An Appraisal of the National Fadama Development
Project (NFDP) in Ogun State, Nigeria

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Abstract: The study attempted to appraise the activities of the national fadama development project in Ogun state, Nigeria. A total of 100 fadama farmers were randomly selected from the four Ogun State Agricultural Development Programme's (OGADEP) zones in the state while, 20 members of staff of the OGADEP were also sampled. Both the interview schedule and structured questionnaire were used for interviews. The study found that age, family size, gender, educational level and frequency of extension contact made significant contribution to the prediction of the adoption of tube well/wash bore, improved seeds and inorganic fertilizer. The Pearson Product Moment Correlation (PPMCC) reveals that there is a significant positive correlation ($r = 0.568$; <0.05) between improved technology adoption and the benefits derived from the project. The multiple regression analysis results indicated that strong F-values of 2.682, 4.651 and 3.249 show the various independent variables as being significant explanatory variables for tube well/wash bore, improved seeds and inorganic fertilizer adoption, respectively. The chi-square (χ^2) result shows that the farmer's personal characteristic had no influence on the benefits derived from the project. Sequel to the findings from the study, recommendations included the provision of credit facilities to the fadama farmers and adequate mobility for the extension staff of the project to help improved the farmers productivity.

Key words: Fadama farmers, regression model, residual, wash bore, tube well, rice

INTRODUCTION

The fact that many government agricultural intervention development programmes in Nigeria have not had lasting impact on agricultural development and that many have not yielded the expected results of sustained increase in food production is well documented (Baba and Singh, 1998). The National Fadama Development Project (NFDP) in Nigeria is one of such programmes in states with fadama potentials. Nigeria as a country is blessed with potentially good land and water resources required for sustainable agricultural development.

The National Fadama Development Project (NAFDP) is a project of the Federal Government of Nigeria through the pooled World Bank loan, to finance the development of fadama lands by introducing small-scale irrigation in states with fadama development potentials. The project aims at boosting incremental food production and raise the standard of living of the beneficiaries. Fadama are low laying lands subject to seasonal flooding or water logging along the banks of streams or depressions. It is a Hausa word meaning, the seasonally flooded or flood able plains along major savannah rivers and or depressions or adjacent to seasonally or perennially flowing streams and rivers. It is called Akuro in Yoruba land.

The enormous potentials for irrigated agriculture in the fadama and flood plain is unquestioned. According to Baba and Singh (1998), the fadama lands have high potentials and agricultural values several times more than the adjacent upland. Fadama development is a typical form of small scale irrigation practice characterized by flexibility of farming operations, low inputs requirement, high economic values, minimal social and environmental impact and hence conform with the general criteria for sustainable development (Akinbile et al., 2006).

Akinbile et al. (2006) submitted that pumping water from wells in fadama helps in controlling the water table and is thus, anti-water logging device. Similarly, pumping water from the wells increase infiltration and leaches harmful salts from the root zone, thereby providing additional basis for sustainable fadama development. The NFDP was established consequent to the failure of large scale irrigated schemes, which the country has pursued

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for the last 2 decades to yield the anticipated increase in food production despite the huge sums of money (>2.0 billion US$) spent on it (Baba and Singh, 1998).

Presently, the NFDP is widely being implemented in all the 36 states of the federation and the Federal Capital Territory (FCT), which have been categorized into the core states and the facility states. The core states include Bauchi, Gombe, Jigawa, Kano, Kebbi, Zamfara and Sokoto, while the remaining states and the FCT constitute the facility states (Baba and Singh, 1998). Ogun state is therefore, one of the facility states.

Several factors have been identified to influence technology adoption by farmers. For instance, Akinbile (2007) and Ladele and Edgal (2005) reported that age, farm size, family size, cost of adoption, extension contact, access to government loan are positively related to adoptiton of tube well technology. Also, according to Oladoja *et al.* (2008a), Iheanacho (1995) and Adisa *et al.* (2006) farming knowledge and experience, socio-economic status, mass media exposure, source of needed agricultural information, income level and farm size are positively related to adoption of innovation.

The constraints militating against sustainable fadama development in Nigeria are legion. For instance, according to Akinbile *et al.* (2006), thousands of fadama lands remain uncultivated due to the problem of accessibility or remoteness, which tends to inhibit the spread of new ideas and concepts of fadama development. Also, according to Oladoja *et al.* (2008b), some of the common drawbacks in the management of fadama are the occurrence of merch lands and swamps, which are difficult to work, thereby making the development and management of fadama expensive and occasionally unhealthy. Baba and Singh (1998) noted that lack of post harvest technologies, poor handling, poor road network and the lack of means of preservation constitute a major constraint of fadama products preservation.

