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Farmers' use of Global System for Mobile for Communication in the Fadama III Project in Northern Senatorial Zone of Taraba State, Nigeria

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Abstract **– The study examined the farmers' use of Global System for Mobile (GSM) for communication among farmers/ beneficiaries in the Fadama III project in Northern Senatorial Zone Taraba State, Nigeria. The population for the study included all beneficiaries/ farmers under the Fadama III project. A purposive sampling was adopted because of the accessibility of the selected three Local Government Areas (LGAs), (Ardo-Kola, Jalingo & Lau) throughout the year. Five Fadama User Groups (FUGs) were randomly selected from each LGA to constitute fifteen FUGs for the study. From each FUG, ten respondents were drawn randomly to give a sample size for the study. Primary data were used for the study through the use of questionnaire. Data collected for this research were analysed using descriptive statistics such as frequency (f), percentage (%) and mean score (M). The study revealed that majority (68%) of the respondents has farm sizes of between 1-2 hectares. The study further showed that the average years of farming experience among the respondents were 10.5 years with the majority (65.3%) of the respondents had between 1-10 years farming experience. Greater proportion (34%) of the respondents had annual income of between N200, 001 – N 250, 000 with the mean (M) annual income of the respondents calculated to be N142, 203.80. Results of the study also revealed that majority (95.3%) of the fadama III respondents owned GSM phone and about (90%) of the respondents reported that they utilize GSM for communicating information on fadama III activities with the officials/ personnel of the project. In Fadama III project also, respondents' key areas of communications with personnel of the project included: group formation (88%), mobilization of members for participation in Fadama III programmes and activities (87.3%), awareness creation of Fadama III intervention (82.7%), capacity building activities (81.3%), convening of Fadama User Group (FUG)/ FCA meetings (81.3%), sub-project preparation and management (80.7%), advisory services and input support services (80%) and environmental/ social friendly practices (72.7%). The study showed that the mean scores of information needs by the respondents on the fadama III activities as follow: adoption of environmental friendly practices (M = 1.55), operation and maintenance of infrastructure such as agricultural production assets (M = 1.21), fisheries equipment, agro-processing equipment and community social assets (M = 1.15), operation and maintenance of irrigation facilities (M = 1.15), preparation of local development plans following participatory and socially inclusive processes, (M = 1.28), techniques for participatory planning and conflict management (M = 1.31), awareness raising strategy (M = 1.13) and capacity building for environmental screening, review and enforcement (M = 1.36) respectively. The study recommended that information and communication unit of fadama III project should collaborate with other media outfits and extension unit to disseminate agro-information to the benefits of not only fadama III beneficiaries, but the generality of the farming families in the study LGAs and State as a whole. This can serve as a method of improving farmers' level of awareness and education.**

Keywords **– Fadama III Project, Global System for Mobile (GSM), Communication, Northern Senatorial Zone.**

I. INTRODUCTION

Information Communication Technologies (ICTs) refer to technologies that facilitate the creation, processing and transfer of information across space and time. At the heart of ICTs technology lie two main or branches of technology: computing and telecommunication. ICTs facilitate the flow of large volumes of information to a wide audience across numerous geographical locations. It is required for effective and successful transfer of technologies that are designed to boost agricultural extension delivery. For famers to benefit from such technologies, they must first have access to them and learn how to effectively utilize them in their farming systems and practices. The extension agencies make use of different ICTs, particularly the Global System for Mobile (GSM) in transferring improved agricultural technologies and practices to the end users (Ani and Baba, 2009). Torero (2013) reported that information and communication technologies (ICTs) play important role in empowering farmers. In other words, these technologies, especially mobile phones, stimulate agricultural and rural development through the provision of information and capacity-building opportunities thereby making rural farmers to need information in higher magnitudes for increased productivity.

