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Analysis of Value Addition and Livelihood Diversification among Fadama Users in Imo State, Nigeria

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Abstract

The study examined value addition among Fadama and non Fadama users in Imo State, Nigeria. Data used for the study were collected with the aid of structured questionnaire administered to 150 randomly selected Fadama users drawn from Fadama Community associations and Fadama user groups in six local government areas of the state. Data were analysed using Heckman two stage selection model and logit regression technique. The results showed that livelihood diversification strategies among Fadama users were influenced by household size, age, educational level, extension visit and access to credit, while livelihood diversification strategies among non Fadama users were influenced by household size, age, educational level and cooperative membership. It was concluded that Fadama project promoted value addition in Imo State. It was recommended that Fadama should be mainstreamed into the state and local government annual work plan and budget to enable the State Agricultural Development Programme to assign her extension staff to supervise and monitor the subprojects for sustainable livelihood in the State.

Keywords: Value addition, fadama, livelihood, diversification

1.0 Introduction

In Nigeria, majority of the farming households either depend on agriculture for survival as supplement to their main source of income. Diversified households are said to be more likely to enjoy higher flexibility and resilience capacity than households that are completely dependent on agriculture (Simtowe, 2010; Ellis, & Madox, 2003; Chapman & Tripp, 2004). Diversification may also develop as a coping strategy to the loss of capital. However, one important means of income generation that rural farmers have not paid much attention to is value addition. Value addition is

any act that takes a raw product a step closer to the form in which it can conveniently meet the needs of the user or any improvement made to product to bring it to a form in which the consumer wants it (Ngore, 2010).

Value addition is useful as a poverty-reduction tool if it leads to increase on and off-farm rural employment. A focus on post-harvest activities, differential value added products and increasing livelihood with access to market for goods produced by low-income producers would appear to be the strategy open to smallholders (Lundy, Felipe and Best, 2002). The poverty reducing potential of value addition is not only in generating rural income and employment but also by improvements in processing that reduce traditional food preparation times. Laudable among these programs is the National Fadama development programme. Fadama is a Hausa word for an irrigable land usually flood plains with shallow aquifers found along Nigerian major river systems. Such lands are especially suitable for irrigation production, fish farming, traditional fish feed and water for livestock (Ingawa, Oredipe, Idefor, & Okafor, 2004; Nwachukwu & Onyenweaku, 2007). The national Fadama Development project is a major instrument for achieving government's poverty reduction objective in the rural areas of Nigeria. Its beneficiaries are the private economic agents who achieve their livelihood directly or indirectly from the exploitation of the natural resources in a given Fadama area. The project empowers Fadama Community Associations (FCAs) with the resources and the needed technical assistance and support to properly manage and control these resources for development. Fadama adopts a community demand-driven (CDD), socially inclusive and participatory process whereby users of the Fadama collectively identify their development priorities and agree on their intervention activities outlined in Local Development Plans (LDPs) (National Fadama Development Office, 2010).

1.1 Objectives of the study

The broad objective of the study was to analyze value addition in fadama activities in Imo State, Nigeria. The specific objectives of the study were to:

(i) Examine the socio-economic characteristics of fadama and non fadama users in the state.

(ii) Identify the areas of value addition in fadama activities in Imo State.

(iii) Determine the extent of value addition in fadama activities in the State.

(iv) Ascertain the determinants of household livelihood diversification strategies among fadama and non- fadama users in the area.

2.0 Methodology

2.1 Study Area

This study was conducted in Imo state which is among the states in Nigeria that benefited from the National Fadama Development project. Imo State lies between Latitude $5^{0}10^{1}$ and $6^{0}35^{1}$ North of the equator and between Longitude $6^{0}35^{1}$ and $7^{0}31^{1}$ East of the Greenwich meridian. The State has a population of about 3,934 million people disaggregated into 2,032 males and 1,903 million females (NPC, 2006). It is bounded on the East by Abia state, on the North by Anambra and Abia State, and on the West by Rivers State. The State is divided into 27 administrative units called Local Government Areas which are grouped into 3 agricultural zones viz Owerri, Okigwe and Orlu. Agriculture is the predominant occupation of the people.