Another major constraint to fadama development is the problem of pests, insects and diseases. According to Oladoja *et al.* (2008a), they constitute a major limiting factor to crop yields. Pests such as Quelea queleq birds, migratory locusts, grasshoppers, army works and head worm have devastating effects and can cause crop losses as high as 25-30%.

High yielding crop varieties are highly susceptible to diseases such as stem and leaf rust, root rot, blight, blasts, aphids and stem borer. According to Akinbile (2007), Nigeria has had many intervention programmes in the agricultural sector, which have not had lasting impact on agricultural development nor yield the expected result of sustained increase in food production. It is therefore, necessary to assess the NFDP to prevent the programme

from suffering the same fate like the earlier ones. This study will therefore, assess the extent to which the farmers perceived that desired benefits from the NFDP has been realized as well as the extent to which the objectives of the NFDP has been achieved.

MATERIALS AND METHODS

The study was carried out in Ogun state Nigeria. The population for the study include all fadama farmers and members of staff of OGADEP/NFDP on the list of Ogun State Agricultural Development Programme (OGADEP). For administrative convenience the OGADEP has divided the state into four zones, namely Abeokuta, Remo, Yewa and Ijebu-Ode zones. The sample was therefore, drawn from this population.

A total of 100 fadama farmers were randomly selected and interviewed from the four OGADEP zones in the state. The numbers of fadama farmers selected per zone were 18, 14, 31 and 37 for Abeokuta, Remo, Yewa and Ijebu-Ode zones, respectively. The disparity in figures was due to the fact that there are more concentration of fadama farmers in some zones than the others, with Ijebu-Ode zone having the highest and Remo zone, the least concentration of fadama farmers.

Similarly 20 members of staff of the OGADEP directly connected with fadama development project were selected and interviewed for the aim of this study. There formed the sample for the study, making a total of 120 and respondents as shown in Table 1. Two set of instrument (i.e., interviews schedule and structured questionnaire) were used to collect information from the respondents, one for the fadama farmers and the other for the OGADEP/NFDP staff.

Table 1: Sampling of respondents (n = 120)

State	Zone in the state	Total no. of fadama farmers in the list of each zone	Sample fadama farmers at 50%
(a) Sampling of fadama farmers			
	Abeokuta	37	18
	Remo	29	14
Ogun	Yewa	75	37
	Ijebu-Ode	62	31
	Total	203	100
State	Zone in the study area	Total no. of OGADEP staff involved in NFDP in each zone	Sampled members of OGADEP staff involved in NFDP in each zone at 50%
(b) Sampling of staff members (OGADEP/NFDP)			
	Abeokuta	8	4
	Remo	7	4
Ogun	Yewa	13	6
	Ijebu-Ode	12	6
	Total	40	20

Source: Field Survey (2007)

The interview schedule and structured questionnaire were pretested for reliability, using the test-retest method to check ambiguity capable of causing mis-representation of statements or being above the reasoning level of the respondents. A reliability coefficient of 0.88 was obtained. Data collected were analysed using frequencies, percentages, Chi-square (χ^2), Pearson product movement correlation co-efficient and regression analysis.

RESULTS AND DISCUSSION

Demographic characteristics of respondents: One of the objectives of the study is to ascertain fadama farmers and staff of OGADEP/NFDP demographic characteristics that could predict their level of adoption of tube well, improved seeds and inorganic fertilizer. The selected demographic characteristics include gender, age, marital status, educational level, occupation, family size and religion.

Table 2 reveals that 84% of the fadama farmers' are males, while 16% are females. This implies that majority of the listed respondents were males, although, the role of women in fadama activities has been severally reported to be highly commendable. The percentage difference between males and females could have arisen from the random sampling procedure adopted by this study, which gave every respondent equal chance irrespective of gender. The importance of gender analysis in this study has been classified by Akinbile *et al.* (2006) that gender has proven to be an essential variable for analyzing roles, responsibilities, constraints, opportunities, incentives, costs and benefits in agriculture.