According to Shelton (2013), a farmers' success depends on more than good weather, healthy soil, and proper seeds. Good farming also involves a series of decisions: how many crops to plant in each growing season, whether to invest in new crops only and which markets to sell the produce to. The right decisions can mean the difference between a profitable harvest and a net loss in farm income. Farmers make these decisions based on their knowledge of prevailing market prices, and supply and demand trends based on produce quality. When they lack access to up-to-date information about prices, farming conditions and produce quality, their productivity and profits can suffer. The key to filling the information gap could lie in something many of us take for granted - mobile phones. Mobile phones can save farmers time and money, and maximize their profits. For example, when rural farmers want to find the market that will offer the highest price for their maize, their only option may be to travel to each market in person, a costly venture. Faced with this option,

a farmer will frequently decide to sell to the nearest market or at the farm gate, missing out potentially more lucrative opportunities. With a mobile phone, a farmer can find out the price for his or her crop in different regional and local markets without leaving home, saves time and expensive travel (Shelton, 2013).

Ogbomo and Ogbomo (2008) defined mobile phones as a telephone system that can move or be moved easily and quickly from place to place. Mobile phones were once the tool of rich and busy executives who could afford both the luxury. Mobile phones are now the ICT that is reshaping and revolutionizing communications globally. Its impact on the economic activities of nations, businesses, and small entrepreneurs is phenomenal. Furthermore, Ogbomo and Ogbomo (2008) asserted that the availability of this new technology has been reshaping the material basis of the society as well as bringing about a profound restructuring of agriculture, economic, political, and cultural relations among states. Nigeria is not an exception.

The use of GSM in Nigeria just as in other developing countries is improving. According to the Nigerian Communication Commission (NCC) (2013), Nigeria's telecoms consumers may have expended about N107 billion on telephone calls in the year 2012; and crossed the 100 million subscribers mark and ended the year with 113 million active subscribers' base. Today, Nigeria can boast of four big GSM service providers, including Mobile Telecommunication Network (MTN) Nigeria, Globacom, Airtel and Etisalat (9 Mobile).

Global System for Mobile Communications (GSM) is a digital cellular communication standard developed in Europe and now used in more than 160 countries. It employs narrowband Time Division Multiple Access (TDMA) technology which allows eight simultaneous calls on the same 200 kilohertz (KHZ) wide communication band at speeds up to 9.6 kilobits per second (Kb/s). Commercially, GSM was introduced in 1991 and provides a high degree of security by using Subscriber Identity Module (SIM) cards and an advanced encryption scheme. In addition, it offers a bi-directional Short Message Service (SMS) for up to 160bytes (about 160 characters) long alphanumeric messages which can also be used for broadcasting news chips (GSM-Wikipedia, mhtml document, the free encyclopedia, 2013).

The Nigerian government over the years, in an attempt to tackle the dependence on rain-fed agriculture initiated the Fadama programme in 1992. Fadama is a Hausa name for irrigable lands-usually low-lying flood plains areas underlay by shallow aquifers found along Nigeria's major river system (Koyenikan1 and Ikharea 2014). The goal of National Fadama Development Project III (NFDP III) is to ensure all-year-round production of food through enhanced use of production technologies, improve agricultural productivity through Fadama irrigation farming along with the use of improved seeds, fertilizer and other relevant inputs became the best alternative option. The programme has evolved in phases covering different States in the first and second while the third which is on-going, covers 36 States of the federation. According to Koyenikan and Ikharea 2014), one of the ways of achieving constant food supply in Nigeria is Fadama farming. The NFDP-III aims at sustainably increasing the income of Fadama Resource Users by directly delivering resources to the beneficiary rural communities, efficiently and effectively, and empowering them to collectively decide how resources are allocated and managed for their livelihood activities and to participate in the design and execution of their subprojects, (Koyenikan and Ikharea 2014). The project targets the rural poor [farmers, pastoralists, fisher folks, marketers, processor, hunters, gatherers and other economic interest groups (EIGs)], disadvantaged groups (widows, handicapped, the unemployed youth), service providers, public and private operators and professional associations operating in the project area. The components of Fadama III include; capacity building, communication and information support, small - scale community - owned infrastructure, advisory service and input support, support to the ADPs, sponsored research, and on-farm demonstration, assets acquisition for individual FUGs and EIGs, Project management, monitoring and evaluation.