The ecological zone favours the growing of tree crops, roots and tubers, cereals, vegetables and nuts (Onyenwaku *et al,* 2010). The state experiences two marked seasons, the dry season which occurs between November to February and the rainy season which begin in March and end in October, with a brake in August and early September. There is dry, cold and dusty wind known as the harmattan, which is often experienced between December and January. The annual precipitation ranges from 1800mm to 2400mm. Annual daily mean air temperature is about 28^{o}C. The relative humidity reaches 90% during the night and 72% during the day. The vegetation is determined by economic trees like the Iroko, Mahogany, Obeche, Gmelina, Bamboo, Rubber, and oil palm. The high population density of the state has led to intensified pressure on land, forest and other natural resources. Fallow period rarely exceeds one year and in some areas continuous cropping is the practice. Oil, gas and solid minerals are available in some local government areas of the state in large and commercial quantities. The major crops cultivated in the state are maize, melon, rice, groundnut, vegetables, yams, cassava, oil palm, and rubber. Major animals reared include chicken, turkey, goats, sheep and pigs.

2.2 Sample Selection

The population for the study comprised the beneficiaries of Fadama II, and Fadama III and their non-beneficiaries. Fadama II was implemented in 11 LGAs in the state, while Fadama III was implemented in 20 LGAs of the State. There are 33,333 farm households in Imo State (Imo ADP, 1988). These include both fadama and non

fadama beneficiaries in the state. Samples for this study were drawn from these farm households. Multistage random sampling technique was used in the selection of the sample. In stage one, two Local Government Areas (LGAs) that participated in both Fadama II and Fadama III were purposively selected from each agricultural zone. FCAs were chosen randomly from each of the selected local government areas, thus giving a total of 30 Fadama Communities Associations. The third stage involved random selection of 5 Fadama user groups (FUGs) from each of the 30 Fadama communities Associations making a total of 150 FUGs. In the 4th stage, a member of the Fadama user group (FUG) was chosen randomly from each of the selected Fadama User Groups, thus giving a sample size of 150 Fadama respondents. In order to study uniform number of parallel respondents, 150 non Fadama users were drawn randomly from the same thirty (30) communities where the Fadama community associations and fadama users groups were chosen (5 non Fadama users from each community), bringing the cumulative sample size of 300.

2.3 Data collection and analysis

The primary data used for the study were collected with validated and structured questionnaire that was administered through face to face interview method. Data were collected on variables such as household income, livelihood diversification strategy, value addition, age, level of education, household size, farm size, cooperative membership, primary occupation, gender, land ownership, farming experience, access to credit. The data collection lasted from September 2014 to August 2015).

The Heckman two stage selection model was used to determine the extent of value addition in fadama activities because the decision on the extent of value addition is usually preceded by a decision to engage in the process of value addition. In the first stage, the decision to add or not to add value was assessed using a probit model, as specified in equation (1).

$$P_i = \mathrm{P}(Y|X_i) \quad (1)$$

Where Pi = probability that the farmer adds value,

X_i = household characteristics that determine value addition

Y = 1 if the farmer adds value, and Y = 0 if he does not. Therefore

$$P_i = P(Z_i \leq \beta_1 + \beta_2 X_i) \quad (2)$$

Where Z_i is the standard normal variable that shows the extent of value addition.

In the second stage the Inverse Mills Ratio (IMR) was added as a regressor in the extent of value addition equation to correct for potential selection bias as shown in equation (3)

$$Z_i^* = \beta_i X_i \mid y\lambda \mid u_i \quad (3)$$

Where λ = the estimated Inverse Mills Ratio (IMR) and U_i = the error term

$Z_i^* = Z_i$ if and only if the farmer adds value

β_1 and β_2 are parameters to be estimated

The two equations were jointly estimated using the Heckman two stage procedure in STATA. The variables used in the two stage Heckman selection model are as shown below.

Y = Value added (dummy, 1 = value addition, 0 = otherwise)

X_1 = Age of the household head (years)

X_2 = Area cultivated (Ha)

X_3 = Access to credit (dummy, 1 = access, 0 = otherwise)

X_4 = Household size (persons)

X_5 = Level of household education (number of years spent in school)

X_6 = Gender of household head (dummy, 1 = male, 0 = otherwise)

X_7 = Farm size (Ha)

X_8 = Co-operative membership (dummy, 1 = membership, 0 = otherwise).

