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Effect of Fadama III Community Infrastructure on Farm Profitability of Members of Fadama user Groups (Fugs) in Anambra State, Nigeria

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ABSTRACT

The study evaluateD the effect of FADAMA III community infrastructure on farm profitability of members of FADAMA User Groups (FUGs) in Anambra state, Nigeria. Specifically, the study determined the effect of rural markets on farm profitability of FUG members; effect of rural borehole on farm profitability of FUG members, and effect of processing facilities on farm profitability of FUG members. These objectives were achieved through analysis of cross sectional data which were collected by employing multi-stage sampling technique in the four Agricultural zones in Anambra, Awka, Aguata and Onitsha to select 375 respondents out of population of 6,125. Research outcome shows that that provision of rural markets has significant effect on farm profitability of FUG members (F ratio = 60.634; significant @ 0.01); provision of water boreholes has significant effect on farm profitability of FUG members (F ratio = 34.737; significant @ 0.01 level); and provision of cassava processing facilities has significant effect on farm profitability of FUG members (F ratio = 27.082; significant @ 0.01 level). The researchers recommended among others provision of agricultural support services such as fertilizer, seedlings, credit and extension services by FADAMA III project managers, so as to boost farming activities and income of FUG members.

KEYWORDS: *FADAMA, rural market, water borehole, processing facilities*

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INRODUCTION

FADAMA is an Hausa name for describing irrigable lands that are flooded plain low-lying areas by shallow aquifers found along Nigeria's major river systems (NPF, 2009). Such lands are especially suitable for irrigation farming and traditionally provide feed and water for livestock. The enormous potential of this land is only partially developed (World Bank, 2008). FADAMA has gone through phases one, two and three in various states in Nigeria.

According to the information from the office of the state coordinator to FADAMA III programme in Anambra state, there are different socioeconomic groups that participated in FADAMA III programme in Anambra. The FADAMA officials in Anambra state believed that the FADAMA Users had many aims and interest for participating, but their common interest for participating in the programme is cantered on how to enhance their household income, similarly, Federal Ministry of Agriculture and Water Resources project implementation manual (2009) indicated income as one of the key indicators for measuring beneficiaries (FUGs) participation performance in the FADAMA III programmes. The Federal Ministry further stated that this would have increased FADAMA Users' household average real income by 40% at the end of the program. In other to achieve this, FADAMA III is equipped with several components that will help farmers have access to community infrastructures, be exposed to quality agricultural extension services, have access to agricultural credit and finally compare their income level before and after involvement in FADAMA III programme.

In spite of the above expectations, there has been no conclusive evidence as to the extent FADAMA III programme has influenced the farm profitability of FUG members in Anambra state. However, implementation of the programme in some cases did not achieve its implementation objectives due to some perceive challenges encountered by the FUGs such as dilapidated access roads to farm and absence of market structure for sale of farm product. Absence of market leads to perish ability of agricultural produce, which eventually leads to damages and mostly reduces the price of agricultural produce. Also, transportation cost of travelling for long distance looking for available market for sales is drastically increased. This equally encourages consuming all that is produced and discouraged production for commercial purposes. This has led to decrease in farm profitability of FUG members in Anambra state. There was no availability of borehole facilities in the area to support agricultural and other related activities. Most of the farmers in the area are into cassava and rice cultivation, and processing mills were

lacking in the area for processing. Majority of them travel far away looking for processing mills, which increase cost and time spent. Basically, failure to process farm produce adds little or nothing to the value and price of the produce. Ahmed (2013) reported that post harvest losses were making Nigerian farmers poor. For a very long time, Nigerian farmers have commented on the situation without getting meaningful assistance.

These constraints are capable of imposing significant adverse effects on farm income and inversely affect the farm profitability of FADAMA User Groups. However, FADAMA III is equipped with measures to address the effects of these challenges but the extent the programme had addressed the issues and their effect on farm profitability of FUGs in Anambra state has not yet been proved to the best of the researcher's knowledge, thus the importance of this study.

Therefore, the need to evaluate and validate these claims became necessary and this necessitated this study. Meanwhile, to the best of the researcher's knowledge, there has been little research effort on the successes of FADAMA III on farm profitability in Anambra state and elsewhere in Nigeria. The existing literatures and empirical evidences showed that a lot of studies have been conducted on FADAMA development projects on the promotion of beneficiaries (FUGs) livelihood; poverty eradication and economic development in Nigeria. But majority of these studies were conducted on FADAMA I and II while few of them weren on FADAMA III.

Thus, the present study attempts to investigate the effect of community infrastructural facilities (which encompasses rural markets, borehole facilities and cassava processing facilities) under the aegis of FADAMA III on farm profitability (gross profit margin) of FADAMA User Groups.

Objective of the Study

The broad objective of this study is to evaluate the effect of FADAMA III community infrastructures on farm profitability of members of FADAMA User Groups (FUGs) in Anambra state. The specific objectives are to:

1. Determine the effect of rural markets on farm profitability of FUG members
2. Examine the effect of rural borehole on farm profitability of FUG members
3. Ascertain the effect of processing facilities on farm profitability of FUG members and;

Hypotheses of the study

Ho_1 : Provision of rural markets has no significant effect on farm profitability of FUG members

Ho_2 : Provision of water borehole has no significant effect on farm profitability of FUG members

Ho_3 : Provision of cassava processing facilities has no significant effect on farm profitability of FUG members

Significance of the Study

The findings of this study will help policy makers in formulating agricultural policies that focuses on influencing the farm profitability of FUG members in Anambra state and Nigeria at large. This study also will provide a guide for both academic researchers and scholars in their future studies since it will help provide new research areas in agriculture and Agricultural Development Programmes.