The NFDP-III adopts a Community Driven Development (CDD) approach. Under this approach, the Fadama resource users operate through their respective Fadama User Groups [FUGs] and their apex bodies, Fadama Community Association [FCA] would reach consensus on how to use the common resources on their mutual advantage. Through this process, communities would decide on which advisory service and infrastructure they need to enable them attain development goals, they set for themselves based on their efforts. The concession so reached would be articulated in the Local Development Plans (LPDs) drawn on the level of Fadama Community Association. Local community members under the umbrella of Fadama Community Association (FCAs) and Fadama User Groups (FUGs), oversee the design and implementation of the project and are empowered through skills and capacity-building to improve their livelihood by Increasing income generating activities (Koyenikan and Ikharea 2014).

Fadama III as a World Bank assisted project aimed at alleviating the poverty situation among rural people in Nigeria. It has the development objective of increasing the income of users of rural land and water resources on a sustainable basis. By increasing the incomes of the users, it hopes to reduce the prevalence of rural poverty and increase food security. This is expected to contribute to the achievement of the Millennium Development Goals (MDGs). The project adopts a demand-driven approach whereby all users of Fadama resources are encouraged to develop participatory and socially - inclusive local development plans (LDPs). Approved eligible sub-projects contained in the LDPs are financed by the implementing agency (Fadama, 2009 in Badiru, 2013).

Purpose of the Study

The general objective of this study was to examine the farmers' use of (GSM) for communication among farmers in the Fadama III project in Northern Senatorial Zone Taraba State, Nigeria. Specifically, the objectives include to:

1. Identify key areas in which GSM are used for communication in Fadama III activities;
2. Ascertain whether the information needs of beneficia--ries are met through GSM;
3. Determine the frequency of usage of GSM for information exchange between Fadama III participants and personnel;
4. Ascertain farmers' satisfaction in the use of GSM in obtaining information in Fadama III project; and
5. Determine major challenges associated with the use of GSM in agricultural information delivery in Fadama III project.

II. Results and Discussion

Availability and Utilization of GSM phones among the Farmers

Results in Table 1 revealed that majority (95.3%) of the fadama III respondents owned GSM phones and only 4.7% do not have. About (90%) of the respondents reported that they utilize GSM for communicating information on fadama III activities with the officials of the project, while 10% of the respondents did not. United Nations Educational, Scientific and Cultural Organization (UNESCO, 2011) concurred with this finding, where they stated that, the newer mobile telephones have exceeded the penetration of traditional land lines in most countries. The innovation of GSM phone has steadily reduced the purchase price of phones, laptops, scientific instruments, and specialized software in recent years. The intuitive design of many technologies and their capacity to convey information visually or audibly make them useful to people with limited formal education or exposure to technology especially the GSM (ICT in Agriculture, undated).

Table 1. Distribution of respondents by ownership of GSM phone and its utilization for communication of information in fadama III activities by the respondents.

Variables	Frequency	Percentage (%)
Ownership of GSM phone by the respondents		
Yes	143	93.3
No	7	4.7
GSM utilization for communicating Information in Fadama III activities by the respondents		
Yes	135	90
No	15	10
Total	**150**	**100**

Source: Field Survey.

Key Areas in which respondents used GSM phone for Communication in Fadama III project

In Fadama III project, respondents' key areas of communications with personnel of the project as indicated in Table 2 included: group formation (88%), mobilization of members for participation in Fadama III programmes and activities (87.3%), awareness creation of Fadama III intervention (82.7%), capacity building activities (81.3%), convening of Fadama User Group (FUG)/ FCA meetings (81.3%), sub-project preparation and management (80.7%), advisory services and input support services (80%), environmental/ social friendly practices (72.7%), asset acquisition activities (68%), record keeping activities (66%), small scaled community infrastructure activities (63.3%) and financial management (61.3%) as indicated in table 4.