4.0 Results and Discussion

4.1 Socio – economic characteristics of Fadama and non Fadama users

The results of the analysis of socio-economic characteristics of respondents show that (44.7%) of Fadama users and (42.7%) of non Fadama users had secondary education. However, 30.75% of the Fadama users had tertiary education while 27.3% of the non Fadama users had tertiary education. The result also indicates that 24.7% and 26% of Fadama and non Fadama users respectively had primary education. The mean year of education was 9.6 and 8.9 years for fadama and non Fadama users respectively. This implies that both Fadama and non Fadama users

are literate. This finding is in line with the works of Bature *et al* (2013); Amanze *et al* (2015) and Mazza *et al* (2015), but at variance with the work of Oladimeji *et al* (2015) who reported 1.09 years mean years of schooling in Kwara State.

Analysis of the data further shows that the mean household size for Fadama and non Fadama users are 7 and 6persons respectively. It also showed that (56%) and (47.3%) of Fadama and non Fadama users respectively had 6 – 10 persons per household. This may suggest that both Fadama and non Fadama users in the study area have large household sizes. Large household sizes reduce the cost of hired labour, ensures availability of labour as well as expansion of farm size and supports diversification of livelihood activities. The result also indicates that (50%) of the Fadama users and (26.7%) of the Non Fadama users received 1-25 extension visits per year while 21% of Fadama users and 3.3% of non Fadama users received 26 – 50 visit per year. The result indicates that 28% of the Fadama users and 66.7% of the non Fadama users had no extension contact. The mean number of visits per year was 21times for Fadama users and 7 times for non Fadama users. The implication of this finding is that Non Fadama users in the study area are poorly visited by extension agents compared with Fadama users.

With regard to years of farming experience, (29.3%) of Fadama users and (32.7%) of non Fadama users have farming experience of 21years and above. This is followed by 22.7% of Fadama users and 19.3 % of non Fadama users who have 6 - 10 and 1-5 years of farming experience respectively. The result further shows that 20% of Fadama users and 18.7% of non Fadama users have 11 – 15 and 6- 10 years of farming experience respectively. The mean years of farming experience for Fadama users was 13.5 and 14.23 for non Fadama users. The analysis of the data showed that 70% of Fadama users are men while 30% are women. This could be attributed to the fact that Fadama project have special preference for women. This finding is in line with Mazza *et al* (2015) and Olaolu *et al* (2013) but disagrees with the work of (Achoja 2014) whose study showed that women participated more in Fadama project than men in Delta state. Gender relationships are important in shaping livelihoods diversification processes. Social organization and culture can significantly influence the relative access to diverse household capital assets by constraining or promoting the ability to mobilize resources along gender lines (Ellis, 2000; Gladwin, 2001; Dolan, 2002).

With regard to age of the respondents, the households were classified into six age groups; i.e. ≤ 30 years, 31- 40, 41-50, 51- 60, 61-70 and 71 years and above. The results show that (50%) and (30%) of Fadama and non Fadama users respectively are within 51 – 60 years of age. However, 30.7% and 28.6% of Fadama and non Fadama users respectively are within the age bracket of 41 – 50 years. The mean age of the Fadama and non Fadama users was found to be 53.5years and 52.1years respectively. This may suggest that the non Fadama users in the study area have younger farmers than the Fadama users. This finding is in line with the work of Ike (2012), but at variance with the national mean age of 48.5. The distribution of respondents according to farm size among Fadama and non Fadama users indicates that (64.7%) of Fadama and (46%) of non Fadama users cultivated between 0.1 – 0.9 hectares of farm land. This is followed by 21.3% and 40% of Fadama and non Fadama users who cultivated 1- 1.9 hectares of farm land. The study also showed that 6% and 12.7% of Fadama and non Fadama users cultivated between 2 – 2.9 hectares of farm land. The mean farm size for Fadama users is similar with the work of Adeyemo *et al* (2010) that indicates an average farm size of 0.77 in Ogun State, Nigeria. This finding is also in line with the work of Mazza *et al* (2015) and Achoja (2014), but disagrees with the work of Awerije (2014) whose report showed an average farm size 0f 1.68ha in a study in Delta State.