This study will provide the government with the knowledge of the extent to which FADAMA III have influenced the farm profitability of FUG members in Anambra State and give them guidelines on the implementation of subsequent agricultural programmes.

Scope of the Study

FADAMA III Development projects has various components like capacity building, small scale community owned infrastructure, advisory service an input support development, support to the Agricultural Development Programmes (ADPs) sponsored research and on-farm demonstrations, etc. But the researcher will concentrate only on community infrastructures (which encompasses rural markets, borehole facilities, and cassava processing facilities) and its effect on farm profitability of FUG members who participated in FADAMA III in Anambra state.

As such, the study intends to evaluate the effect of FADAMA III community infrastructures on farm profitability of members of FADAMA User Groups (FUGs) in Anambra state, and specifically to determine the influence of rural markets, rural borehole, processing facilities on farm profitability of FUG members in Anambra state and further compare the farm profitability of FUG members before and after involvement in FADAMA III programme.

LITERATURE REVIEW

Conceptual Review

FADAMA III Development Programme

FADAMA areas are typically waterlogged in the rainy season but retain moisture during the dry seasons. FADAMA areas are considered to be of high potential for economic development through appropriate investments in productive assets, rural infrastructure and technical assistance. The desire to harness the vast potentials of FADAMA in Nigeria culminated in the design of National FADAMA Development Project I, II and III. FADAMA I (phase I of the FADAMA Development Project) was implemented during the 1993-1999 period. While FADAMA I focused mainly on crop production, downstream activities such as processing, preservation and marketing were largely neglected. The design did not take into cognizant of the need of spatial integration of the markets (creating of physical and market infrastructure). It also failed to take into consideration other FADAMA resource users such as livestock producers, fish folks, pastoralists, hunters etc. The project did not also support post harvest technology, which manifested in reduced crop prices and increased storage losses during the period (Momoh et al, 2007).

FADAMA III project is a community driven development projects of the Federal Ministry of Agriculture and Water Resources jointly funded by the Federal Government of Nigeria and the World Bank with component funding by state and local government. The project is basically agricultural based that aims at increasing the income of FADAMA Users through FADAMA Community Associations and FADAMA User Group in a sustainable and environmentally friendly manner. As a community-driven intervention, projects are initiated by communities, though with supervision from the state and National FADAMA office. (Federal Ministry of Agriculture and Water Resources, 2013).

FADAMA III project established standardized procedures and steps to guide the local people on how to take part in the decision making process. It established platforms for participation, such as local consultation meetings to identify and select the needed infrastructure to be funded by the project. Beneficiaries (participants) were trained to identify the needed infrastructure, execute and manage small scale development projects in their communities. Community people through the FUGs and FCAs were designated to be executing agencies of local development projects. Capacity building activities were conducted to ensure that they have the ability to manage the different aspects of project implementation, including financial management, procurement management and quality control at a level acceptable to the project.

The FADAMA III is targeted at the 36 states of the federation, including the federal capital territory, with strategic engagement using the unit structure of local governments to directly impact the grassroots. Only Bornu state is yet to be part of the FADAMA project. Though the primary focus of the project is targeted at involvement in food production, there is a tangential part, involving social and economic support to vulnerable groups such as widows, physically handicapped, orphans based on identified needs (demand-driven) in line with the principles of positive list of project design. FADAMA III Project Implementation Manual 2008)

The Third National FADAMA Development Project in conjunction with the 3rd joint World Bank/FGN Supervision mission aims at assessing the progress made by the different states implementing the FADAMA III projects. The supervising team comprising key departmental personnel of the FADAMA office under the Ministry of Agriculture, the World Bank representatives, Federal Ministry of Finance, Federal Ministry of Environment, State programme Officers from each of the Zones and National/Zonal NGO representatives visited the 6 geopolitical zones, viz: Bauchi (North-East), Kaduna (North-West), Kogi (North Central), Ondo (South West), Imo (Southeast) and Delta (South South). (UNDP 2012)

As a development initiative that is demand-driven and of counterpart-funding processes, the FADAMA III supervision mission was an integrated approach to transparently understand the nature of the projects executed and determine the level of people involved and ownership. Given the externalization of development provisioning in the country, either in terms of donor-funded interventions or government-designed initiatives, a critical challenge has been to actually see or encounter development as the targets see or encounter it. Beneficiaries' view of a project is paramount to access impact and ensure sustainability. The supervision mission therefore, deliberately mediated this need and the challenge which such efforts usually face. (Federal Ministry of Agriculture and Water Resources 2007)

According to international Development Agency (IDA, 2010), the project was designed to focus on increasing the incomes of rural poor, reduce rural poverty, increase food security and contribute to the achievement of a key Millennium Development Goal (MDG).

Financing of FADAMA III project comprised of US$ 250 million from the World Bank through International Development Agency (IDA) credits and $200 million counterpart contribution from Nigeria's federal, state and local governments and beneficiaries (World Bank, 2010).

