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IMPACT OF NATIONAL FADAMA DEVELOPMENT PROJECT II ON SMALL-SCALE FARMERS' INCOME IN OGUN STATE: IMPLICATIONS FOR FINANCIAL SUPPORT TO FARMERS

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ABSTRACT

The study assessed the impact of the Fadama Development Project Phase II on farmers' income as well as the problems and constraints to efficient production and productivity in the Fadama endowed Communities in Obafemi-Owode Local Government Area of Ogun State. Multi-stage stratified systematic random sampling technique was used in this study to select three villages each, for both beneficiaries and non-beneficiaries. Data were collected from a total of 90randomly sampled households. These data were analysed using descriptive and inferential statistical analytical tools.. Most of the farmers were between the age 30 and 59 years with an average ages of 46.3years and 43.6 years for beneficiaries and non-beneficiaries respectively. Majority have no formal education and large household sizes, (average of 10members/ household). The vast experience of the respondents in farming, (average of 12.5 years) was found to be a facilitating factor in productivity improvement in the localities. Gross Margin analysis of beneficiaries and non-beneficiaries revealed a nominal difference between the income of both the beneficiaries and non-beneficiaries cultivating less than one hectares of farm land though the analysis of the difference of Means using the two sample t-test assuming unequal variances, revealed that there is no statistically significant difference in the incomes of groups of respondents at that level of operation. The analyses of the difference of means at the same scale of operation, for both groups with < 2 hectares and ≥2.0 hectares of land, showed significant differences at 5% and 10% levels of probability, giving the t-values of 0.0411 and 0.0504 respectively. The null hypotheses were rejected and the alternatives accepted for both levels of operation. Some of the problems discovered on the operation of the farmers in the communities are inadequate infrastructural and storage facilities, inadequate capital for the farm operations, insufficient access to micro-credit facilities and other support services by members of the Fadama endowed communities based on the findings of the study. The study however recommended that better performance and improvement in

resource use efficiency and participation of the farmers, could be enhanced, if relevant policies are formulated and geared towards support for agricultural sector increase in the net farm income of farmers in such a way that the marginal income will increase and more investments on agriculture and rural infrastructures could also be improved. The need to implement policies to ensure sustainable integration of the Fadama Users' Association's capital needs into the operations of the Micro-finance and other Banks through mandatory bank lending to agricultural sector participants was also suggested by the study.

Key words: *Impact, income, Fadama, Beneficiaries, Non-beneficiaries, Farmers, Obafemi-Owode L.G. A , micro-credit financing.*

INTRODUCTION

Traditional agricultural production system practiced nationwide, involves the use of land holdings of less than two hectares committed to mixed cropping. In Nigeria, the adoption of the cropping system by most farmers is based on sound biological principles, experiences and relatively higher level of output that could result when compared with the cultivation of the component crops separately (Andrews and Kassan, 1976). Studies have shown that agriculture is the locus of poverty in Nigeria (World Bank, 1996), as farm income are generally very low due to many factors including declining productivity, weather vagaries and other natural hazards like drought, pests and disease attack mention a few. This is particularly serious as agriculture remains the mainstay of Nigerian economy contributing about 77 percent of the working population (UNICEF, 1995). The low farm income in the agricultural sector could be attributed to the dependence on rainfall for production in some parts of the country, the scarcity of which becomes a critical limiting factor to all-year round cultivation.

Agricultural production in the southern part is mainly rain-fed with annual rainfall ranging between 750mm and 1500mm and is concentrated between March and September (Daramola,1998). Given the need for all-year-round cultivation to exploit the potentials of the dry seasons for farm income generation, and the campaign for food security and poverty alleviation, Nigerian Government in collaboration with the World Bank and the Agricultural Development Bank(ADB), initiated the small-scale farmer-managed irrigation schemes to develop the Fadama lands nationwide. In addition, it was realized that increased agricultural production necessary to make the rate of growth in food production faster than the population growth rate cannot be attained without recourse to supplementary irrigation for the major food production areas of the country (Adeolu and Taiwo 2004). Hence, the need for the initiation and implementation of the National Fadama Development Project (NFDP), in the country.

'FADAMA' as an Hausa name for wetlands means "Akuro" or "Abata" in Yoruba language. These are low-lying flood plains with easily accessible shallow ground water. Though the surfaces of these flood plains become dry during the dry seasons, appreciable amount of water can be trapped from shallow aquifers that abound round the plains by drilling, leading the development of tube wells. The water obtained from the tube wells is used for the development of small-scale irrigation schemes to boost dry season crops production (Journal

of Agricultural Development Project in Nigeria, 2006). The National Fadama Development Project II (NFDP II) is a follow -up to the successfully implemented Phase I Project executed between 1983 and 1999, to achieve the objective of sustainable increase in the income of farmers in Fadama areas through the expansion of farm and non-farm activities that could result in high value-added outputs. The Project covers twelve states in Nigeria, including the Federal Capital Territory. The States are Adamawa, Bauchi, Gombe, Imo, Kaduna, Kebbi , Lagos , Niger , Ogun, Oyo, and Taraba States (http:// www.fadama.org).

The National Fadama Development Project I (NFDP I) focused mainly on the promotion of simple low-cost irrigation technologies in the bid to increase food production but neglected largely the down stream activities like processing, preservation, conservation and rural infrastructures meant to ensure efficient evacuation of farm produce to the markets. Also, the project did not take into consideration farmers involved in other areas of agriculture like livestock and fisheries. This resulted in not only perpetual conflicts between the users, but restricted benefits to only those who were involved in crops production (http://www.fadama.org.).