It is important to mention that, the most needed key areas are mostly those that have to do with group formation and the mobilization of members' for meetings concerning Fadama III project. This could be because in the fadama III project emphasized on group or cooperative association in infracting with the beneficiaries. The least percentage of the key areas was financial management which most farmers want to keep as secret in their lives.

Table 2. Key areas in which GSM are used for communication in Fadama III activities.

Fadama 111 activities	Frequency	%
Capacity building activities	122	81.3
Advisory services and input support activities	120	80
Asset acquisition activities	102	68
Small-scaled community owned infrastructure activities	95	63.3
Sub-project preparation and management	121	80.7
Mobilization of members for participation in Fadama III activities	131	87.3
Convening FUG/FCA meetings	122	81.3
Financial management	92	61.3
Record keeping activities	99	66
Awareness creation of Fadama III intervention	124	82.7
Group formation	132	88
Environmental/social screening and environmental friendly practices	109	72.7

Source: Field Survey.

Mean Scores of the Fadama III respondents based on Information types

Table 3 showed the mean scores of information needs by the respondents based on information types. Farmers indicated their information needs on these fadama III activities as: adoption of environmental friendly practices (M = 1.55), book keeping (M = 1.19), credit/ savings management (M = 1.20), operation and maintenance of infrastructure such as agricultural production assets (M = 1.21), fisheries equipment, agro-processing equipment and community social assets (M = 1.15), operation and maintenance of irrigation facilities (M = 1.15), preparation of local development plans following participatory and socially inclusive processes, (M = 1.28), techniques for participatory planning and conflict management (M = 1.31), awareness raising strategy (M = 1.13) and capacity building for environmental screening, review and enforcement (M = 1.36) respectively.

Furthermore, the table 5 indicates that methods of participatory monitoring and evaluation (M = 1.13), input and output prices for crops (M = 1.41), input and output prices for livestock and fisheries product (M = 1.18), available markets for sale of crop products (M = 1.19), availability of new crop varieties (M = 1.05), availability of livestock breeds (M = 1.31), available market for sale of

livestock and fisheries product (M = 1.40), improvements in existing farming systems for horticultural produce, grains, roots and tubers (M = 1.19), crop production technologies (M = 1.28), livestock production technolog--ies (M = 1.57), proper management of livestock diseases, pest and disease management (M = 1.14), soil and water conservation technologies (M = 1.33), storage facilities for products/produce (M = 1.14), aquaculture and smallholder fisheries production activities (M = 1.05), animal husbandry techniques (M = 1.04), veterinary services (M = 1.55) and erosion control measures (M = 1.30) are all needed and required by the Fadama III beneficiaries in the study area.

These averages indicated that Fadama III beneficiaries needed information based on type of on all the enumerated Fadama III activities except the aquaculture and smallholder fisheries production activities (M = 0.96) which is less than 1, this could be due to less water regime in the area, while the positive means could be because of their relevance in improving project performance and respondents' agricultural development and income. Furthermore, all the standard deviations in Table 5 were less than 1.0 which indicate that all the farmers' individual scores as regard their selection of options on the extent on the need of information did not differ much from the mean scores.

Table 3. Mean scores of information needs by the respondents.