FADAMA III Strategic Choice

The main strategic choices made in the project design include the following:

- **To address constraints to productive infrastructure:** Inadequacies in rural infrastructure and essential support services, road access and dry season irrigation, and availability of relevant agricultural and land management technologies constraint growth and adoption of more sustainable approaches to land management. The core activities funded by this project address these constraints.
- **To improve livelihood opportunities:** the project supported productive activities, technical assistance and investment in assets and land quality and services identified by communities as relevant to generation of higher incomes and better livelihoods.
- **To empower the rural poor:** the poor lack power and voice to access basic services, identify opportunities, and exercise legal rights. Information is scarce. Household, village, and local government decision- making processes are often opaque and exclusionary. Mechanisms to ensure accountability in delivery of state and local government services are weak. The project's facilitators working with the FADAMA groups will help them overcome barriers deriving from lack of knowledge or insufficient cooperation among groups.
- **To promote socially-inclusive and community-based approaches:** integration of social inclusion and community- driven principles has proven to be cost effective, responsive to local priorities and effective in reducing conflicts over use of natural resources. This proven approach has demonstrated that the key is to promote investments that bring both private profitability and public benefits.
- **To accord adequate attention to technical quality assurance:** limited capacity in supervising the technical aspects of community Sub projects contributed to delay in implementing local development plans sub projects funded under the FADAMA II project. The FADAMA development facilitators and service providers will receive adequate training before they are deployed in the communities. The facilitators' training programme will be designed to increase their sector-specific technical skills and provide them with the skills to perform feasibility work and technical supervision with the participation of the farmer groups. The Agricultural Development Programme (ADP) offices will train the service providers.

Community Infrastructure

Community Infrastructure is a basic physical and organisational structures needed for the operations of a community or society or the service and facilities necessary for an economy to function. Community Infrastructure refers to a set of investments that include rural roads, water supply and sanitation, energy and telecommunication (Olaolu, Akinnegbe, Agbe, 2013).

According to Cityshaping (2015), community infrastructure is the basic physical and organisational structures and facilities (e.g. roads, water supply, sewage,

telecommunications and energy) needed to sustain operation of community. Community Infrastructure is defined as the places and spaces that are assessed by the community for community development, social, cultural recreation and sporting activities.

Community Infrastructure is defined as a complex system of facilities, programme and social networks that aimed at improving people's quality of life (United way of greater Toronto, 2004). People in isolated rural communities have greater economic opportunities and well-being as a result of improved infrastructure services. Infrastructure can help catalyze development in rural communities, and as well reduced poverty by taking away some of these burdens and hardships of life.

According to Madu (2007), the importance of community infrastructure provision lies in its capacity to sustain daily activities, quality of life and economic base on the rural area. Investment in infrastructure increases agricultural productivity and general output per unit of input, farm yield by crop or total output per hectare, and output per work.

Community Infrastructure is the basic physical and organisational structure and facilities (e.g. roads, water supply, sewage, telecommunication and energy) needed to sustain operation of a community.

Community infrastructure was responsible for the establishment of economic infrastructure needed to improve the welfare of the entire community and also increase the productivity of FADAMA III users. No doubt in the observations of Olisa and Obiukwu, (2011), that poor infrastructural facilities were responsible for poor productivity in agriculture which affects farmers' profitability negatively. FADAMA III provisions for community infrastructure financed the construction and rehabilitation of small scale infrastructural projects specified as priorities by the community in the local development plans. Such infrastructural projects specified specified as priorities by the community in the local development plans included: feeder roads, culverts, drift stock routes, grazing reserve, markets and market structures such as VIP toilets, drainages, boreholes, cold rooms and cooling sheds (Adeoye, Yusuf Balogun & Carim-Sanni, 2011).

Rural Market and Farm Profitability

Olagunju (2012) stressed that provision of market and road infrastructure will improve farm profitability of the rural households in the rural areas and will reduce rural- urban migration. He went further to suggest that provision of good and tarred road linking the rural areas to urban areas will reduce the rate at which perishable agricultural product turn sour thereby reducing wastefulness of the farmers output. Market infrastructure therefore acts as a means of providing safety to farmers output. Absence of rural market and roads can affect the farm profitability negatively.

According to FAO (2003), efficient market system can provide better prices for producers and improve the availability of competitive price to consumers. In some cases, new market or improvement to existing markets in rural areas can help overcome many of the marketing problems like reduction in post harvest losses, provision of rural focal point and raise in income of rural dwellers.

Market access thus influences farmers production system to those who live close to better roads and have more frequent and direct contact with the market are willing to produce more systematically for the market, while those with poor market access are forced to produce for domestic consumption, in such a situation food consumption is limited to what can be produced on-farm or within the community, in some cases resulting in poorly balanced diets.

Rural Borehole and Farm Profitability

According to Fakayode, Omotosho, Tsoho, Ajayi (2000), provision of efficient community infrastructure is now widely recognised as indispensable to agricultural progress as it is a known fact that infrastructure can support economic growth, reduce poverty and make development environmentally sustainable. In any modern economy, the role of infrastructures such as borehole, electricity, transportation networks, good health centre in promoting development cannot be over emphasised. Its improvement increases the efficiency of production and contributes to high standard of living and increased profitability.

Rural infrastructure such as borehole and has enormous implications on production outcome in agricultural sector and overall development of the country. It impacts on welfare in three basic respects; it has basic consumption value, and as such, affects utility derivable from existing budgeted incomes.

Processing Facilities and Farm Profitability

According to Oluwasola (2010), cassava processing enterprises help in development of sub-sector to generate income and employment for farmers' household, especially during off season. It provides necessary catalyst for the development of farm gate business, to reduce post-harvest loss, add value to farm products and enhance food security of a nation.

An important feature of agro processing industries is that they are major sources of empowerment and increased profitability, thus providing access to food and other necessities to a larger group of population. They are, therefore, essential elements in attainment of good security goals.

Aside from reducing wastage and enhancing good security, many Nigerians have employment in small-scale food processing, majority of them women. This is because many farmers are establishing cottage food processing businesses to turn primary agricultural produce into other commodities for market.

Indeed, agro processing sector is going to play a significant role in terms of job creation and sustainability in terms of economy (agriculturenigeria.com).