At the completion of the project Phase, Nigerian Government adopted new rural development strategies in the Year 2001 to address most of the discovered flaws and constraints to implementation. The new strategy which was in line with the African Development Bank's strategic plan had as its focus a number of approaches to development. The plan stressed on the need for consistency, sustainability and greater equity in the access to the benefits of the land resources in Fadama areas of the country. Consequently, the Bank found it necessary to agree to the Nigerian government's request for funding the phase II of the project, not only as a follow-up to Phase I but also to expand it in scope and size(NFDP I Appraisal Report, 2003).

The design of the phase II of the project therefore incorporated a community-driven development (CDD) approach in which various fadama users; (crop farmers, hunters, pastoralists, women, youths, vulnerables and the marginalized); operating through their respective fadama Users Groups (FUGs) and Fadama Community Associations (FCAs); could reach consensus on how to use the common resources to their mutual advantages. Through this process communities decided on which advisory services and infrastructures they needed to attain developmental goals based on their efforts (NFDP I Appraisal Report, 2003). With these in mind the study was therefore focused on the impact of the National Fadama Development Project II on the income of small-scale crop farmers in Obafemi-Owode Local Government Area of Ogun State. Efforts were made to investigate how the project benefited the farmers and the impact of the funding assistance and other benefits from the project on the beneficiaries in the study area.

Justification for the Study

One of the major goals of any country is to provide adequate food for its citizen. Underlying the trend in the poor performance in the agricultural sector, is the problem that the farming systems are upland subsis-

tence agriculture that depend mainly on vagaries of weather while the potentials for irrigation using underground and surface water remain underdeveloped. With the growing awareness that to maximize welfare through economic development, there is a need to reduce unemployment, rapid population growth rate and poverty among rural dwellers, various agricultural programmes and policies have been instituted in the past. These were meant to sustainably improve productivity and farmers' income, hence the quality of lives of the rural households. One of such projects is the National Fadama Development Project II.

However, despite the beneficial goals of the project in phases, some communities are yet to participate and benefit from the services offered in the study area. This is because they lack the required basic infrastructures and this tends to reduce their production efficiencies and capacities to meet market demands. It is believed that if all the farmers were aware of the potential benefits of participating in the project, they will get more involved. The study will provide information on the impact of the National Fadama Development Project II services on the beneficiaries in comparison to the non-beneficiaries in the study area. The study will also bridge knowledge gap on the socio-economic factors that could enhance economic efficiency of beneficiaries in the study area. Meaningful policy recommendations will be made from the findings of the study and the outcome will serve as a guide to policy makers on issues relating to financial supports for agricultural development programmes in Nigeria and world wide. In addition, the findings from the study will contribute to increasing literature on agricultural financing in Nigeria and the world at large

Objectives of the Study

The major objective of the study is to assess the impact of the National Fadama Development Project II on the income of the small-scale crop farmers in the Obafemi-Owode Local Government Area of Ogun State.

Specifically, the study is to:

- Examine the socio-economic characteristics of the small-scale Fadama crop farmers in the study area;
- Estimate the factors affecting the level of revenue generated by the respondents through participation and non-participation in Fadama Project;
- Identify the funding and assistance derived by the respondents through participation in the fadama project ;
- Compare the farm income of both beneficiaries and non-beneficiaries of fadama project in the study area;

Identify the constraints to participation in the fadama project in the study area; and to

- Make recommendations based on the findings from the study.

METHODOLOGY

Study Area

The study was conducted in Obafemi–Owode Local Government Area of Ogun State, Southwest Nigeria. The State is situated in the tropics covering a land mass of 16,409.26 sq. kilometers and an estimated population of over 3 million people (2006, NPC Estimates) . Ogun State shares its boundaries in the West by the Republic of Benin, in the East with Ondo State and in the North with Oyo State . Obafemi-

Owode local Government Area of Ogun State is made up of has a land mass of 104,787.04 hectares, with the major part used as agricultural land . The study area lies between latitudes 03^0 6' and 07^0 3' North and longitudes 03^0 2' and 03^0 8' East of Greenwich Meridian. Bounded in the North by Odeda Local Government Area and Oyo State, in the East by Sagamu and Ikenne Local Government Areas and in the South by Ifo Local Government Area and Lagos State.

Endowed with vast area of fertile land for the cultivation of arable crops like rice, maize cassava, tomatoes and a variety of vegetables and cash crops like sugar-cane, kolanuts, cocoa and oil palm. The area is particularly regarded as the "Home of Ofada Rice". The people residing in the area are mostly "Egbas" who speak Yoruba as the common language with the egba dialect. Most of the residents of the area are farmers who are noted for arable crops and vegetable production though some also engage in livestock and fishing. The study area is noted as the best in Fadama farming in the State (OGADEP, 2005).

Sources of Data

For the study, both primary and secondary data were used. Primary data were obtained with the aid of pre-tested well structured questionnaire/interview guides administered to small-scale farmers (beneficiaries and non-beneficiaries); in six (6)communities in the study area. Information collected from farmers, Fadama project facilitators and desk officer, bothered on their socio-economic characteristics, production and revenue data as well as constraints to production in the Fadama area. Secondary data were sourced from the Ogun State Fadama Development Office (OGSDO), anchored at the Ogun State Agricultural Development Programmes Office (OGADEP), Annual Reports and periodic evaluation papers on the project, journals, internet and other electronic library on the subject matter. Attendance at several Fadama Community Associations (FCAs) meetings also assisted in capturing salient information relating to the study.

Sample size and Sampling techniques

Sampling technique used was multi-stage stratified systematic random sampling. In the first stage, the Communities were stratified into two(2) as benefiting and non-benefiting communities. From the list of communities in the study area, three (3) Fadama Community Associations (FCAs) and three (3) non-benefiting communities were selected to give the six(6) communities explored in the second stage. The randomly selected FCAs are Ifeparapo Eriti FCA, Ifesowapo Aluoge FCA and Irewolede Ijana–Alapako FCA. The non-benefiting communities are Abata, Ajade-Ogundipe and Lemomu Communities. The final stage of the sampling was the random sampling of ninety (90) respondents selected from both benefiting communities and non-benefiting communities made up of 45 farmers from each stratum (i.e. 3 FCAs and 3 non-benefiting communities). 15 farmers from each of the six (6) selected communities in the study area. Equal number of respondents were randomly selected within each stratum to give equal chance for comparison of the respondents.

