Fadama Farming as an Environment Friendly and Viable Enterprise in Ondo State, Nigeria

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ABSTRACT The study examined Fadama farming as a viable enterprise in Ondo State, Nigeria. It specifically examined the socio-economic characteristics of the respondents, determined the profitability of Fadama farming and examined the resource-use efficiency of fadama farming in the study area . A multistage sampling technique was used to select 120 Fadama farmers in the study area and structured questionnaire assisted with interview schedule was used to collect data from the respondents. Descriptive statistics, Gross margin and Production function analyses were used to analyse the data collected. The study revealed that 84.17% of the respondents were males and 95% of them were married. The result also showed that 97.5% of the respondents had farm size in the range of between 0.5 or less and1.5 hectares (ha) .The profitability analysis revealed that an average farmer incurred a variable cost of ₦37524.66 but earned an average revenue of ₦67544.40. This indicates that an average farmer earned a gross margin of ₦ 30,019.74 per annum suggesting that Fadama farming is a profitable venture in the study area. The result of the Production function showed that the regressors explained 65.8% in the variation of the regressand. A Return to Scale of 1.1478 obtained from the study showed that production was in the irrational zone (stage 1) of the production surface which indicates that farmers should increase the use of inputs which have direct influence on productivity to get an optimum economic return.

INTRODUCTION

Nigerian agriculture is mainly rainfed especially in the southern part of the country. There are two main cropping seasons in the country based on early and late rainfall season. Given the need for continual cultivation to exploit the dry season and to increase farm income potential, government initiated the small scale low cost farmer managed irrigation scheme to develop Fadama lands (flood plains). According to Ayanwale and Alimi (2004), the incremental food production is necessary to make food production surpass average population growth rate and guarantee national food security which cannot be attained without recourse to supplementary irrigation for the major food production areas of the country. In the same vein, Spore (2008) said that small scale irrigation enables farmers to make use of water from rivers or groundwater sources to extend their cultivation period, adding off season crops to traditional rainfed ones during the dry season. The National Fadama Development Programme (NFDP) was to assist the qualifying states of the Federation through the World Bank supported Agricultural Development Projects (ADP) to among others finance the provision of shallow tubewells/ washbores;

constructing fadama infrastructures, organizing fadama farmers for irrigation management, cost recovery and better access to credit, marketing and other services and providing vehicle, pumps and other equipments.

Afolabi (2008) said that Fadama farming in the southern part of the country is prevalent along river banks and other wetland areas and the crops mainly grown are vegetables. Vegetable crops are of various types and may be classified according to botanical requirement. Vegetable of which the leaves and stem parts are used are called leafy vegetable, cabbage etc. Those which the underground parts are used are referred to as root vegetables e.g. garlic, onion, sweet potatoes, carrot etc. while those whose fruits or seeds are used includes okra, pepper, pumpkin, cucumber etc (McCollum 1980). Fruits are those portions of the plant which house the seeds and are commonly eaten as desired while vegetables are those plant items that are eaten in the course of a meal (Potter 1978). Okro is one of the fruit vegetable crops and consumed in many homes and it contains a lot of important nutrients. The nutrient content for per 100 gram serving okro are as follow: calorie 33 Kcal, cholesterol 0, protein 2gm, carbohydrate 7.6 gm, fat 0.1gm, fibre 3.2 gm, vitamin C 21gm, folate 87.8 mg, vitamin E 0.3mg,

vitamin B6 0.2mg, vitamin K 40.0mg, vitamin A 660iu, calcium 77.0mg, iron 0.3mg, magnesium 36 mg, potassium 135 mg (Grubben and Denton 2004).Since we know that agricultural practices in Nigeria is mainly rainfed coupled with it's attendants continued widening food demand-supply gap, the need for fadama farming and hence research into it is paramount. The objectives of this study therefore are: to examine the socio-economic characteristics of fadama farmers in the study area, to determine profitability of fadama farming and examine resource-use of efficiency of respondents.

RESEARCH METHODOLOGY

Study Area: The study was carried out in Ondo State situated in the South-Western Nigeria. Ondo State is one of the six states that made up South-Western Nigeria. The state lies between longitude $4^0 30$" and $6^0 00$" East of the Greenwich meridian and latitude $5^0 45$" and 8 15" North of the equator. The state has a population of 3,441,024 people (National Population Commission, 2006) .The people of the state are mainly of Yoruba race although other Nigerians and foreign nationals coexist peacefully in the state. The state has a tropical climate with high temperature all the year round, heavy rainfall during the rainy season (April to October) and dry wind during the dry season (November to March) . This favourable climate accounts for the reason why about 75 percent o the inhabitants are farmers. Apart from farming they also engaged in other occupations such as trading, carpentry to mention a few .