Profitability

Profitability as stated by Hofstrand (2009) is the primary goal of all business ventures. Without profitability the business cannot survive in the long run. Profitability is measured with income and expenses. It helps to measure current and past profitability and then forecast the future profitability. Income is money generated from the activities of the business while expenses are the cost of resources used up or consumed by the activities of the business. In a few

words, profitability is measured with an income statement whereby a list of income and expenses during a period of time for the entire business is made. Furthermore, FAO (2007) stated that the Gross profit amount is obtained by subtracting the cost of sales (cost of goods sold) from revenues.

The Gross profit margin analysis uses the percentage calculation to provide a comprehensive measure of a company's profitability. It shows the Gross profit as a percentage of Revenue. A high percentage means that the business is making a healthy profit on the goods or financial products it sells, before administrative costs.

Profitability can also be calculated by using the Return on Investment (ROI) method, a measure that investigates the amount of additional profits produced due to a certain investment. Once ROI is positive, that means an investor has earned more than the cost of investment. It is expressed in Percentage.

Empirical Review

Ogbonna and Nwaobiala (2014) studied the effects of FADAMA III project on rural women production in Gombe state, Nigeria. The study analysed the socio-economic characteristics of rural farm women; determined the effect of the project on the participating rural farm-women. A multi-stage random sampling technique was used in selection of six local government areas. The study revealed that FADAMA III project has played a contemporary role in extension delivery in the study area. Based on this, it is evident that the FADAMA III project increased the profitability of rural farm women. This is based on the fact that the beneficiaries' levels of income were improved through the use of feeder roads, pipe borne water. Despite this, the project identified late arrival of farm inputs, late payment of counterpart funds and retraining of women as pertinent problem affecting the project. He suggested that government at all levels should pay their counterpart funds on time in order to sustain and improve the profitability of rural farm women and to enable them and the development partners achieve the goals of the project. Finally, considering the impact made by the project, it should be replicated in other communities to help reduce rural poverty.

Adeoye, Yusuf, Balogun (2011) also undertook a study to examine rural infrastructure and profitability of farmers under FADAMA III project in Oyo state, Nigeria, using infrastructural index and gross margin. They compared the infrastructural development between FADAMA II local government areas and non FADAMA II areas. Their findings revealed that more than half of the villages in FADAMA III local government area has more infrastructure than non-FADAMA III villages. This implies that FADAMA II project has contributed significantly to infrastructural development in Oyo.

Lianto (2012) studied the impact of infrastructure on agricultural productivity in Philippines. He employed regression analysis and descriptive statistics to analyse the data collected. The data were obtained from respondents selected across the states. He concluded that rural infrastructure, like other public investments, raises agricultural productivity, which in turn induced growth in rural area, bringing about higher agricultural wages, and improved opportunities for non-farm Labour.

Furo, Bello, Mcheha, Hammanyaji (2013) studied the role of FADAMA III in improving the income of FADAMA User Groups (FUGs) through agro- processing and market accessibility in Adamawa state, Nigeria. Sample questionnaire were administered to the members of FUG selected from 3 senatorial districts. Results showed that processing machines executed in the study area increased farm profitability of members of FUG.

Ahmadu, Ahmad & Hamsan (2012) conducted study on perspective on beneficiaries experiences of participation in community based agriculture and rural development program in Guba, in Niger state of Northern Nigeria, where 408 beneficiaries were sampled and they made use of qualitative research, findings of the study are presented thematically and it was concluded that participation theoretically implies the active and full movement of beneficiaries in all program cycle- from design to evaluation, evidences also indicated that beneficiaries participation in the program is only feasible at lower levels and does not transcend beyond participating. Based on the premise above, the theory of collective action becomes important to this work especially as FADAMA User Groups are organized, incorporated and managed as co-operative organizations. This is buttressed more by Chavez (2003) who opined that Collective Action Theory's definition, principles and practice directly or indirectly relate to cooperative seven internationally recognised principles of voluntary and open membership, member economic participation, cooperation among co-operatives, concern for community etc. According to Dick, Gregorio & McCarthy (2004) collective action theory is a theory that is very useful in agriculture, rural resources management, and rural development programmes. These are the hallmark of FADAMA User Groups.

Akinbamowo and Atanda (2014) in their study on Accelerating community development through provision of rural infrastructure; an appraisal of third National FADAMA Development Project in Ondo state, Nigeria. Descriptive statistics and inferential statistics were employed while analysing the data collected. Results showed that 22 markets were provided, 7 culverts constructed, 46 feeder roads rehabilitated, 7 new access roads constructed. Profitability of FADAMA Users increased drastically.

Bojaja and Adebayo (2014) examined the impact of FADAMA III programme specifically on the living standard of dry season farmers who benefited from the FADAMA III loans in Gombe state. The study revealed that the project did not make any impact on the beneficiaries of the FADAMA loan by increasing their income, improving the living standard and access to more personal belongings.

Correspondingly, Adegbite, Oloruntoba, Adubi, Oyekunle, and Sobanke (2008) carried out an assessment on the impact of FADAMA III on small-scale farmer's income in Ogun state with emphasis on the implication for agricultural financing in Nigeria. Using a multi-staged stratified random sampling in their study, three villages were selected each for both beneficiaries and non-beneficiaries in FADAMA endowed communities of Obafemi-Owade local government area of Ogun state. Evidence from their study also revealed no significant increase in the income of the FADAMA beneficiaries compared to non-beneficiaries of the FADAMA project in the study area.

Olagunju, Anyinde, Adewumi, Adesiji (2012) in their study, analysed effect of rural roads and marketing infrastructure on profitability of farming households in Osun state, Nigeria. They sampled 260 respondents. Analytical technique used included descriptive statistics, regression analysis, ANOVA and T-test. The result revealed that a high percentage agreed that rural road and market had effects on farmers produce. It also showed that most essential infrastructures such as pipe-borne water, electricity, bank, market stalls were present in the area.