Analytical Procedures

A combination of statistical, budgetary and

parametric analyses were used to analyse the data. These include descriptive statistics, gross margin analysis, analysis of difference of means; as well as multiple regression analysis.

Descriptive Statistical Tools

Tables, frequencies, percentages were used to describe the socio-economic characteristics of the respondents. The characteristics include the ages of the farmers, marital status, educational attainment, off-farm/minor occupation, farming experience, gender etc.

Gross Margin Analysis

The budgetary technique was used to determine the gross margin income per hectare of land at various scales of operation cultivated by both beneficiaries and non-beneficiaries of the project using t-test for two sample assuming unequal variances.

Model used in estimating the **Gross Margin** is :

$GMI = \sum TR \sum TVC$.....(i)

$TR = P_{y.} Y_i$..... .(ii)

$TVC = P_x . X$ ..... (iii)

$TC = TVC + TFC$..... (iv)

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

where:

GMI = Gross margin Income (N)

TR = Total Revenue (N)

TVC = Total Variable Cost (N)

TC = Total Cost (N)

NFI = Net Farm Income (N)

P_y = Unit Price of output produced (N)

Y = Quantity of Output (Kg)

P_{xi} = Unit Price of variable Inputs used (N)

X_i = Quantity of Variable inputs (Kg)

Multiple Regression Analysis

Multiple regression analysis was also used to estimate the relationship of the factors affecting total revenue of the farmers and the independent variables affecting crops production in the fadama area. In implicit form, the Regression model is represented by

$Y = f (X_{1,} X_{2,} X_{3,} X_{4,} X_{5,,} U)$..... (vi)

where: X_{is} are the explanatory variables, i = 1 - 5

U = Random error term

In estimating through the regression analysis, the four functional forms used to estimate the relationship are:

Linear function:

$Y = a + b_1 X_1 + b_2X_2 + b_3 X_3 + b_4X_4 + b_5 X_5 + b_6 X_{6+} \; b_6 X_{6+} b_7 X_{7+}U$..... (vii)

Semi-log function:

$Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_{6+} \; b_7 X_{7+} \ln U$.....viii)

Double log (Cobb-Douglas):

$\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_{6+} \; b_7 X_7 + \ln U$.....(ix)

Exponential function

$Y = X^b$ ……...…….. (x)

where:

Y = Total Revenue (N)

X_1 = Farm size (FSz) (in ha.)

X_2 = Cost of Farm tools (Ft)(in (N)

X_3 = Cost of planting materials (Seeds) in (N)

X_4 = Cost of Agro-chemicals(Fertilizer, Herbicides, Pesticides, Insecticides) in (N)

X_5 = Cost of Labour in (N)

U = Error term

From these, the equation of best fit was chosen. Z-test was also used to test the levels of significance of the co-efficient; R^2 and F-test were also used to determine the extent to which the explanatory variables X_i's could explain the relationship in the revenue-cost function .

Difference Of Means In Income

The Difference of Means in income of the beneficiaries and non-beneficiaries was computed to test for significant difference in income of Fadama Project beneficiaries and non-beneficiaries in the study Area.

Model specification is :

$$Z = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{\sigma^2}{n_1} + \frac{\sigma^2}{n_2}}}$$

where: X_1 = Mean Gross Margin Income of microcredit Users in the study area

X_2 = Mean of Gross Margin of microcredit non -Users in the study area

σ_1^2 = Variance of Gross Margin of microcredit Users in the study area

σ_2^2 Variance of Gross Margin of microcredit non-Users in the study area

n_1 = Number of microcredit Users in the study area

n_2 = Number of non-micro credit Users in the study area

Z = Test statistics used for the sample n $\geq$30

Hypotheses

Ho_{1A} : b_o , b_1 , b_2 , b_3, b_4 , b_5 = 0

Hi_{1B} : b_o ., b_1 , b_2 , b_3 , b_4 , $b_5 > 0$

Ho_{2A} : There is no significant difference in the income of Fadama Project beneficiaries and non-beneficiaries in the study area.

Hi_{2B} : There is a significant difference in the income of Fadama Project beneficiaries and non-beneficiaries in the study area.

The a priori expectation is that the parameters are significantly different from zero

$b_o > 0$., $b_1 > 0$, $b_2 > 0$, $b_3 > 0$, $b_4 > 0, b_5 > 0$

RESULTS AND DISCUSSION

The socio-economic and demographic variables investigated are the age of the respondents, gender, educational level, farming experience , occupation;(major and minor) and the farm size . The problems limiting the productive capacities of the farmers in the fadama area and suggested solutions were also considered. Findings from the study revealed that majority of both beneficiaries and non-beneficiaries fall between 30 years and over 59 years with majority ,(41, (91.1%), 37,(82.2%), respectively, with an average of 45.5 years for beneficiaries and 43.8 years for non-beneficiaries in the study area (Table1). This implies that most of the farmers are still within their productive and active working age range, hence their ability to participate or produce to earn some revenue in the fadama project area.

Most of the respondents, 57.8% and 60% for beneficiaries and non-beneficiaries are males and 89.9% of the beneficiaries are married (Table1). The average household size in the locality was found to be 8.7 and 8.4 persons for both the beneficiaries and non-beneficiaries respectively; with the majority of the beneficiary and non=beneficiary households;(86.7% and 75.6%); respectively having 4 -12 members. The implication is that the relatively large household size may likely enhance family labour supply on the farms hence supporting the favourably, productive capacities of the farmers already enhanced by their ages. This corroborates (Adegbite and Oluwalana 2004, Adegbite et al, 2007,) Agbamu, 1993 and Okweche et al 1998; that the larger the household size, the more the likelihood of sustainable labour efficiency on farmers' farms given the constant labour supply .