Table 2 also shows that 50% of the respondents were between the age category of 40-49 years while, 8 and 36% of the respondents are within the age-ranges of 20-29 and 30-39 years, respectively. The implication of the findings is that most of the respondents are in their active and productive ages and thus capable of undertaking the labor demanding tasks characteristics of fadama irrigation farming activities. The observed low number of respondents within the age ranges of 1-19, 50 and above indicates that the young adults and the elderly ones are not intensively involved in fadama development by Oladoja *et al.* (2008a). Table 2 also shows that majority of respondents 90% were married. This might corroborate the stand that the marriage institution is still cherished and it is an indication of economic responsibilities of the respondents in caring for dependents. This conforms with the position of Jibowo (1992) that the vast majority of the adult population of any society consist of married people. About 51 and 46% of the

Table 2: Respondents demographic characteristics

Variables	Operationalization	Fadama farmer Frequency	Percentage
Gender	Male	84	84
	Female	16	16
Age	15-19	4	4
	20-29	8	8
	30-39	36	36
	40-49	50	50
	Above 50	2	2
Marital status	Married	90	90
	Single	6	6
	Divorce/separated	4	4
Educational level	No formal education	40	40
	Adult literacy	32	32
	Primary	13	13
	Secondary	10	10
	Tertiary	5	5
Family size	1-3	14	14
	4-6	46	46
	7-9	30	30
	10-12	10	10
	above 12	-	-
Occupation	Farming	65	65
	Civil servant	15	15
	Trading	-	-
	Artisan	4	4
	Farming/fishing	16	16

Source: Field Survey (2007)

respondents were adherents of the Islamic faith and Christians, respectively, while about 3% of the respondents are traditional worshipers.

Table 2 also shows that 40% of the respondents have no formal education, a reflection of the level of education, in the rural areas. The result implies that literacy level is not likely to be a major constraint to fadama development in the study area because the educational attainment is somehow fair, although complex terms and phrases might require some clarifications. Table 2 also reveals that 65% of the respondents have farming as their primary occupation while, the remaining 35% combine farming with other secondary occupation as civil service, fishing and artisan. This conforms with the finding of Oladoja *et al.* (2008b) that majority of people dwelling in rural areas of Nigeria are farmers. Table 2 also shows that about 76% having family size of between 4-9 persons with only 14 and 10% having family size of 1-3 and 10-12 persons, respectively. The majority have 4-9 persons in their household is explained by Oladoja *et al.* (2008b) and Baba (2002) that in societies where little mechanization is practiced, most economic production activities are carried out manually. Thus, the greater the number of hands available, the greater the productivity of the family.

Distribution of respondents production practices: Table 3 shows that 88% of respondents possess farm sizes of between 1-10 ha while, 10% have above 10 ha. This finding agrees with the finding of earlier studies

Table 3: Frequency distribution of fadama farmers production practices

Variables	Operationalization	Frequency	Percentage
Variable	<1 ha	2	2
	1-10 ha	88	88
	Above 10 ha	10	10
Farm size	1-9	20	20
	10-19	77	77
	20 and above	3	3
Source of land	Inheritance	80	80
	Lease/rent	5	5
	Gift	10	10
	Purchases	2	2
	Borrowing	3	3
Crop grown	Okro	45	45
	Amaranthus	76	76
	Tomatoes	55	55
	Rice	35	35
	Maize	86	86
Production season	Dry season	92	92
	Raining season	98	98
	Throughout the year	96	96
Sources of labor	Family labor	35	35
	Personal labor	7	7
	Hired labor	18	18
	Communal labor	10	10
	Combination of all the above	30	30

Source: Field Survey (2007); n = 100

Table 4: Demographic characteristics of OGADEP staff

Variables	Specialisation	Frequency	Percentage
Gender	Male	18	90
	Female	2	10
Age	20-29	7	35
	30-39	13	65
	40-49	-	-
Marital status	Married	17	85
	Single	3	15
	Divorced	-	-
Educational level	OND	2	10
	HND/B.Sc.	13	65
	MSc	5	25
Post	Fadama users association officer	4	20
	Extension Agents	7	35
	Zonal Manager	4	20
	Extension Supervisor	4	20
	Director of technical services	1	5
Duration of involvement in Fadama development	1-2	4	20
	3-5	11	55
	6-8	5	25
Improved technologies*	Tube well	18	90
	Wash boes	12	60
	Pumping machines	16	80
	Improved seeds	10	50
	Inorganic fertilizer	6	30
Constraints*	Inadequate mobility	15	75
	Inadequate funding	5	25
	Inadequate improved technology	10	50

Source: Field Survey (2007); *Multiple responses, n = 20

on fadama landholding in Nigeria (Oladoja *et al.*, 2008a; Baba and Singh, 1998). From the study, about 97% have 20 years experience and less and 3% have over 20 years farming experience. The result implies that majority of the respondents have adequate farming experience to be able to adapt easily with improved fadama technologies being promoted by the NFDP.