4.2 Areas of value addition in Fadama activities in Imo State

Increase in post-harvest losses has continued to pose a great challenge to rural farmers in Imo state and Nigeria at large thereby limiting their income generation. Several researchers are of the view that Processing of cassava root tubers into products that increase the shelf life of cassava would help to reduce the seasonal glut effects and bridge the food gap in developing countries. It would also serve as means of job creation and provide linkages between production and marketing processes (Awerije, 2014; Eboh *et al*, 2012; Benin *et al*, 2010; Awoyinka, 2009). Agricultural produce are known to be highly perishable, hence most rural farmers do not get the desired reward for their work as most of their produce are lost a day or two after harvest (Aniedu *et al*, 2012). In order to enhance the livelihood and sustainable income generation of the rural dwellers, the Nigerian government over the years introduced and implemented several policies and programmes aimed at increasing farmers' income, supporting livelihood activities and thereby reducing

poverty. An effort towards this was the introduction of National Fadama Development Project. Fadama I focused mainly on crop production and largely neglected support of post-production activities such as commodity processing, storage and marketing (downstream agricultural sector).

The emphasis was on providing boreholes and pumps to crop farmers through simple credit arrangements aimed at boosting aggregate crop output (Nkonya *et al*, 2008). Fadama II and later Fadama III projects were implemented to address the problems identified in Fadama I by involving all the stakeholders in the common resource utilization and some downstream activities such as value addition and marketing.

Fadama project in the study area supported the following activities; crop production (cassava, maize, garden egg, yam, rice etc.), livestock production (pig, poultry, sheep and goat) fishery production, forestry (apiculture, snailry, tree planting, grass cutter rearing, etc), agro processing (cassava mill, oil mill, feed mill, palm kernel extracting mill,), farm implement, rentals, storage facility (cold room), market infrastructure(lock-up shop , open market stalls), bore hole, construction of roads and culverts and irrigation facilities etc. However, the result of the findings showed that processing as a form of value addition is the only area supported by Fadama activity. The concept of “processing” entails the special treatment of the agricultural produce before it is consumed to increase the shelf life. For instance cassava roots are produced and processed as a subsistence crop for home consumption and sometimes for sale in village and urban markets. When cassava is processed, value has been added to the produce. Some of the value-added products in the study area are mainly *garri, fufu*, tapioca, palm oil, palm kernel oil etc.

4.3 Extent of value addition in Fadama activities

To determine the extent of value addition in Fadama activities, the Heckman two stage selection models was employed. The result is presented in Table 1. The result produced a chi-square value of 39.11 which was significant at p = 0.05 level, implying that the Heckman model gave a good fit to the data.

Table 1: Result of Heckman two selection models on the determinant of the extent of value addition in Fadama activities in Imo State

Variables	Coefficient	Standard error	Z	P>|Z|
Age (X_1)	0.0987	0.0279	3.54**	0.000
Land ownership (X_2)	-0.1849	0.4165	-0.44	0.657
Access to credit (X_3)	2.3892	0.7378	3.24**	0.001
Household size (X_4)	0.0494	0.0607	0.81	0.415
Level of education (X_5)	-0.0617	0.0385	-1.60	0.109
Gender (X_6)	-0.9546	0.3505	-2.72**	0.006
Farm Size (X_7)	0.9950	0.2552	3.90**	0.000
Coop. membership (X_8)	-0.2862	0.5056	-2.54*	0.011
Constant	-6.4944	1.7317	-3.75**	0.000

ρ	-0.31332	Number of observation	= 150
∑	.30661718	Censored observation	= 107
λ	-.09606931 .1926303	uncensored observation	= 43
χ^2	39.11	pro> χ^2	= 0.0065

Source: Survey data, 2015 *Significant at 5% level, **Significant at 1% level.