Out of the sampled benefiting farmers; 40% had no formal education and 37.8% had primary school education. Their occupational (farming) experience ranging from I – 25 years, with a mean of 15.2 years among the benefiting farmers, has implications on their productivity which must have enhanced their on- and off-farm income-generating capacities to service their counterpart contributions to Asset acquisition as individual beneficiaries within their respective Fadama Users' Groups (FUGs). (Table 1). Primary occupation is farming though some of the respondents are involved in other income-generating activities that supplement farm income. . For instance, 20% of them were into petty trading, 4.4% were Artisans and 75.6% in other forms of income-generation for the benefiting farmers. The average farm size was 1.47 hectares though for most benefiting farmers, about 82.2%, manage between 0.1 and 1.99 hectares of farm lands on vegetables and food crops in scattered holdings.

Most, 82.2%, of beneficiaries preferred to use hired Labour (Table 1). This could be attributed to their access to regular financial and other supports from the project unlike the non-beneficiaries who sourced their labour mainly from family members. Both groups asserted that their sources of funds for farm operations were from diverse sources in different proportions as stated on Table 1

Table 1: Socio-economic and Demographic Characteristics of Respondents

	Fadama Beneficiaries				Non- Fadama Beneficiaries			
Characteristics	**Frequency**	**%**	**Mean**	**Std Dev.**	**Frequency**	**%**	**Mean**	**Std Dev.**
Age (Years)								
20-29	-	-			3	6.7		
30 -39	13	28. 9			14	31.1		
40- 49	15	33. 3			15	33.3		
50-59	13	28. 9			8	17.8		
60-69	2	4.4			2	4 4		
≥70	2	4.4	45.5 yrs.	10	2	6.7	43.8	13. 96
Total	45	100			45	100		
Gender (No.)								
Female	19	42.2			18	40.0		
Male	26	57.8			27	60.0		
Total	45	100			45	100		
Marital Status								
Married	40	88.9			41	91.1		
Divorced	1	2.2			1	2.2		
Single	2	4.4			3	6.7		
Widow	2	4.4			0	0.0		
Total	45	100			45	100		
Household size								
1-3	1	2.2			3	6.7		
4-6	12	26.7			16	35.6		
7-9	14	31.1			11	24.4		
10-12	12	26.7			7	15.6		
13-15	5	11.1			5	11.0		
>15	1	2.2			3	6.7		
Total	45	100	8.7 ≈9	3.53	45	100	8.4≈8	4.47
Occupational experience (Years)								
1-5	7	15.6			6	13.3		
6-10	14	31.1			15	33.3		
11-15	7	15.6			9	20.0		
16-20	12	26.7			4	8.9		
21-25	3	6.7			4	8.9		
≥25	-	-			7	5.6		
Total	45	100	15.2yrs.	9.8	45	100		
Minor occupation								
Trading	9	20.0			10	22.2		
Labourers	29	64.4			31	68.9		
Driving	2	4.4			1	2.2		
Food/Fish processing	1	2.2			-	-		
Artisans	2	4.4			2	4.4		
Others	2	4.4			1	2.2		
Total	45	100			45	100		

Table 1: Socio-economic and Demographic Characteristics of Respondents (contd.)

Characteristics	Fadama Beneficiaries Frequency	%	Mean	Std Dev.	Non- Fadama Beneficiaries Frequency	%	Mean	Std Dev.
Educational Level Attainment								
No Formal Education	18	40.0			14	31.1		
AdultLiteracyEducation	1	2.2			-	-		
Primary Education	17	37.8			24	53.3		
Secondary Education	7	15.6			7	15.6		
Higher Education	2	4.4			2	4.4		
Total	45	100			45	100		
Farm size (hectares)								
0.1-0.99	22	48.9			20	44.4		
1.0-1.99	15	33.3			13	8.9		
2.0-2.99	2	4.4			2	4.4		
3.0-3.99	1	2.2			-	-		
4.0-4.99	3	6.7			6	13.3		
>4.99	2	4.4			1	2.2		
Total	45	100	1.47 ha	1.44	45	100		
Sources of Labour								
Hired Labour	37	82.2			6	13.3		
Family labour	3	6.7			35	77.8		
Family and hired labour	5	11.1			4	8.9		
Total	45	100			45	100		
Sources of Capital*								
Friends & Family	6	13.3			8	17.8		
Banks	16	35.6			45	100		
Fadama Funds	45	100			-	-		
Personal Savings	30	66.7			31	68.9		
Cooperatives	25	35.6			16	35.6		

Source: Field Survey, 2007
* Multiple responses

Funding and Assistance derived by Respondents through participation in Fadama II Project

The Fadama II project comprises of five (5) main components, namely; Capacity-building, Rural infrastructure investments, pilot productive Asset acquisition support, demand-responsive advisory Services and Project management, monitoring and Evaluation. All except for the last component affected the beneficiaries directly during the project implementation by all the stakeholders. Evidence from the data collected on the study showed that the beneficiaries had access to all the components of the project funding and assistance in the study area while the non-beneficiaries

could only derive benefits on part of the assistance(market facilities and access to agrochemicals), on the project by reason of nearness or proximity to the participating Fadama communities(Table 2). All these had implications positive impact on the socio-economic well being of the beneficiaries of the project.