Also, Innih & Dimelu (2013) studied participation and attitude of beneficiaries of FADAMA III in Kogi state and the result revealed that beneficiaries participated at different levels in the implementation of FADAMA III as they were involved at consultative level in preparation of list of constraints to be addressed through advisory services and were involved at collegial level in the management of financial resources as well as collaborated activities.

Theoretical Framework

The study was anchored on the Community-Driven Development (CDD) approach to community. CDD was engineered by Mr. James David Wolfensohn, a former President of World Bank Group (1995-2005). It was developed as an alternative to top-down approach to community development. By 1990s, economic failure and rural neglect in many countries were attributed to excessive centralised and top-down approaches, while Community-Driven Development emerged as a response to this concern.

Community- Driven Development is a development infrastructure that provides control of a development process, resources and decision making authority directly to communities, and are the best judges of how their lives and livelihoods can be improved and if provided with adequate resources and information, they can organise themselves to provide for their immediate needs. Moreover, CDD programmes are motivated by trust in people (Naidoo and Finn, 2001) and hence it advocates people being in charge of their own environment on a powerful force for development.

By treating poor people as assets and partners in the development process, previous studies have shown that CDD is responsive to demands, inclusive and more cost-effective compared to centrally- led NGO-based programmes. CDD can also be supported by strengthening and financing community groups, facilitating community access to information, and promoting an enabling environment through policy and institutional reform (Dongier, 2002). CDD projects work by providing poor communities with direct fund for development, with the communities then deciding how to spend its money. Lastly, the community plans and builds the project and takes responsibility for monitoring its progress.

Community-Driven Development (CDD) programme operates on the principle of transparency, participation, local empowerment, demand-responsiveness, greater accountability and enhanced local capacity.

Experience has shown that when given clear transparent access to information, appropriate capacity and financial support, access to information, appropriate capacity and financial support, poor men and women can effectively organise to identify community priority and address local problems by working in partnership with local government and other supportive institutions.

The World Bank recognises that CDD approaches and actions are important element of an effective poverty reduction and sustainability development strategy. The Bank has supported CDD across a range of low to middle income and conflict-affected countries to support a variety of urgent needs, including water supply and sanitation, school and health post construction, nutrition programmes for mothers and rural access roads and supports to micro enterprises.

Relevance of Community-Driven Development project to the study

Community- Driven Development is relevant to this study because it is anchored on bottom-up and demand-Driven approach. It places control of development process, resources and decision making directly to the community and beneficiaries. They are at "driver's seat". It is people-oriented. The people decide on the sub-project that meets their needs. Unlike other previous programmes that uses top-down approach, where beneficiaries were not fully involved in the management of the projects and this accounts to why majority of the programme failed (Awuchie 2009).

METHODOLOGY

Research Design

Survey research was adopted for which data were obtained from the respondents who are FUG members of FADAMA III through the administration of structured questionnaire forms.

Study Area

Anambra state is in Southern eastern Nigeria. Its name is an anglicized version of the original 'Oma mbala". The native name of the Anambra River. The capital and seat of government is in Awka. Anambra was created on 27 August 1991. It has a population of 4,055,038 (2006 census), with density of 846/km2 (2,200/sqm) and total land mass of 4,854km2. Anambra is rich in natural gas, crude oil bauxite, and ceramic and has an almost 100 percent arable soil.

Anambra state has many other resources in terms of agro-based activities like fishery and farming, as well as land cultivated for pasturing and animal husbandry. Boundaries are formed by Delta state to west, Imo state and Rivers state to South, Enugu stale to the east and Kogi to the North.

Population of the Study

The population of the study consists of all members of registered FADAMA User Groups (FUGs) that benefited from FADAMA III Community Infrastructure in Anambra State. The FADAMA Users are organized into FADAMA User Groups, (FUGs) with average of 20 persons per group at community level. These FUGs are further organized into FADAMA Community Association (FCAs) with average of 15 FUGs per FCAs at local government level. There are 245 FUGs that benefited from Community Infrastructure of FADAMA III. The FUGs have membership strength of 6,125 (ADP, FADAMA III Office, Awka, Anambra state, 2018).

Determination of Sample Size and Sampling Technique

For the purpose of this research, multi-stage sampling was adopted. There are four (4) Agricultural zones in Anambra state (Anambra, Awka, Aguata and Onitsha). In the first

stage, two (2) Agricultural Zones were randomly selected out of the four (4) agricultural zones in Anambra state. The two Agricultural zones that were studied are; Anambra and Awka agricultural zones because they are dominant in agricultural activities and for purpose of saving cost. In the second stage, three (3) local government areas were selected from each of the 2 Agricultural zones, making a total of 6 LGAs. Third stage, three (3) communities were selected from each of the (6) LGAs, making a total of 18 communities. One FUG was randomly selected from each community.

Using Taro Yamane to determine the sample size from the population of 6,125, this is 375, and was apportioned to each of the selected FUGs on pro rata basis.

$$n = \frac{N}{1+N\,(e)^2}$$

Where
N = sample size
N = population
E = margin of error (5% or 0.05)
I = constant

Substituting in the formula

$$N = \frac{6,125}{1+6,125(0.05)^2}$$

$$n = \frac{6,125}{16.3125}$$

$$= 375.47$$

n = **375**

The data for the study were sourced mainly from primary and secondary sources. Primary data were sourced from the respondents through structured questionnaire forms. On the other hand, secondary information were obtained from published Journals, textbooks, unpublished materials, internet materials etc.