Table 3 also indicates that 80% of respondents acquire their land holdings through inheritance, above 5% through lease/rent and 10% through gift, while, 2 and 3% acquire theirs through purchase and borrowing, respectively. This result can be corroborated with the submission of Baba and Singh (1998) that inheritance is the most important method of land acquisition in fadama lands of Northern Nigeria. Table 3 shows the fadama farmers cropping enterprises in order of popularity. About 86% of the respondents cultivate maize, 76% amaranths, 55% tomatoes, 45 and 35% cultivate okro and rice, respectively. The cropping pattern indicated that fadama farmers concentrate more in the production of crops that can be preserved and prevented from spoilage or deterioration using indigenous technology. For instance, crops like rice, maize and okro can be dried and stored for as long as the situation demands. Table 3 also, reveals that about 2% of the respondents are dry season producers while 8% produce during the rainy season only. Those, who produce throughout the year constitute 90%. The implication of the finding is that resources are being optimally utilized to ensure availability of food crops all the season.

Data in Table 3 shows that 53% of respondents rely on both family labor and hired labor 35% on family labor sources while, 10% rely on communal labor sources. The result agrees with Oladoja *et al.* (2008a) submission that family labor constitutes in major source of labor in rural Nigeria.

Information on personal characteristics of the OGADEP/NFDP staff: The information on staff involved in the implementation of the project activities in term of improved technologies introduced to the target beneficiaries and constraints is presented in Table 4.

Table 4 shows that 90 and 10% of the respondents are males and females, respectively. From the study, 85% of the respondents are married, 65% were between 30-39 years, while 35% are between 20-29 years as shown in Table 4, the result reveals that most of the staff are in active years of their life when they are physically fit and mentally alert to effectively cope with the rigours of field work. From Table 4, it is shown that 65 and 10% of the respondents posses HND/B.Sc. and OND, respectively while, 25% had Masters degree among the respondents. The results indicate that the OGADEP staff is made up of qualified professionals. Most of the staff (80%) has been associated with fadama development project for a period

Table 5: Distribution of respondents according to their perceived benefit derived

Item benefits from	Frequency*	Percentage*
Tube well	23	23
Wash bore	25	25
Pumping machine	33	33
Inorganic fertilizer	19	19
Improved seeds	24	24
Agro-chemical	15	15
Extension contact	40	40
Membership of Fadama Users Association (FUA)	38	38

Source: Field Survey (2007); *Multiple responses

Table 6: Achievement of NFDP in development in the last 3 years in the study area

Item	Target	Achievement	Percentage
Pumping machines	397 produce	194 sold to farmers	48.9
Tube well	108	108	100.0
Wash bores	260	260	100.0
FUA	280	260 registered	92.8
Storage facilities	Nil	Nil	Nil
Credit facilities	Nil	Nil	Nil

Source: Field Survey (2007)

of 3-8 years. The result revealed that most (90-60%) of them agreed that tube well, wash bores and pumping machines have been introduced to the fadama farmers, while very few (50-30%) of the respondents agreed that improved seeds and inorganic fertilizer have been introduced. The low response with respect to improved seeds and inorganic fertilizer might be due to the high costs of these inputs, thereby making their availability a constraint. From the study, about 75% of the management staff indicates inadequate mobility as one of the constraints they face in their operations. Furthermore, 25 and 50% of the staff identified inadequate funding and inadequate improved technologies as other constraints they are faced with.

Table 5 indicates that the fadama farmers are in constant contact with the extension agents. The efforts of the NFDP in the state in ensuring adequate extension contact is therefore, commendable. Table 5 also shows that many of the respondents are members of the Fadama Users Associations (FUAs), while they also benefit from provision of pumping machines for lifting water for watering their farm plots. The respondents derive the least benefit from the provision of agro-chemicals, which they turn opined they often source for through private marketers. The effort of the NFDP is thus not channeled towards the provision of agro-chemicals and fertilizers.

Table 6 shows that out of the 397 pumps procured by the state under he NFDP, 194 have been sold to the farmers. Also, all the targeted tube well and wash bores of 108 and 260, respectively were drilled. Out of the 280 FUAs, 260 have been established and registered. Storage and credit facilities were not provided and these may not be the priority of the programme.