The age of the household head (X_1) plays a major role in determining the extent of value addition in Fadama activities. Age was found to be significant at 1% level and positively related to extent of value addition. This finding is in line with the work of Awerije (2014) who's study in Delta State showed that age was significant at 5% level and positively related to quantity of *garri* processed. This implies that the older the household head, the greater the likelihood to engage in activities that enhance value addition. Land ownership **(X_2)** was negative and none significant with extent of value addition. This suggests that ownership of land has no influence on value addition. This can be explained by the fact that those who own large portions of land are normally involved in so many other on-farm activities like crop farming thus leaving no time for value addition. Access to credit (X_3) was shown to be significant at 1% level and positively related to extent of value addition. This implies that 1% increase in access to credit increases the extent of value addition.

The coefficient of household size (X_4) was found to be positive and statistically none significant. This implies that Fadama users' household size has no influence on the extent of value addition. Level of Education (X_5) was negative and statistically none

significant. This implies that level of education has no influence on the extent of value addition. This could be because there is no special skill required to increase value addition in Fadama activities. Mishra and Uematsu (2010) observed that educated people are more likely to earn more income from none farm activities; hence they put less effort and time on agribusiness activities like value addition. Gender of household head (X_6) was found to be negative and significant at 1% level. This suggests that female headed households are more involved in value addition than their male counterparts. This could be because value addition is more like a domestic work. Traditional or cultural practices and beliefs in Nigeria, as in many regions of the world, demand that the roles and activities of men and women are different. In most cases, the ordering of these roles is influenced by the ability of the head of the household to have access to farm inputs/resources (Olagunju *et al*, 2013). Farm size (X_7) was found to be significant at 1% level and positively related to value addition. This may suggest that 1hactare increase in farm size will increase the extent of value addition by 9.95%. Membership of Cooperative Society (X_8) was found to be statistically significant at 5% level and negatively related to extent of value addition, suggesting that membership of cooperative society may not necessarily increase value addition in fadama activities.

4.4 Determinants of household livelihood diversification strategies among Fadama and non- Fadama users

To analyze the determinants of household livelihood diversification strategies among Fadama and non- Fadama users, the logit regression model was employed.

Table 2 shows the result of the Logit regression analysis on determinants of household livelihood diversification strategies among Fadama users. The result of the analysis showed household size (X_1) was significant at 1% level and negatively related to diversification strategy adopted by Fadama users.

Table 2: Result of Logit regression on determinants of household livelihood diversification strategies among Fadama users

Variables	Coefficients	Standard error	Z	P>|Z|	marginal effects
Household Size(X_1)	-0.2052	0.0141	-3.32**	0.001	-0.0469
Gender (X_2)	-0.1429	0.1062	-0.31	0.760	-0.0324
Age (X_3)	-0.0751	0.0078	-2.20*	0.028	-0.0172
Education level (X_4)	0.2282	0.0138	3.77**	0.000	0.0522
Extension visit (X_5)	0.0175	0.0018	2.19*	0.029	0.0040
Coop. membership (X_6)	0.1698	0.0953	0.41	0.684	0.0387
Access to credit (X_7)	-1.5737	0.0913	-3.06**	0.002	-0.2792
Constant	6.9687	2.3081	3.02**	0.003	
Log likelihood	-74.7584				
Chi-square	53.90				
Pseudo R^2	0.2650				
Number of observations = 150					

Source: Survey data, 2015 *Significant at 5% level, **Significant at 1% level.

This inverse relationship implies that an increase in Fadama household size by one person reduces the odd to diversify by 0.46%. This finding is in line with the work of Abimbola *et al* (2014) in a similar study in Oyo State. This could be that most of the household members of the Fadama users are younger and of school age and therefore may not have participated in livelihood diversification. Gender (X_2) was negatively related to diversification strategy and statistically none significant. This result suggests that gender does not affect livelihood diversification strategies adopted by Fadama users. This could be linked to the fact that Fadama project is not gender biased.