Sampling Technique: A multistage sampling technique was used to select 120 Fadama farmers in the study area. The first stage involved purposive selection of four Local Government Areas (i.e Ifedore, Ile-Oluji/Oke Igbo, Okitipupa and Ondo West) because of the prominence of Fadama farmers in the areas due to many rivers and streams with their rich soil along their banks. The second stage also employed purposive selection of 4 towns/villages in each of these four selected local government areas which is also due to the availability of rivers and streams with their rich flood plains . The third stage involved the use of purposive sampling method to select 30 respondents in each of these four towns/villages making a sample size of 120. Data were collected

with the use of structured questionnaire administered on these respondents coupled with interview schedule.

Methods of Data Analysis: Descriptive statistics such as frequency distribution and percentages were used to analyse the socio-economic characteristics of the respondents. Gross margin analysis was used to determine the profitability of Fadama farming in the study area. The gross margin was represented by equation (1) i. e.,

G.M = G.I – TVC……………… equation (1)
where
G.M = Gross margin
G.I = Gross sales/income
TVC = Total variable cost

The Production function analysis using Ordinary Least Square (OLS) was used to determine quantitatively some socio-economic factors that influence the revenue of respondents and also to examine the resource-use efficiency of fadama farming.

Model Specification

The production function postulated is implicitly presented by equation (2) i. e.,

$Y = f(X_1, X_2, X_3, X_4, X_5, ui)$.
where
X_1 = Cost of seeds (₦)
X_2 = Cost of fertilizer (₦)
X_3 = Cost of labour (₦)
X_4 = Farm size (ha)
X_5 = Age of respondents (yrs)
ui = error term (which is assumed to have zero mean and constant variance (Koutsoyiannis 1977).

RESULT AND DISCUSSION

Socio-economic Characteristics of Respondents

Table 1 reveals that 84.17% of the respondents were males while 15.83% of them were females. The dominance of farming by males may be due to the crude implements and strenuous activities involved in farming in the study area. Analysis also showed that 95% of these people were married while 5% were single which can have positive effect on the availability of family labour. The Table also reveals that 94.17% of these respondents were farmers while 1.67% and 4.17% of them were civil servants and night guards respectively. The result also showed that 63.33%

of the respondents operated 0.5 hectares or less as farmland while 25% of them had farm size in the range of between 0.6 and 1.0 hectres. About 9.17% of these farmers owned farms in the range of between 1.1 and 1.5 hectres while only 2.5% of them operated more than 1.5 hectres of land. Analysis suggest that all the respondents operated small-scale farms which may be due to the non-availability of land because fadama farming in the study area is mainly along the rivers and streams which reinforced the findings of Afolabi (2008) in his study of " Economic Analysis of Fadama Farming in Ondo State, Nigeria. The table also revealed that 84.17% of the respondents grew leafy vegetables while 66.67% grew okro. About 41.17% of these respondents grew tomatoes while 25% of them grew pepper and 49.17% of them grew maize. Analysis suggest that these respondents combined two or more enterprises on their farms, the strategy that may be targeted at maximizing their income and also as a way to reduce risk and uncertainty which confimed the findings of Ayanwale and Alimi (2004) in their study of "Impact of the National Fadama Facility in Alleviating Rural Poverty and Enhancing Agricultural Development in South-Western Nigeria".

Table 1: Socio-economic characteristics of respondents

Variable	Frequency	Percentage
Gender		
Males	101	84.17
Females	19	15.83
Total	120	100.00
Marital Status		
Married	114	95.00
Single	6	5.00
Total	120	100.00
Primary Occupation		
Farming	113	94.17
Civil servant	2	1.67
Night guard	5	4.17
Total	120	100.00
Farm Size (ha)		
< 0.5	76	63.33
0.6 – 1.0	30	25.00
1.1 – 1.5	11	9.17
> 1.5	3	2.50
Total	120	100.00
Enterprise Combination		
Leafy vegetables	101	84.17
Okro	80	66.67
Tomatoes	53	41.17
Pepper	30	25.00
Maize	59	49.17

Profitability Analysis

Table 2 showed that the cost of seeds accounted for 7.91% of the total cost while pesticides accounted for 7.49% of the total cost. The cost of fertilizer gulped 31.99% of the total cost while labour accounted for 28.35% of the total cost. The cost of implements accounted for 24.25% of the total cost. The total variable cost accounted for 55.54% of the total sales revenue. The relative high percentage of returns to fadama enterprise in the study area may be due to the favourable market prices usually enjoyed by vegetables during the dry season . The table also revealed that an average farmer incurred a variable cost of ₦37,524.66 but earned an average revenue of ₦67,544.40. This indicates that an average farmer earned a gross margin of ₦30,019.74 per annum suggesting that fadama farming is a profitable venture which conform with the result of the study carried out by Afolabi (2008).

