organic Manure ($_4$)	-0.025	-0.01
Herbicides (X_5)	0.2323**	2.65
F – Value	36.12	
R^2	0.71	
R^2 (adj)	0.73	

Where * = 1 percent level of significance

** = 5 percent level of significance.

Source: Survey Data, 2006/2007.

Table 6: Elasticities of production

Variables	Elasticities
Land (b_1)	0.34
Seed (b_2)	0.18
Labour (b_3)	0.05
Organic Manure (b_4)	-0.03
Herbicides (b_5)	0.23
$\sum (b_i)$ = Total	0.77

Source: Survey Data, 2006/2007.

Table 7: Determination of Resource use efficiency of *Masakwa* production.

Variables	Estimated MVP	Estimated MFC	MVP / MFC ratio
Seeds (kg)	232.31	22	10.56
Labour (man-hrs)	0.65	300	0.002
Organic Manure (kg)	-4.25	0.40	-10.63
Herbicides (litres)	246.84	900	0.27

Source: Survey Data, 2006/2007.

Table 8 problems to *Masakwa* Production

Problems	No of Respondents *	% of Respondents	Rank
Low flooding from River Benue	68	25.37	1st
Pest and diseases infestation	54	20.15	2nd
Unattractive Prices	52	19.40	3rd
Grazers rearers	42	15.67	4th
Bulk purchase by middlemen	24	8.96	5th
Lack of Capital/Credit	16	5.97	6th
Inadequate supply of agrochemicals	8	2.99	7th
Lack of good road network (high transport fares)	4	1.49	8th
Total	268	100.00	

* Multiple responses.
Source: Survey Data, 2006/07

Farm Size: The size of holdings among *masakwa* farmers ranged from less than 1 to 6 hectares. Majority (53%) of the farmers have farm sizes of upto 2 hectares.

Level of education: In this study about 3.51 percent of the respondents had no formal education, while majority of them (72%) were found to be literate. Adoption of improved technologies would therefore be enhanced with little effort of the extension agents (Table 1).

Household Size: Majority of the *masakwa* household (56% percent) had less than 15 people, and the mean household size was 13. These household members contributed labour during farm operations in the study area (Table 1).

Farming Experience: About 51 percent of the *masakwa* farmers had 20 years farming experience. This implies that farmers are capable of making rational decisions and are able to manage risks regarding their *masakwa* production (Jongur, 2006). About 16 percent may find it difficult to change to new practice (Table 1).

Sex: The study shows that 85.96 percent of the respondents were male and only 14.04% were female farmers. These means that masakwa production is dominated by men (Table 1).

Major occupation: About 67 percent of the farmers were self employed and about 28 percent were employed civil servants, etc (Table 1)

Land Tenure: About 38 percent of the farmers acquired their land through inheritance and 48 percent through leasing. Farmers might acquire some farms apart from their leasing inherited lands (Tables 1).

Input-output levels of *Masakwa*

Farm size was estimated by physical measurement of farms. A total of 312.5ha of land was used by the *Masakwa* farmers in Yola, and on per farmer basis an average of 2.7ha was used for *Masakwa* production in 2006/2007 cropping. This may indicate scarcity of the flooded plains due to the construction of *Laddo* dam on the river benue bank by the Republic of Cameroon. The maximum and average yields were 30,100kg/ha and 976.55kg/ha respectively. The average seed (7.58kg), labour (94.80 man hours), organic manure (6.82kg) and herbicides 1.02 litres) were used (Table 3).

***Masakwa* Yield**

The total *masakwa* yield obtained in 2006/07 season was 114, 257.52kg in Yola LGA, giving an average yield of 976.56kg/ha. This yield is higher than the rainfed sorghum which yield an average of 570kg/ha (Tabo, *et al*, 1999), and 830kg/ha (Bage, 2004). Therefore, *Masakwa* yield more than rainfall sorghum and is often used as a food security crop to the people of Yola.

Costs and Returns Analysis

Gross returns:-The gross return was obtained by multiplying the total quantity of *masakwa* produced by the market price that prevailed in 2007. Table 4 shows the average yield/ha as 976.56kg and the price was N22/kg (N35/1.6kg *mudu*). The gross returns/ha obtained from *Masakwa* production was N21, 484.32.

Cost of Production: The cost of production in *Masakwa* includes the fixed costs (hoes, rake and cutlasses) and the variable costs components e.g. costs of inputs such as seeds, labour, herbicides, transportation, marketing costs and other costs. The value of land was not computed as most of farm lands are communal land on which minimal or no rent is paid. Herbicides were used to clear the most notorious weed found on masakwa farms such as *Mbure, Katkagel, Wuta-Wuta and Ardadel* (Jongur, 2006).