Table 2: Funding and Assistance derived by Respondents through participation in Fadama II Project

	Beneficiaries n=45		Non-Beneficiaries n =45	
Funding & Assistance derived by Respondents	Frequency*	% count	Frequency*	% count
Advisory services	45	100	-	
Rural infrastructures	45	100	-	-
Asset Acquisition	45	100	-	-
Capacity building	45	100	-	-
Input procurement	45	100	-	-
Provision of market facilities	45	100	29	64.4
Mechanization	20	44.4	-	
Access to agro-chemicals	35	77.8	10	22.2
Supply of storage facilities	25	55.6	-	-
Supply of Water pumps	30	66.7	-	-
Access to extension services	27	60.0	-	-

Source : Field Survey, 2007
* Multiple Responses

Regression Analysis Result

The Lead equations chosen for both the beneficiaries and non-beneficiaries are double-log functions. (Table 3 and Table 4).The functions have at least three of the variables significantly different from zero with relatively high R^2 and F values .The Cobb Douglas function showed four of the parameters significantly different from zero, but it was rejected because the sign of b_1 negates the a priori expectation on tools . Though the semi log function have four of its variables significant at different probability levels of 0.01 to 0.1, the relatively lower values of the co-efficient of determination R^2 (52.9%) and its adjusted value (46.9%), when compared with the values recorded for the double log function (72%) and (68.4%), conferred the choice of the equation of best fit on the double log function for the beneficiaries. The result of the regression analysis also showed that three of the parameters b_1, b_4 and b_5 significantly different from zero at 1%, 5% and 1% probability levels respectively. However, the overall significance of all the variables used in all the models, were reflected in their F-values ranging from 6.41 to as

high as 20.06, df (5,39) at 1% level of significance (Table 3)

From the Table 3, the adjusted R^2 value of the lead equation is 0.684. This implies that the regressors had explained about 68.4% of the total variation in the regressand (Total Revenue) while the remaining 31. 6 % remained unexplained variables. Therefore, the Lead equation chosen is double-log equation represented as :

$$Y = \underset{(2.64)}{6.03} + \underset{(3.13)}{0.3338\ X_1}^{***} - \underset{(-1.27)}{0.2671\ X_2} + \underset{(1.12)}{0.1589\ X_3} + \underset{(2.07)}{0.0518\ X_4}^{**} + \underset{(3.50)}{0.5718\ X_5}^{***}$$

***Significant at 1%, **Significant at 5%, *Significant at 10%, F-value = 20.06, $R^2 = 0.72$, Adj. $R^2 = 0.68$,Prob. > F = 0.0000

Table 3:RegressionResulton Factors Affecting Farm Revenue generated by Beneficiaries

Model specification	b_o	b_1	b_2	b_3	b_4	b_5	R^2 value	Adj. R^2	F value
Linear	3861.8	154054.7*	39.141	-2.362	28.203**	-0.9474	0.451	0.381	6.41
t-value	(0.02)	(1.71)	(0.59)	(-0.64)	(2.61)	(-0.84)			
Semi-log	563554.5	348244.7***	-5665	8639.72	35810.96*	2818.3**	0.469	0.529	8.78
t-value	(0.30)	(3.01)	(-3.24)	(0.73)	(1.72)	(2.07)			
Double log	6.029***	0.3338***	-0.2671	0.1586	0.05165**	-0.57175***	0.720	0.684	20.06
t-value	(2.64)	(3.13)	(-1.27)	(1.12)	(2.07)	(3.50)			

Source: Field Survey, 2007

The double-log model was selected as the equation of best fit because :

(i) It has the highest F and Adjusted R^2- values

(ii) It has more number of significant bi values both at 1% and at 5%. Therefore, the estimated model is given as:

$$Y = \underset{(2.64)}{6.03} + \underset{(3.13)}{0.3338\ X_1}^{***} - \underset{(-1.27)}{0.2671\ X_2} + \underset{(1.12)}{0.1589\ X_3} + \underset{(2.07)}{0.0518\ X_4}^{**} - \underset{(3.50)}{0.5718\ X_5}^{***}$$

***Significant at 1%, **Significant at 5%, *Significant at 10%, F-value = 20.06, $R^2 = 0.72$, Adj. $R^2 = 0.68$,Prob. > F = 0.0000

Table 4: Regression Analysis Result on Factors Affecting Farm Revenue of Non-Beneficiaries

Model specification	b_o	b_1	b_2	b_3	b_4	b_5	R^2 value	Adj. R^2	F value
Linear	-2062.2	2121.98	-1.3300	0.7356	7.0119	1.234***	0.775	0.746	26.88
t-value	(-0.11)	(2.58)	(-0.69)	(0.65)	(4.04)	(3.37)			
Semi-log	-861.8***	2403.64	-1201.1	522.7*	464.42	5452.84*	0.621	0.572	12.77
t-value	(-2.95)	(1.50)	(-1.27)	(2.85)	(1.65)	(1.83)			
Double log	2.3497**	0.00648	0.0852**	0.234***	0.2327*	0.5651	0.879	0.864	56.76
t-value	(2.17)	(1.09)	(2.43)	(3.44)	(2.23)	(5.10)			

Source: Field Survey, 2007

Double-log model was selected for non-beneficiaries as the equation of best fit

$Y = 2.35 + 0.00648X_1 + 0.0852X_2$ ** $+ 0.234X_3$*** $+ 0.0233 X_4$***$+ 0.5651X_5$ ***
(2. 17) (1.09) (2.43) (3. 44) (2. 23) (5 .10)

***Significant at 1%, **Significant at 5%, *Significant at 10%, F-value = 56.76, R^2 =87.9 %, Adj. R^2 = 86.4%

From the Lead equation, all the variables are positively correlated with the regressand . This indicated their importance in determining the total revenue of the beneficiaries, hence in line with the a priori expectation that $b_{is} > 0$. The result of the regression analysis for the beneficiaries revealed that, holding other variables constant, a 1% increase in land area (X_1) , cost of farm tools(X_2), cost of planting materials (X_3) , cost of agro-chemicals (X_4), and cost of labour (X_5) will result in 0.33 % increase, 0.26% decrease, 15.9% increase, 5.2% increase 57.2% decrease respectively, in revenue accruing from vegetable output (Table 3).