Table 2: Costs and returns of respondents

Items	Amount (₦)	Percentage (%) of total cost	Percentage (%) of total sales
Seeds	356160	7.91	4.39
Pesticides	337400	7.49	4.16
Fertilizer	1440600	31.99	17.77
Labour	1276800	28.35	15.75
Implements	1092000	24.25	13.47
Total Variable Cost	4502960	100.00	55.54
Total Revenue	8105328		
Total Variable Cost/ farmer	375425		
Total Revenue/ farmer	67544.4		
Gross Margin	3602368		
Gross margin/ farmer	30019.7		

Estimated Production Function

The linear, semilog and Cobb-Douglas functional forms of the production function were tried using Ordinary Least Square Technique (see Table 3). The estimated functions were evaluated in terms of the statistical significance of coefficient of multiple determination (R^2) as indicated by F-value, the significance and signs of the estimated coefficients and the magnitude of the standard errors. Based on these statistical

and economic criteria, the Cobb-Douglas functional form was selected as the lead equation.

The result in table 3 shows that the estimated coefficient of multiple determination (R^2) indicates that the included variables in the model explained 65.8% in the variation of the revenue generated from fadama farming by respondents. All the estimated coefficients except age of respondents (X_5) had positive signs which indicates that an increase in the quantity of these variables would lead to an increase in the level of revenue generated by respondents *ceteris paribus*. The coefficient of age of respondents (X_5) that had negative sign implied that an increase in this variable would lead to a decrease in the level of revenue generated by respondents and vice versa. The positive coefficient of seeds implied that an increase in the quantity of seeds planted would lead to higher yield and hence higher revenue. The positive coefficient of farm size would also lead to higher revenue resulting from increase in plant population. This result was in agreement with the findings of the study by Ayanwale and Alimi (2004). An increase in the usage of fertilizer leads to higher yield and hence more revenue which confirmed the findings of the study by Afolabi (2008). The positive coefficient of labour indicates that if more hands are employed, this would bring about increase in yield which would translate to increase in revenue. The negative coefficient of age of respondents implied that the older the respondents become, the less innovative he becomes to adopt modern techniques of agriculture.

Table 3: Estimates of production function for fadama farmers in the study area.

Variable	Functional Forms		
	Linear	Cobb-Douglas	Semi Log
Constant	249.86 (787.03)	5.576 (1.002)	-1346.6 (5297.2)
Cost of Seeds (X_1)	578.62* (214.89)	0.2344* (0.0812)	-381.6 (163.65)
Cost of Fertilizer (X_2)	1005.48 (4897.1)	0.2794* (0.0631)	214.49 (108.95)
Cost of Labour (X_3)	1685.14 (2007.6)	0.134 (0.218)	181.47) (0.134
Farm size (X_4)	1396.34 (8427.3)	0.519* (0.142)	195.58 (141.16)
Age of respondent (X_5)	8589 (7265.8)	-0.019 (0.426)	691.77 (451.13)
R^2	0.612	0.658	0.58
R^2	0.514	0.621	0.55
F – Value	2.199	6.7	4.84

Resource-use Efficiency

All the variables had positive elasticity of Production except age of respondents (X_5) that had negative sign as shown in table 4. Variable with negative elasticity of production indicates that they are in stage III of the production zone. The Return to Scale (RTS) which was the summing up of the production elasticities of inputs was 1.1478. It shows a positive increasing return to scale which implied that production was in the irrational zone of production (i.e stage 1). This suggests that inputs were not efficiently allocated and utilized and hence output was not optimally produced.

Table 4: Estimates of production function parameters of respondents

Variables	Elasticity of production
Cost of Seeds (X_1)	0.2344
Cost of Fertilizer (X_2)	0.2794
Cost of Labour (X_3)	0.134
Farm Size (X_4)	0.519
Age of Respondents (X_5)	-0.019
Return to Scale (RTS)	1.1478

CONCLUSION

The study revealed that 84.17% of the respondents were males and 95% of them were married. The result also showed that 94.5% of these people had farm size in the range of between 1.5 ha and 0.5ha or less. The profitability analysis revealed that an average farmer incurred a variable cost of ₦37,524.66 but earned an average revenue of ₦67,544.4. This indicates that an average farmer earned a gross margin of ₦30,0019.74 per annum suggesting that Fadama farming is a profitable venture in the study area. The result of the production function showed that the regressors explained 65.8% in the variation of the regressand. A Return to Scale (RTS) of 1.1478 obtained from the study showed that production was in the irrational zone (stage 1) of the production surface which indicates that farmers should increase the use of inputs which have direct influence on productivity to get an optimum economic return.

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