Total variable cost of production: This was obtained by summing up the costs of labour, seeds, herbicides and other costs. The average variable cost for Masakwa/ha in 2006/07 was N6,408.85 where labour cost accounted for about 74% of the total variable costs (Table 4).

Regression Analysis

A production function with the yield of *Masakwa* as dependent variable and other inputs as independent variables was estimated using the *Cobb-Douglas* method The result is presented in Table 5.

$$Y = aX_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5} \quad U$$

$$Y = 2.82 + 0.32 X_1 + 0.111X_2 + 0.066X_3 + 0.049X_4 + 0.232X_5.$$

Where:

Y = Output of *Masakwa* (kg/ha)
X_1 = Farm Size (ha)
X_2 = Seed (kg/ha)
X_3 = Family Labour (man-hours/ha)

X_4 = Hired Labour (man-hours/ha)
X_5 = Agrochemical (litres/ha)
U = Error term

This was transformed into a double log form and estimated using an ordinary multiple regressions. All the assumptions of the ordinary least square method were made (Nwagbo and Onwuchekwa, 1988).

Apriori expectations were that the coefficient of $X_1 - X_5$ would be positive. The productions elasticities of the inputs are shown in Table 6, and the sum of the elasticities is 0.77. The production function thus, exhibits decreasing return to scale. The *Masakwa* farmers are operating at the economically rational region of production (Heady and Dillon, 1972; Nwagbo and Onwuchekwa, 1988; and Jongur, 2006).

The estimated *Cobb-Douglas* production function was used to compute the marginal value of productivities of the inputs used in *Masakwa* production. The marginal value of productivity when compared with the unit price of each input gives an indication of how resources have been utilized. Majority of the farmers indicated that they inherited the land on which they are farming, so the marginal value product of the land was not computed. The result of the analysis shows that the marginal value productivity of seeds (10.56), labour (0.002), organic manure (-10.63); and agrochemical (0.27) were compared with their respective marginal cost (Table 7). This implies that labour, organic manure and herbicides were over utilized, except seed which was under utilized

Profitability analysis

The net farm income of farmers was used to determine the profitability of *Masakwa* farmers in the study area (Jongur, 2006) Also the difference between the gross farm income (GFI) and the total variable cost (TVC) per hectare is termed as gross margin (GM). Table 3, shows a gross margin/ha of N15,075 47. This implies that Masakwa production is profitable despite the 2006 rainfed crop bumper harvest, which lowered the prices for all cereals. The gross margin per naira invested indicated that on every naira invested in *Masakwa* production, a profit of N2.35 was obtained. Therefore, Masakwa production is more profitable than rainfed sorghum production (Bage, 2004) as revealed by the returns of N0.87K and N1.03k by Sasakawa, non-Sasakawa and the traditional sorghum farmers in Kaduna State.

***Masakwa* Cultivars**

The Study has identified three local cultivars of *Masakwa* in Yola (Jongur 2006) and these are -

1. *Ajagaman*-white seed grain with darker testa
2. *Baman*- Introduced from Bama in Borno State some years ago, white seed grain with slight black testa
3. *Ndaneri* Oldest local cultivar and has three species and these, are *cholade* (white testa) *danejum* (red testa) and *belmbalegum* (white testa).

Problems in *Masakwa* Production

Masakwa production in the north east zone of Nigeria faces certain basic problems where the problems seem to be more during low rainfall season, especially Yola Local Government area of Adamawa State. It is the intensity of the problem that determines the profitability of *Masakwa*. The major problems identified were: low flooding from the river Benue (25 4%), grazers (15 7%), pest and disease infestation (20.2%), unattractive prices (19%) to lack of good road network and high transport fares (Table 5)

SUMMARY AND CONCLUSION

Masakwa Sorghum constitutes a major source of food and income for a large proportion of farmers in Yola LGA of Adamawa State. Majority are between the ages of 31 to 50 years. *Masakwa* has no improved practices or technology, except the three local cultivars earlier identified; *Bamari, Ndeneri* and *Mbelbalagum*. This study reveals the importance of all the stakeholders of agriculture on the improved *Masakwa* varieties.

The study shows a gross margin/ha of N15, 073.91, with a gross ratio of 2.35 on every Naira invested in *Masakwa* production. The net farm income per hectare of *masakwa* was N14, 573.91. The study identified the major problems of *Masakwa* production to include; low flooding from the river Benue, pest and diseases infestation, unattractive prices, and attack on farms by the grazers/cattle rearers and high transport fares were enumerated by the farmers.

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