For *the non-beneficiaries,* the functions have at least three of the variables significantly different from zero with relatively high R^2 and F values .The Cobb Douglas function showed only two variables, X_3 and X_5, as significant at different probability levels between 0.01 and 0.1, the relatively lower values of the co-efficient of determination R^2 value (62.1%) and the adjusted value (57.2%), when compared with the values recorded for the double-log function (87.9%) and (86.4%), conferred the choice of the equation of best fit on the double log function for the non-beneficiaries. The result of the regression analysis also showed that four of the parameters b_2, b_3, b_4 and b_5 were found to be significantly different from zero at 5%, 1% , 5% and 1% probability levels respectively. However, the overall significance of all the variables used in all the models,

were
reflected in their F-values ranging from 26.88 to as high as 56.76, df (5, 39) at 1% level of significance (Table 4). Also, the adjusted R^2 value of the lead equation is 0.729. This implies that the repressors had explained about 72.9% of the total variation in the regressand (Total Revenue) while the remaining 27.1 % remained unexplained variables. Therefore, the Lead equation chosen is double-log equation represented as:

$$Y = \underset{}{2.35} + \underset{(2.17)}{0.00648\,X_1} + \underset{(1.09)}{0.0852\,X_2}^{**} + \underset{(2.43)}{0.234X_3}^{***} + \underset{(3.44)}{0.0233\,X_4}^{***} + \underset{(2.23)}{0.5651\,X_5}^{***} \quad (5.10)$$

***Significant at 1%, **Significant at 5%, *Significant at 10%, F-value = 56.76, R^2 =87.9 %, Adj. R^2 = 86.4%

Gross Margin Analysis

Profitability of a farm serves as one of the indicators used in decision-making on increase or decrease in output of the farming enterprise. The Gross Margin Analysis of beneficiaries and Non-beneficiaries from the findings of the study as presented on Table 5 revealed a nominal difference between the income of both the beneficiaries and non- beneficiaries cultivating less than one hectares of farm land (Table 5). This may be attributed to the beneficiaries' access to the pilot acquisition facilities and the capacity building training opportunities offered by the project unlike the non-benefiting groups. However, the analysis of the difference of Means using the two sample t-test assuming unequal variances, revealed that there is no statistically significant difference in the incomes of groups of respondents at that level of operation. (Table 6).

Table 5: Gross Margin Per Hectare at Different Scales of Operation

	0.1-0.99 ha		1.0 - 1.99ha		≥2.0 ha	
	Benefs	Non-Benefs	Benefs	Non-Benefs	Benefs	Non-Benefs
No. of Farmers	22	20	15	13	8	12
Av. Farm size(ha.)	0.51	0.40	1.07	1.28	5.15	3.47
Av. Total variable cost (N)	119,551.14	84,552.55	149,180.67	128,569. 23	417,890. 00	178,481.25
Av. Total Revenue (N)	289,886.36	90,009.10	266,953.33	160,380 .77	987,041. 63	230,975.00
Av. Gross Margin (N)	170,335.23	5,456. 55	117,772.67	31,811. 54	569,151. 63	52,493.75
Av. Gross Margin (N/ha)	224,980.46	17,721.95	117,257.50	31,434. 03	131,622. 61	15,694.88

Source: Field Survey, 2007

Also, as reflected in the gross margin analysis for less than 2 hectares and ≥2.0 hectares of land for both groups (Table 5) and in the analyses of the difference of means at the same scale of operation, there were significant differences in the income of beneficiaries and non-beneficiaries at 5% and 10% levels of probability, giving the t-values of 0.0411 and 0.0504 respectively (Table 6). The null hypotheses were rejected and the alternatives were accepted for both levels of operation. This may be due to beneficiaries operating farms between 1.00-1.99 hectares of land taking advantage of economies of scale than those operating lesser area of land, hence the latter could not record significant differences in their revenue when compared to the non-beneficiaries. Another probable reason that could be suggested is the uneconomic size in the land area and scale of production which could have implications for under-utilization of resources derivable from the Fadama project hence inefficiency in production and sub-optimal productivity of the farmers.

Table 6: Test of Difference of Means between Beneficiaries and Non- Beneficiaries

	0.1-0.99 ha		1.0 - 1.99ha		≥2.0 ha	
	Benefs	Non-Benefs	Benefs	Non-Benefs	Benefs	Non-Benefs
Mean (GM/ha)	224,980.46	17,721.95	117,257.50	31,434. 03	131,622. 61	15,694.88
Variance	4.26509E+11	224826988	19108024587	338724158	1931725597	1472825181
No. of Observations	22	20	15	13	8	12
Hypothesized Mean Diff.	0		0		0	
Df	21		19		8	
t Stat.	1.4842		2.1910**		2.3014*	
P(T≤ t), one tail	0.0763		0.0206		0.0252	
t critical, one tail	1.7207		1.7291		1.8595	
P(T≤ t), two tail	0.1526		0.0411		0.0504	
t critical, two tail	2.0796		2.0930		2.3060	
Av. Hectarage	0.51	0.40	1.07	1.28	5.15	3.47
Remarks	t stat, not significant		t stat, significant at 5%		t stat, significant at 10%	

Source: Field Survey, 2007

Implications for Financial Support to Farmers

To produce an hectare of vegetables in Fadama Communities, farmers may require between N85,000.00 and N420,000.00 financial assistance; depending on the proposed scale of operation, This is expected to provide the required capital for farm operations and post-harvest handling of the produce. Any strategy on Fadama for Pilot Asset acquisition and infrastructural development and capacity building will enhance continued participation of farmers in Fadama areas of the country. Therefore, the policy of the counterpart contributions to assistance given to fadama beneficiaries has to be reviewed in favour of the farmers. For instance, for Asset acquisition, the policy was initially stipulated at the ratio of

60%:40% of the total amount required for the procurement of the Asset from Fadama project funds and Fadama Users' Groups respectively. It was later changed during the course of project implementation, to ratio 50%:50%. If the counterpart contributions by the Users' groups could be reduced it will go a long towards supporting farmers in acquiring farm equipment that will increase their levels of production and enhance their efficiency in the production. In addition, Farmers' groups can also rent out some of the equipment for income generation.