Table 7: Chi-square (χ^2) analysis of relationship between fadama farmers personnel characteristics and their perceived benefits

Variable	(χ^2)	df	p-value	Remarks
Age	0.798	4	0.930	NS
Gender	2.315	4	0.813	NS
Level of education	5.455	2	0.059	NS
Family size	2.599	2	0.217	NS
Marital status	0.375	2	0.733	NS

Source: Field Survey (2007)

Table 8: Personal product moment correlation coefficient of Fadama farmers adoption of improved technologies their attitudes and their perceived benefits

Variable	R-value	p-value	Decision
Adoption	0.568	0.000	S
Attitude	0.088	0.426	NS
Benefits	0.176	0.115	NS

Source: Field survey, 2007, where, r = Cumulative coefficient, P = Level of probability, At p<0.05 (2 tailed), S = Significant, NS = Not Significant

Table 7 reveals that there is no significant relationship between fadama farmers personal characteristics (such as age, level of education, family size, marital status and gender) and their perceived benefits. This implies that the fadama farmers personal characteristics had no influence on benefits derived from the project.

Table 8 shows that there is a significant correlation at (p<0.05) between for technology adoption and perceived benefits. That is the adoption of technology is a determining factor for benefits to be derived. On the other hand, correlation is not significant at (p<0.05) between for technology adoption and the farmer's attitude, as well as for farmer's attitude and their perceived benefits.

Table 9 reveals that all the seven independent variables were able to predict up to 31% of the total variation in the adoption of improved seeds. The R = 0.535 indicates that a high relationship exist between the variables and improved seeds adoption. The F-value (4.651) suggests that we can accept the above variables as significant explanatory variables on the dependent variable.

Table 10 depicts that all the seven independent variables, namely: gender, age, marital status, family size, educational level, farm size and extension contact were able to predict up to 21% of the total variation in tube well adoption. The R-value (0.470) also shows that there is a high relationship between the independent variables and tube well adoption. The strong F-value (2.682) indicates that the above independent variables can be accepted as significant explanatory variables of the dependent variable.

Table 11 shows that the independent variables were able to predict up to 25% of the total variation in the adoption of in-organic fertilizer. The R-value of (0.487) indicated that a high relationship exists between the predictor variables and the criterion variable.

Table 9: Summary of result of multiple regression analysis of the adoption of improved seeds with independent variables

Sources of variation	df	Sum of square	Mean of square	F-value	Significant level
Regression model	7	22.791	3.256	4.651	0.000
Residual	92	64.409	0.700	-	-
Total	99	87.199	-	-	-

Source: Field Survey (2007); $R = 0.535$, $R^2 = 0.306$, SE estimate = 0.8457

Table 10: Summary of result of multiple regression analysis of the adoption of tube well with independent variables

Sources of variation	df	Sum of square	Mean of square	F-value	Significant level
Regression model	7	22.791	1.274	2.682	0.016
Residual	92	43.693	485	-	-
Total	99	52.610	-	-	-

Source: Field Survey (2007); $R = 0.470$; $R^2 = 0.207$; SE estimate = 0.6791; Significant at 0.01 level

Table 11: Summary of result of multiple regression analysis of the adoption of in-organic fertilizer with independent variables

Sources of variation	df	Sum of square	Mean of square	F-value	Significant level
Regression model	7	17.456	2.405	3.249	0.005
Residual	92	70.939	0.679	-	-
Total	99	87.199	-	-	-

Source: Field Survey (2007); $R = 0.487$; $R^2 = 0.245$; SE estimate = 0.8683; Significant at 0.01 level

The F-value (3.25%) reveals that the independent variables can be accepted as significant explanatory variables on the dependent variables.

CONCLUSION

From the study, it can be concluded that age, educational level and extension contacts were the variables that significantly contributed to the prediction of the dependent variables namely tube well, improved seeds and inorganic fertilizer adoption.

RECOMMENDATIONS

In the above findings, the provision of credit facilities to the fadama farmers is recommended to enable them finance their fadama farming enterprises. Also adequate mobility for the extension staff of the project to enable them discharge their researchh effectively, particularly in the areas of extension services need be provided. Fadama farmers should be provided with basic infrastructures such as portable water; feeder roads, electricity to make them develop favourable attitude towards the National Fadama Development Project (NFDP). Efforts should be made by research institutes to generate new improved technologies on fadama production.

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