Information Type	Mean	Std. Deviation
Adoption of environmental friendly practices	1.55*	0.68
Book keeping	1.19*	0 .69
Credit/savings management	1.20*	0 .73
Operation and maintenance of infrastructure such as agricultural production assets, fisheries equipment, agro-processing equipment and community social assets	1.21*	0.69
Operation and maintenance of irrigation facilities	1.15*	0.72
Preparation of local development plans following participatory and socially inclusive processes	1.22*	0.68
Techniques for participatory planning and conflict management	1.15*	0.69
Awareness raising strategy	1.28*	0.71
Capacity building for environmental screening, review and enforcement	1.31*	0.63
Methods of participatory monitoring and evaluation	1.13*	0.72
Input and output prices for crops	1.36*	0.77
Input and output prices for livestock and fisheries product	1.13*	0.81
Available markets for sale of crop products	1.41*	0.72
Availability of new crop varieties	1.18*	0.84
Availability of livestock breeds	1.19*	0.85
Available market for sale of livestock and fisheries product	1.05*	0.85
Improvements in existing farming systems for horticultural produce, grains, roots and tubers	1.31*	0.72
Crop production technologies	1.40*	0.74
Livestock production technologies	1.19*	0.81
Proper management of livestock diseases	1.28*	0.83
Pest and disease management	1.57*	0.56
Soil and water conservation technologies	1.14*	0.67
Storage facilities for products/produce	1.33*	0.64
Establishment of seed and plantation nurseries	1.14*	0.75
Aquaculture and smallholder fisheries production activities	0.96	0.78
Animal husbandry techniques	1.05*	0.78
Veterinary services	1.04*	0.80
Erosion control measures	1.30*	0.74

Source: Field Survey, *Information Needed < 1.

Farmers' level of Satisfaction in the use of GSM in Obtaining Information

In Table 4 the mean values revealed farmers' level of satisfaction in the use of GSM in obtaining information on the various fadama III activities. Farmers indicated their satisfaction in obtaining information on capacity building activities by the use of GSM with the (M = 1.21),advisory services and input support activities (M = 1.28), asset acquisition activities, (M = 1.16), mobilization of members for participation in Fadama III activities (M = 1.40), convening FUG/ FCA meetings (M = 1.43), financial management (M = 1.09), record keeping activities (M = 1.17), awareness creation of Fadama III intervention (M = 1.27), group formation (M = 1.37) and environmental/ social screening and environmental friendly practices (M = 1.17).

However, farmers were not satisfied with the generation of information by the use of GSM on small-scale community owned infrastructure activities (M = 0.91) and sub-project preparation and management (M = 0.95). This could be because of poor leadership among the beneficiaries and inadequate knowledge and skills on infrastructures and management techniques.

Table 4. Farmers' level of satisfaction in the use of GSM in obtaining information in Fadama III project.

Fadama 111 Activities	Mean (M)	Std. Deviation
Capacity building activities	1.21*	0.76
Advisory services and input support activities	1.28*	0 .64
Asset acquisition activities	1.16*	0. 61
Small-scale community owned infrastructure activities	0.91	0.66
Sub-project preparation and management	0.95	0.79
Mobilization of members for participation in Fadama III activities	1.40*	0. 65
Convening FUG/FCA meetings	1.43*	0.68
Financial management	1.09*	0.72
Record keeping activities	1.17*	0.64
Awareness creation of Fadama III intervention	1.27*	0.67
Group formation	1.37*	0.64
Environmental/social screening and environmental friendly practices	1.17*	0.61

Source: Field Survey

Major Challenges in the use of GSM in Fadama III project

Data on Table 5 show the main challenges faced by the respondents in the utilization of GSM in the fadama III project by the beneficiaries. The main challenges included no GSM phones provided by Fadama III to farmers (M =1.37), low level of education of farmers (M = 1.55), erratic power supply (M = 1.41), high call tariff (M = 1.11), poor network coverage (M = 1.24), lack of supportive government policies (M = 1.62), lack of maintenance e.g. recharging (M = 1.11), and fluctuating services by the service providers (M = 1.16).

This is in line with the findings of Egbule (2012), which reported high call tariff, poor network coverage and erratic power supply as challenges to the utilization of GSM phones in information dissemination. With regards to low level of education of farmers, this contradicts the work of Egbule (2012) who stated that farmers' without regards to their educational qualification sourced for information through the use of GSM, particularly, through making calls than SMSs.