Description of Data Collection Instrument
Structured questionnaire forms were distributed among the respondents. Section A of the questionnaire asked questions on socio-economic profile of the members, while section B, asked questions on the influence of FADAMA III community infrastructure on farm profitability of FADAMA User Groups

Validity of Data Collection Instrument
The research instrument was invalidated by three test measurement and evaluation specialists at the Faculties of Education and Management Sciences in the areas of research interest, to determine the degree of its validity. Suggested amendments and corrections were effected before the questionnaire forms were distributed.

Reliability of Data Collection Instrument
The data used in the study will be collected from the answered questionnaire from respondents. To ensure reliability of the instrument, a test-retest method of reliability was used. Same set of respondents (20) will be given the questionnaire on two different occasions of two weeks interval. The coefficient of reliability for the response from the two results was established using Pearson Correlation Coefficient which is higher than 0.89 is considered high enough for the instrument to be reliable.

Administration and Collection of Questionnaire
The research will employ 'on the spot method' to personally administer and collect the questionnaire from the respondents. This ensures high return rate. 375copies of questionnaire will be administered to the selected FUGs in Anambra state. The questionnaire will be collected as soon as they are filled by the respondent.

Method of Data Analysis
Descriptive statistical tools and inferential statistics were used to present and explain collected data. Descriptive statistics were employed to describe the socio-economic characteristics of the respondents. Such descriptive tools like mean; averages, frequency counts, tables etc were used extensively. Also inferential statistics such as multiple regression analysis was employed to address issues raised in research questions and hypotheses (1-3) which sought to measure the influence of rural market, borehole and processing facilities respectively obtained from FADAMA III on farm profitability of FUG members was be addressed through the application of multiple regression analyses.

The implicit specifications of the three relevant models are as follows:

Farm profitability = $f(X_{1rm}, X_{2rm}, X_{3rm}, X_{4rm}, X_{5rm})$ 1
Farm profitability = $f(X_{1bh}, X_{2bh}, X_{3bh}, X_{4bh}, X_{5bh})$ 2
Farm profitability = $f(X_{1pf}, X_{2pf}, X_{3pf}, X_{4pf}, X_{5pf})$ 3

Where:
Profitability = Profitability status of member of FUG proxied by gross margin realized in farm operations in 2018.
X_{1rm} to X_{5rm} = Vectors of availability of rural markets variable (mean of ratings by members).
X_{1bh} to X_{5bh} = Vectors of availability of boreholes variable (mean of ratings by members).
X_{1pf} to X_{5pf} = Vectors of availability of cassava processing facilities (mean of ratings by members).

The necessary explicit specifications of the models, 1 to 3 yield models 4 to 6:

Profitability $= \alpha + \beta_1X_{1rm} + \beta_2X_{2rm} + \beta_3X_{3rm} + \beta_4X_{4rm} + \beta_5X_{5rm} + e$ 4
Profitability $= \alpha + \beta_1X_{1bh} + \beta_2X_{2bh} + \beta_3X_{3bh} + \beta_4X_{4bh} + \beta_5X_{5bh} + e$ 5
Profitability $= \alpha + \beta_1X_{1pf} + \beta_2X_{2pf} + \beta_3X_{3pf} + \beta_4X_{4pf} + \beta_5X_{5pf} + e$ 6

The αs and the βs are the estimation parameters and the es are error terms designed to capture the effects of unspecified variables in the models.

The regression analyses was run using SPSS version 22 package to determine the order of importance of the explanatory variables in explaining the variations observed in the three dependent variables. The t-test was performed to test the significance of each of the explanatory variables at the alpha levels of 5%.

Gross Margin Analysis
Gross margin analysis is an analytical tool that is often used in analyzing the profitability of farm production. According

to Choumbou, Odoemenem, and Oben (2015), gross margin as the concept of contribution from marginal costing has been used widely in farm management since 1960. Within agriculture, it is usually called gross margin or, sometimes profit. Indeed, gross margin of the farm activity is the difference between the gross income earned and the variable costs incurred. It is difference between the gross farm income (GFI) and Total Variable Cost (TVC).

DATA PRESENTATION AND ANALYSIS

Availability and maintenance of FADAMA III community infrastructural facilities

Table4.1: Perceptions of FUG members on the establishment and maintenance FADAMA III infrastructural facilities

S/N	Facilities	Sum	Mean	Std. Dev.	Decision
1	**Rural Markets**				
a.	FUG rural markets exist in each community	1477.00	3.3876	.62421	Agree
b.	The markets are maintained from tolls collected from traders by FUG managers	1451.00	3.3280	.57555	Agree
c.	Members of FUG are allocated stalls on the basis of equality	1370.00	3.1422	1.03855	Agree
d.	FUG members pay less than standard tolls for using the market facilities	1423.00	3.2638	.82861	Agree
e.	The rural market attracts traders from within and without the communities	1445.00	3.3142	.80509	Agree
	Grand mean	1433.20	3.2872	.43154	**Agree**
2	**Water Borehole facilities**				
a.	Members have priority in the use of the water borehole facilities	1351.00	3.0986	.82317	Agree
b.	Members of FUG are exempted from paying for water in the facility	1293.00	2.9656	.79724	Agree
c.	Members use water from the facilities for domestic and agricultural activities.	1289.00	2.9564	1.10399	Agree
d.	The water facilities are available at all times	1416.00	3.2477	.83218	Agree
e.	Water borehole facilities are managed/maintained with water charges collected from users.	1398.00	3.2064	.84066	Agree
f.	**Grand mean**	1349.40	3.0950	.48430	**Agree**
3	**Cassava processing mills**				
a.	Processing facilities are established in each rural community	1433.00	3.2867	.52339	Agree
b.	There is no ceiling as to the quantity of produce a member can process	1414.00	3.2431	.46542	Agree
c.	Members are assisted with free consultancy services at the facilities	1387.00	3.1812	.86395	Agree
d.	Money realized from the processing mills are used in maintaining the machines in the facilities	1392.00	3.1927	.93442	Agree
e.	Members of FUG have priority in the use of the processing facility	1363.00	3.1333	.87498	Agree
f.	**Grand mean**	1143.60	3.1229	.65798	**Agree**

Source: Survey data 2018.