There is also a strong need to enlist the participation of more Communities and encourage financial empowerment and access to capital sourcing from formal credit institutions like the Nigerian Agricultural Credit and Rural Development Bank (NACRBD) and the Ogun State Agricultural and Multi-purpose Credit Agency (OSAMCA) so that beneficiaries can become adequately empowered to pay their counterpart funds as Fadama project beneficiaries. The capital that may be sourced from financial outfits could be used in joint acquisition of mechanization and irrigation equipment as Fadama users' Groups (FUGs), pay for labour services and procure other assets as may be required by the Users' groups in each Community.

Table 7: Problems faced by of Respondents

Problems faced by Respondents	Beneficiaries		Non-Beneficiaries	
	Frequency*	% of Total	Frequency*	% of Total
Labour Problem				
Unavailability of Labour	29	64.4	27	60
Non-challant Attitude of Labour	11	24.4	25	55.6
High Cost of Labour	5	11.2	36	80
Capital Problems				
Lack of mechanization /irrigation Equipment	21	46.7	42	93.3
Lack of Collaterals	16	35.6	7	15.6
High rates of Interest	8	17.8	1 8	40.0

Source: Field Survey, 2007
* Multiple responses

Table 8: Constraints Limiting increased production of Respondents in Fadama Area

Constraints	Beneficiaries		Non- Beneficiaries	
	Frequency*	% of total	Frequency*	% of Total
Lack of Infrastructure	45	100	45	100
Inadequate Capital	8	17.8	31	68.9
Lack of Markets	14	31.1	29	64.4
Lack of Mechanization	28	62.2	20	44.4
Lack of Water Pumps	3	6.6	30	66.7
Lack of storage facilities	41	91.1	45	100
Limited Access to Agro-chemicals	16	35.6	8	17.8
Poor Extension Services and Training	4	8.8	11	24.4
Inefficient transportation Network	38	84.4	33	73.3
Tenure system of Land ownership	20	44.4	12	26.7
Inadequate access to improved seed varieties	9	2 0	42	93.3

Source: Field Survey, 2007
***** Multiple responses

Table 9: Suggested Solutions to Limitation to increased crops production in Fadama Area

Suggested Solutions	Beneficiaries		Non- Beneficiaries	
	Frequency*	% of total	Frequency*	% of Total
Provision of good roads	45	100	45	100
Financial Assistance by Government	45	100	37	82.2
Establishment of central ProduceMarkets	31	68.9	29	64.4
Provision of Machinery for farm Operations	42	93.3	40	88.8
Easy access to regular Extension Services	8	17.8	27	60.0
Provision of Water Pumps by Government at subsidized prices	3	6.7	25	55.6
Easy access to Agro-chemicals	9	20.0	8	17.8

Source: Field Survey, 2007
* Multiple responses

Summary of major the Findings

The study explored the impact of National Fadama Development Project II on small-scale Fadama crop farmers' income in Obafemi-Owode Local Government Area of Ogun State. The study revealed that 71.1% of the benefiting farmers were adults aged ≥40 years while 28.9% were youths of ≤39 years. For the non-beneficiaries, 62.2% of the farmers were adults while 37.8% were youths (Table1). 57.8% and 60% of the beneficiaries and non-beneficiaries were males respectively while the other s were females in their respective groups. Although most of the beneficiaries were married (88.9%), 2.2% were divorced ,4.4% widowed while 4.4% were singles. On the other hand, 91.1% of the non-beneficiaries were married while 6.7% widowed and 2.2% divorced (Table 1). Household sizes of 1and 3 persons constituted 2.2%, 6.7%, 4-6 persons (26.7%, 35.6%),7-9 persons (31.1%, 24.4%),10-12 persons (26.7%,15.6%), 13-15persons (11.1%, 11.1%) and >15 persons (2.2%, 6.7%) for all the beneficiaries and non-beneficiaries respectively. Among these beneficiaries however, 40% had no formal education, 2.2%adult literacy education15.6% had secondary school education while only 4.4% had post-secondary school education. 31.1% of the non-beneficiaries had had no formal education, 53.3 had primary education and only 6.7%finished secondary education. Though 4.4% of the benefiting respondents were found to be artisans, 4.4% Clergy men, 20% were involved in transport business, 64.4% had farming as their major occupation. 68.9% of the non-beneficiaries were however farmers, 4.4% artisans, 2.2% were drivers while 2.2% were herbalists.(Table1). The farming experiences of the two sets of the respondents ranged from between 1 and 30 years. (15.6%,13.3%) had between 1and 5 years of experience, (31.1%,33.3%) had 6-10 years, (15.6%,33.3%) had 11-15years (8.9%,20%) 16-30 years respondents for benefiting and non-benefiting respectively. (Table1). Going by the size of the fadama land cultivated, 48.8%,44.4% planted 0.10 -0.99 ha, 33%,28.9% planted 1.0 -1.99ha while 19.8%,27.7% planted between 2 and 4.99ha for the beneficiaries and non-beneficiaries respectively.