Age of the farmer (X_3) was found to be significant at 5% level and negatively correlated with Fadama users' decision to diversify. This implies that the odd to diversify decreases by 0.17% as the age increases by one year. The possible reason could be that Fadama users, whose age is relatively younger, leaving other factors constant, could be pushed to engage more in non-farm activities than in agriculture. Education attainment (X_4) was found to be negative and statistically significant at 1% level. This implies that the odd to diversify decreases by 0.6% with increase in level

of education. This could be attributed to the fact that with more formal education, preference for white collar jobs would be heightened. Extension contact (X_5) was positive and statistically significant at 5% level, suggesting that the likelihood to diversify increases by 0.04 % with increase in extension visit. Membership of cooperative Society (X_6) was found to be positive and statistically none significant, implying that social organization membership has no effect on livelihood diversification strategy among Fadama users. Access to credit (X_7) was shown to be statistically significant at 1% level and negatively related to livelihood diversification strategies. This implies that, access to credit decreases the likelihood to diversify by 2.7 %. This negative relationship may suggest that credit use allows farmers to follow agricultural intensification by accessing high yielding farm inputs.

Table 3: Result of logit regression on determinants of household livelihood diversification strategies among non Fadama Users.

Variables	Coefficient	Standard error	Z	P> | z|	marginal effects
Household Size (X_1)	0.263	0.004	2.06*	0.040	0.009
Gender(X_2)	-1.245	0.024	-1.43	0.152	-0.034
Age (X_3)	-0.085	0.001	-2.05*	0.040	-0.003
Educational level(X_4)	0.192	0.003	2.02*	0.043	0.006
Extension visit (X_5)	0.089	0.001	1.75	0.080	0.003
Coop. membership (X_6)	-2.281	0.045	-2.39*	0.017	-0.107
Access to credit (X_7)	0.105	0.029	0.13	0.896	0.003
Constant	6.671	3.194	2.09*	0.037	
Log likelihood = -39.041593					
Chi-square = 31.99					
Pseudo R^2 = 0.2907					
Number of observations = 150					

Source: Survey data, 2015 *Significant at 5% level **significant at 1% level.

Table 3 shows the result of the logit regression on determinants of household livelihood diversification strategies among non Fadama Users. The table shows that household size (X_1) positively related to livelihood diversification and statistically significant at 5% level. This implies that larger households diversify more than

smaller households. The analysis shows that an increase in household members increases the odds to diversify by 0.09%. This finding agrees with the work of Olawuyi *et al* (2012) who found that household size was significant at 1% level and positively related to livelihood diversification in a study in Ogun state. Gender (X_2) was found to be negative and statistically none significant. This implies that gender has no influence on livelihood diversification among non Fadama users. Again the finding agrees with the work of Olawuyi *et al* (2012) in a similar study in Ogun state. Age (X_3) was found to be significant at 5% level and negatively related to livelihood diversification strategies. This implies that non Fadama users' choice to diversify decreases as they get older.

Educational attainment (X_4) was found to be positive and statistically significant at 5% level. This direct relationship signifies that increase in education favours livelihood diversification. The analysis showed that acquiring higher level of education increases the odds to diversify by 0.6%. This result is consistent with the work of Idowu *et al (*2011) who observed that education is a key determinant in the diversification of income generating activities in southwest Nigeria. Extension contact (X_5) was found to be positive and statistically none significant. This implies that extension contact has no influence on livelihood diversification among non Fadama users. Similarly, access to credit (X_6) was positive and statistically none significant. This implies that access to credit has no influence on livelihood diversification strategies adopted by non Fadama users. Membership of Cooperative Society (X_7) was shown to be statistically significant at 5% level and negatively related to livelihood diversification strategy. This suggests that, participation in cooperative activities decreases the odds to diversify by10.7%. Though, cooperative membership promote access to social capital in which none farm options are gained, but the result of this study suggests that non Fadama users' participation in cooperative activities would play important role in promoting agricultural development rather than enhance diversification.

5.0 Conclusion

Based on the finding of this research study, it can be concluded that Fadama project promoted value addition and supported livelihood diversification in Imo State.

6.0 Recommendations

On the basis of the findings of this study, the following recommendations were made.

(1) Fadama should be mainstreamed into the state and local government annual work plan and budget to enable the State Agricultural Development Programme to assign her extension staff to supervise and monitor the subprojects for sustainable livelihood in the State.

(2) Government and donor agencies should intensify efforts to incorporate packaging and labeling of Fadama products. This would enable Fadama products to be acceptable at the global market.

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