FUG rural markets exist in each community (3.39); The markets are maintained from tolls collected from traders .by FUG managers (3.33); The rural market attracts traders from within and without the communities (3.31); FUG members pay less than standard tolls for using the market facilities (3.26); and Members of FUG are allocated stalls on the basis of equality (3.14). Grand mean (3.29).

The water facilities are available at all times (3.24); Water borehole facilities are managed/maintained with water charges collected from users (3.25); Members have priority in the use of the water borehole facilities (3.10). However Members of FUG are exempted from paying for water in the facility (2.96) and Members use water from the facilities for domestic and agricultural activities (2.96). Grand mean (3.10).

Processing facilities are established in each rural community (2.29; There is no ceiling as to the quantity of produce a member can process (3.24); Money realized from the processing mills are used in maintaining the machines in the facilities (3.19); Members are assisted with free consultancy services at the facilities (3.18); and Members of FUG have priority in the use of the processing facility (3.13). Grand mean (3.12)

Farm Revenue and Profitability of Farm Operations of FUG Members

Table 4.3: Farm revenue and profitability, 2018

Descriptive Statistics				
	N	Total	Average per member	Std. Deviation
Maize (Naira)	436	18,818,797.60	43,162.3798	33074.93059
Cassav (Naira)	436	141,945,762.40	325,563.6752	267746.30275
Yam	436	100,941,040.00	231,516.1468	172483.75666
Total farm revenue (Naira)	436	**261,705,600.00**	**600,242.2018**	**448884.51763**
Harvesting cost (Naira)	436	16,171,650.00	37,090.9404	20451.23899
Crop Transportation (Naira)	436	105,111,750.00	241,081.9954	148164.32107
Total variable cost (Naira)	**436**	**121,283,400.00**	**278,172.9358**	**148851.15852**
Gross profit (Naira)	**436**	**140,422,200.00**	**322,069.2661**	**451721.70530**
Gross margin (%)	**436**	**41.41**	**41.4086**	**41.58409**
Valid N (listwise)	436			

Source: Survey data 2018.

Table 4.3 presents the analysis of farm revenue and profitability. The total farm revenue in 2018 was N261,705,600.00 or an average farm revenue per member of 600,242.20. It is also seen that total variable cost for the entire 436 FUG members was N278,172.94 which gives an average per member of N148851.16. The overall farm gross profit realized by target FUG members in 2018 was N140,422,200.00 or an average gross profit per member of FUG of N322,069.27. The farm gross margin of the FUG members, which in this study, is an indicator of profitability, was calculated as 41.4%.

Effect of FADAMA III Infrastructural Facilities on Farm Profitability of FUG Members
Effect of FUG rural market facilities on farm profitability of members/test of hypothesis one

Table 4.4: Regression Estimates (effect of FUG rural markets on farm gross margin of members).

Model	Coefficient Estimates	t-Value	Significance
(Constant)	1.177	8.757	0.000
FUG rural markets exist in each community (X_1)	0.104	3.777	0.000
The markets are maintained from tolls collected from traders .by FUG (X_2)	0.143	4.749	0.000
Members of FUG are allocated stalls on the basis of equality (X_3)	0.123	7.759	0.000
FUG members pay less than standard tolls for using the market facilities (X_4)	0.116	5.892	0.000
The rural market attracts traders from within and without the communities (X_5)	0.153	7.558	0.000
R^2	0.414		
Adj R^2	0.407		
F	60.634; sign, @ 0.000)		

Dependent Variable: Gross margin

From the result of the multiple regression analysis in table 4.4, the R^2 (coefficient of multiple determinations) value of 0.414 suggests that all the five variables in the model accounted for more than 41% of the variations in farm gross margin of FUG members. Thus, the overall regression fit (goodness of fit) was modest. It was also found that all the independent variables (X_1 to X_5) had direct or positive relationships with farm gross margin at the 1% levels.

Test of hypothesis one
H_0 : Provision of rural markets has no significant effect on farm profitability of FUG members.
H_1 : Provision of rural markets has significant effect on farm profitability of FUG members..

The hypothesis, "provision of rural markets has no significant effect on farm profitability of FUG members", was tested through the use of multiple regression analysis in table 4.4.

Decision: The F ratio of 60.634 as seen in the table (table 4.4) was significant at less than 1% level. Therefore the null hypothesis is rejected and the alternate (provision of rural markets has significant effect on farm profitability of FUG members) accepted. It is therefore concluded that provision and maintenance of rural markets in the area has brought about increased profitability in the farm activities of FUG members.

Effect of FUG Water Borehole Facilities on farm profitability/test of hypothesis two
Ho : Provision of water boreholes has no significant effect on farm profitability of FUG members.
Ha : Provision of water boreholes has significant effect on farm profitability of FUG members

The hypothesis, "provision of water boreholes has no significant effect on farm profitability of FUG members", was tested through the use of multiple regression analysis in table 4.5.

Table4.5: Regression Estimates (effect of FUG water boreholes on farm gross margin of members).