The study further identified that beneficiaries derived benefits from the fadama project II in terms of advisory services, infrastructural development, Asset acquisition, capacity building and input procurement. All (100%) fadama project participants benefited from advisory services, infrastructural development, capacity building maximally, while only 33.3%highly benefited from asset acquisition and 66.7% benefited minimally unlike the non-beneficiaries who were not disposed to any of the benefits. The Gross margin analysis at various scales of operation revealed that operators of farm size between 0.1 and 0.99ha had margins /ha of N 97,347.52 as compared to the non-benefiting counterparts who had N17,721.95 (Tables 5 and Table 6). For farm sizes between 1.00 and 1.99ha beneficiaries had N 117,257.50 as compared to N 31,434.03 margin /ha earned by their non-benefiting counterparts. Above 2ha, beneficiaries had N131,622.61while the non-beneficiaries earned N 115,694.88.

The 2-tailed difference of means statistics showed that there was a 1% significant difference between the gross margin/ha of

beneficiaries and non-beneficiaries at 0.1-0.99ha scale of operation. 5% significant difference at 0.1- 1.99ha and >2 ha. The study further revealed that, farm size (ha), cost of agro-chemical used (N), and cost of labour(N) influenced farm revenues generated by the beneficiaries. Regression analysis was also used to estimate the factors that influenced the revenue generated by the farmers. The co-efficient of multiple determination (R^2) was 72%, Adjusted R^2 68.4% and F value was 20.06 for the beneficiaries, results of regression analysis revealed that cultivated farm size (b_1) , cost of agrochemicals used (b_4) in N as well as the cost of labour (b_5) in N were statistically significant .These variables were found to be important in determining farm revenues generated and to explained the percentage of variation observed in the study as 72%. The R^2 value for the non-beneficiaries regression result was 87.9%, adjusted R^2 value was 86.4% while F value was found to be 56.8. The analysis further revealed that the cost of irrigation (b_2) in N cost of planting materials (b_3) in N and the cost of agrochemicals (b_4) in N were statistically significant. These variables are important in determining the farm revenues generated for the non-beneficiaries and in explaining the variation observed in the study as 87.95%. Apart from inadequate financial capacity as the major common constraint identified by both set of respondents, other constraints identified by the beneficiaries include, inadequate number of irrigation pumps, boreholes and transport facilities. On the other hand, lack of infrastructural facilities, irrigation pumps, lack of mechanization among other, were the major constraints facing the non-benefiting farmers in the fadama area studied.

CONCLUSION

On the finding that majority (71.1%) were in the adult group among the beneficiaries, there is a need to encourage more youth to get into the farming business. The relatively high experience of the farmers in fadama crop farming could be extended to training the younger farmers to ensure sustainability in the fadama endowed area. The study also stressed that there were great significance in the gross margin income generated by beneficiaries and non-beneficiaries as a result of the impact of the National Fadama Development Project Phase II on the benefiting small scale fadama crop farmers. Thus emphasizing the need to extend benefits of the fadama project to the non-benefiting communities in the area. For the beneficiaries, farm size (b_1) , cost of agrochemicals used (b_4) in N as well as the cost of labour (b_5) in N were positively related to farm revenues generated indicating that the larger the farm size and the more the cost of agrochemicals used the more the revenues expected to be generated by the farmers. This is not the same for the cost of labour used in Naira. Though the cost of labour was found to be positively correlated according to the explicit form of the chosen lead equation, however in reality the high cost of labour will likely reduce the revenue generated .Hence the finding did not conform with the a priori expectation of the study. The non-beneficiaries analysis on the other hand revealed that the cost of irrigation (b_2) in N cost of planting materials (b_3) in N and the cost of agrochemicals (b_4) in N were all positively correlated to farm revenue generated . The more the money invested on these input, the more the likelihood that farm revenue would increase significantly. They all conform to the apriori

expectations.

RECOMMENDATIONS

Based on the findings from the study, the following recommendations are suggested to improve the farm income generated , enhance development of the fadama farming communities and improve the quality of lives of the respondents , especially the non-beneficiaries :

i. The Fadama II project should expand its target and geographical scope to other non-beneficiaries within the study area to harness the benefits of the projects to the areas. This is high essential in order to tap the resources of the fadama at its maximum capacity and to achieve the objective for which the project has been implemented which was " to sustain ably improve the fadama farmers' income and to raise their standards of living " in all the fadama farming communities in the study area;

ii. The link between the Village Extension Agents (VEAs), Fadama Facilitators and the fadama farmers should be strengthened , if the objective of sustainable increase in farmers' income is to be continually achieved;

iii. Adequate training should be given through capacity building , farm management skill development and efficient use of assets and intensive advisory services should be given to the farmers as frequently as possible ;

iv. Government should provide loan facilities to the small holders so that they can improve their domestic hectarage for both beneficiaries and non-beneficiaries;

v. financial institutions need to be encouraged by Government to provide financial assistance to farmers in the Fadama communities. This is expected to increase in their capital base, enhance economic empowerment and expand their production capacities in the rural areas with resultant improvement in the farmers' standards of living;

vi. The Fadama Facilitators and the Village Extension Agents should assist the farmers in procuring improved inputs like seeds and agro-chemicals to save the farmers from the risk of buying poor quality , non viable inputs from the open markets;

vii. The State Fadama Office should invest more in rural infrastructural facilities and production assets, especially irrigation pumps and boreholes to ease farmers farming operations. The various problems and constraints limiting production could be reduced or avoided, if, the project implementers harness resources towards rural infrastructural development of the Communities and empowerment of the farmers through capacity building on integrated pest management and improved cultural practices, to reduce their costs of production and enhance their capacities to manage their farm holdings without much dependence on agro-chemicals, thus increasing the total revenue accruable from any production;

viii. Efficient transportation and road network as well as proximal markets should be established to facilitate transportation and marketing of produce and reduce losses due to spoilage.

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