High costs of acquiring GSM and its accessories (M = 0.72), information type in Fadama III not suitable for GSM use (M = 0.73), inadequate number of GSM phones among farmers (M = 0.82) and inability to buy recharge cards regularly (M = 0.98) were not hindrances to utilization of GSM in Fadama III project. This may be due the fact that numerous brands of handsets available in the markets in affordable rates and the presence of lower denomination of recharge cards and the different promotions offered by the various service providers for as low as a hundred naira (N) per day for all calls.

Table 5. Major challenges associated with the use of GSM in agricultural information delivery in Fadama III project.

Constraints	Mean	Std. Deviation
No GSM phones provided by Fadama III to farmers	1.37*	0.83
Low level of education of farmers	1.55*	0.71
High costs of acquiring GSM and its accessories	0.72	0.77
Information type in Fadama III not suitable for GSM use	0.73	0.77
Erratic power supply	1.41*	0.63
High call tariff	1.11*	0.72
Inadequate number of GSM phones among farmers	0.82	0.78
Inability to buy recharge cards regularly	0.98	0.63
Poor network coverage	1.24*	0.64
Lack of supportive government policies	1.11*	0.64
Lack of maintenance e.g recharging Fluctuating services by the service providers	1.16*	0.65

Source: Field Survey, * Main Challenge < 1.

III. Conclusion and Recommendations

Conclusion

From the findings of the study the following conclusions were drawn:

1. Majority (73.3%) of the respondents were males, most (66.7%) of fadama III participants were married and majority (80.7%) of the respondents do not have access to credit facilities.
2. It is evident that farmers are utilizing GSM in communication and dissemination of information in the fadama III project in the study area. This is true from fact that higher percentages of ownership and utilization of mobile phone in the area with majority (93.3%) and (90%) respectively owning and utilizing GSM among the respondents.
3. Higher averages of the use of GSM in the mobilization of members for participation in Fadama III activities

(M = 1.50), awareness of creation of Fadama III intervention (M = 1.47) convening FUG/ FCA meetings (M = 1.43), and group formation (M = 1.40) are enough evidences to conclude that GSM utilization is very relevant in fadama III project among the beneficiaries in the study area.

4. Farmers' level of satisfaction in the use of GSM in obtaining information in Fadama III project with the averages between (M = 1.09 to M = 1.43) on Fadama III activities were indications of level of respondents' acceptability and satisfaction among the beneficiaries of the project.
5. The mean scores of information needs by the respondents of between (M = 1.04) and (M = 1.57) on information types showed that respondents needed information on majority (96.3%) of all the information types enumerated for the respondents to check – list in the questionnaire.
6. The results of this study indicated that seven (7) variables with ranges between (M = 1.11 to M = 1.55) hindered and challenged the effective use of GSM in agricultural information delivery in fadama III project in Northern zone of Taraba state, Nigeria.

RECOMMENDATIONS

Based on the findings of this work, the following recommendations were made:

1. Information and communication unit of fadama III project should collaborate with other media outfits and extension unit to disseminate agro-information to the benefits of not only fadama III beneficiaries, but the generality of the farming families in the study LGAs and State as a whole. This can serve as a method of improving farmers' level of awareness and education.
2. Considering the low volume of agricultural credit available to fadama III beneficiaries, it is recommended that commercial banks should offer special credit to farmers at concessional rates to increase volume of investment in the fadama project and agricultural production in general.
3. Government should provide sufficient support services to fadama III project by providing the necessary inputs and materials (regular power supply for recharging mobile phones, farm machines, agro - chemicals, improved seeds, fertilizers, e.t.c.) for effective project implementation and communication in the fadama III project in the study area in particular and the state in general.
4. Subsequent agricultural development projects involving GSM technology should be customized to motivate beneficiaries of the project.

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