Model	Coefficient Estimates	t-Value	Significance
(Constant)	.828	5.105	.000
Members have priority in the use of the water borehole facilities (X_1)	.131	4.152	.000
Members of FUG are exempted from paying for water in the facility (X_2)	.168	5.124	.000
Members use water from the facilities for domestic and agricultural activities (X_3).	.058	2.472	.014
The water facilities are available at all times (X_4)	.172	5.698	.000
Water borehole facilities are managed/maintained with water charges collected from users (X_5).	.138	4.723	.000
R^2	0.288		
Adj R^2	0.279		
F	34.737; sign, @ 0.000)		

Dependent Variable: Gross margin

From the result of the multiple regression analysis in table 4.4, the R^2 (coefficient of multiple determinations) value of 0.288 suggests that all the five water borehole variables in the model accounted for more than 34% of the variations in farm gross margin of FUG members. Thus, the overall regression fit (goodness of fit) was low. It was further found that all the independent variables (X_1 to X_5, had direct (or positive) and significant relationships with farm gross margin at the 5% levels.

Test of hypothesis two.

DECISION: The F ratio of 34.737 as seen in the table (table 4.5) was significant at less than 1% level. Therefore the null hypothesis is rejected and the alternate (provision of water boreholes has significant effect on farm profitability of FUG members) accepted. It is therefore concluded that provision and maintenance of water boreholes in the area has brought about increased profitability in the farm activities of FUG members.

Effect of FUG cassava processing facilities on farm profitability of members/test of hypothesis three

Table4.6: Regression Estimates (effect of FUG cassava processing facilities on farm gross margin of members).

Model	Coefficient Estimates	t-Value	Significance
(Constant)	1.658	5.686	.000
FUG rural markets exist in each community (X_1)	.127	2.186	.029
The markets are maintained from tolls collected from traders by FUG (X_2)	.043	.655	.513
Members of FUG are allocated stalls on the basis of equality (X_3)	.120	3.406	.001
FUG members pay less than standard tolls for using the market facilities (X_4)	.237	7.049	.000
The rural market attracts traders from within and without the communities (X_5)	.165	4.641	.000
R^2	0.240		
Adj R^2	0.231		
F	27.082; sign, @ 0.000)		

Dependent Variable: Gross margin

From the result of the multiple regression analysis in table 4.6, the R^2 (coefficient of multiple determinations) value of 0.240 suggests that all the five variables in the model accounted for more than 41% of the variations in farm gross margin of FUG members. Thus, the overall regression fit (goodness of fit) was low. It was also found that all the independent variables had direct or positive relationships with farm gross margin. However, only X1, X3, X4 and X4 had significant influence on farm gross margin of the FUG members.

Test of hypothesis three

Ho : Provision of cassava processing facilities has no significant effect on farm profitability of FUG members.

Ha : Provision of cassava processing facilities has significant effect on farm profitability of FUG members.

Hypothesis three was tested through the application of multiple regression analysis as presented in table 4.6.

DECISION: The F ratio as seen in table 4.6 (27.082) is significant at less than 1% level. The null hypothesis is therefore rejected and the alternate, provision of cassava processing facilities has significant effect on farm profitability of FUG members, is accepted. Thus, it is concluded that provision and maintenance of cassava processing facilities in the area has brought about increased profitability in the farming activities of FUG members

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

Summary of findings, conclusion and recommendations

The attempt here is to highlight in a concise way the findings made in the study, the conclusion is then drawn and recommendation given.

Summary of findings

1. The study shows that provision of rural markets has significant effect on farm profitability of FUG members (F ratio = 60.634; significant @ 0.01) hence the conclusion that that provision and maintenance of rural markets in the area has brought about increased profitability in the farm activities of FUG members.
2. The study equally revealed that provision of water boreholes has significant effect on farm profitability of FUG members (F ratio = 34.737; significant @ 0.01

level). It is therefore concluded that provision and maintenance of water boreholes in the area has brought about increased profitability in the farm activities of FUG members.

3. It was also seen from the study, that provision of cassava processing facilities has significant effect on farm profitability of FUG members (F ratio = 27.082; significant @ 0.01 level). Thus, the study concluded that provision and maintenance of cassava processing facilities in the area has brought about increased profitability in the farming activities of FUG members.

Conclusion

The objective of FADAMA III project is to sustainably increase the incomes of FADAMA land and water resource users to reduce rural poverty, increase food security as well as contribute to the achievement of the Sustainable Development Goals (SDG).

Farmers in FADAMA user groups (FUCs) in Anambra State benefitted commendably from FADAMA III supportive activities in terms of provision of local markets facilities, borehole facilities, and cassava processing facilities. Indeed, the result of the analysis and hypothesis shows that the project has impacted positively on the farm revenue of members of FUG and also there from their farm profitability. This was achieved because the project is anchored on bottom up approach and derivable through full participation of FUG members.

FADAMA III is an important programme that emphasizes supply of farm inputs and farm support services for the benefit of rural dwellers. The study has confirmed that indeed, FADAMA III has through community infrastructural provisions as rural markets, boreholes and cassava processing facilities promoted the farm operations of the participants. Clearly, the analyses as presented and discussed above revealed a significant effects of community infrastructural facilities on farm profitability of members of FUGs. It was however noted that in spite of the community infrastructural facilities on profitability of FADAMA III participants, farm revenue has not increased. Thus, it could be deduced that provision of the facilities impacted more on efficiency with which the farmers carried out their farming operations but failed to lead to increased revenue for the FUG members.

Recommendation

Clearly, provision of FADAMA III community infrastructural facilities impacted positively and significantly on farm profitability of members but it had negative relationship with farm revenue of FUG members. To reverse this situation the following recommendations are made:

1. FADAMA III should include provision of Agricultural Supportive Activities like fertilizer, seedlings, credit and extension services. This will boost farming activities of members but also lead to increased revenue.
2. FADAMA III Project managers should ensure that FUG members benefit maximally from infrastructural facilities provided in the various communities. This they could do by making sure that the facilities are affordable.
3. Project monitoring should be an integral part of FADAMA III projects to ensure that provided facilities are not abused and are sustainable.

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