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The Performance Of Fadama III User Groups Crop Farmers At Mid-Term In Southeast Nigeria

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Abstract: Investigating the performance of Fadama III User Groups' (FUGs) crop farmers at mid-term, this study described socio-economic characteristics of the farmers, estimated annual incomes of the farmers before and after joining the project, determined influence of socio-economic characteristics of the farmers on annual incomes before and after joining the project, and identified constraints to effective realization of project objectives. Multistage and random sampling methods were used to select 240 crop farmers. Primary data were collected using well structured and pre-tested questionnaires, scheduled interviews and panel discussions. Descriptive statistics and Ordinary Least Squares multiple regression were adopted for data analyses. Average farm size and distance to market were 0.5ha and 3.4km respectively. Cassava earned the farmers the highest income of ₦23,500,424.5 before and ₦70,541,583 after joining the project. An increase in mean annual income of ₦504,777.58 or 204.80% was realized by the farmers after joining the project, thus making Fadama III project laudable. Distance to market, farm size, extension visits and productive resources significantly influenced income while education, age, availability of special infrastructure, family size, gender and farming experience were not significant. Serious constraints to project were irregular fund disbursement, late release of government cash contribution, demand for users' cash contribution, non-payment of counterpart fund by the beneficiaries, misconception of the project by benefiting communities, inadequacy of facilitators, and inadequate logistics for extension agents. Introducing the principles of comparative advantage, by providing credit facilities to the farmers in the five States that make up the Southeast, only for the production of those crops in which they have comparative advantage over others should be encouraged. In addition, timely disbursement of funds, payment of counterpart funds, recruitment of more facilitators, and provision of logistic supports to the extension agents will ensure further improvement in earned income and programme sustainability.
Keywords: Collective action theory, Fadama iii, Crop farmers, Income, Southeast Nigeria.

INTRODUCTION

National development is predicated on the development of the rural areas which reduces poverty, unemployment and inequality. This development is achieved through the use of development projects. Fadama is a World Bank development project being executed in collaboration with the Federal Government of Nigeria to achieve the needed national development in the country. The World Bank Assisted Fadama 111 Project is a comprehensive five-year action programme developed by the Federal Ministry of Agriculture and Water Resources (FMAWR) in close collaboration with the Federal Ministry of Environment (FME) and other federal and state government ministries, local governments and key stakeholders (donors, private operators, NGOs). The word "Fadama" is an Hausa name for irrigable land, usually low-lying, and flood plain areas underlined by shallow aquifers found along Nigeria's river system [1]. According to Echeme and Nwachukwu Fadama also refers to a seasonally flooded area used for farming during the dry season[1]. It is an alluvial lowland formed by erosional and depositional actions of the rivers and streams. They comprise of land and water resources that could easily be developed for irrigation agriculture. Fadama are typically waterlogged during the rainy season but retain moisture during the dry season.

The Project, which is anchored on the community-driven development (CDD) approach, will be implemented over a five-year period-from July 2008 to June 2013 and will terminate finally in December 2013[2]. The United Nations postulated that the objective of the 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 Millennium Development Goals

(MDGs) [3]. The project takes the Community Driven Development (CDD) approach, which places beneficiaries on the driver's seat. Local community members, under the umbrella of Fadama Community Associations (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 livelihoods by increasing income generating activities.

In the Southeast States of Nigeria (Anambra, Abia, Ebonyi, Enugu, and Imo states) Fadama plains are found along the rivers such as Niger, Anambra , Mamu/Ezu, Idemili and Ulasi rivers in Anambra State, Imo in Imo State, Ebonyi river in Ebonyi State, Oji and Ukwa-Ngwa rivers in Enugu and Abia States respectively; the smaller perennial streams; and the in-land valley ponds and lakes like the Agulu Lake in in Southeast, Nigeria and Uguta lake in Imo state. The main thrust of Fadama III Project is to sustainably increase the income of Fadama User Groups members by directly delivering resources to the beneficiary rural communities efficiently and effectively; and empowering them to collectively decide on how resources are allocated and managed for their livelihood activities and to participate in the design and execution of their sub-projects. However, some challenges have been reported to limit income realized by the participants. These challenges as recorded by Ezugwu [4] were that:

- the communities had not yet come to terms with the fact that they were very important stakeholders in the financing of the project;
- ii the operational modules of Fadama III stipulate that the benefiting communities should pay counterpart contribution of 30 per cent for assets and another 10 per cent for infrastructure;
- beneficiary communities were also required to contribute 50 per cent of the cost of the inputs they would use – a misconception which limited the programme's impact to the extent that some Fadama projects had been abandoned midstream;
- lack of payment of counterpart contributions by some stakeholders is the bane of the Fadama programme and this has limited its success across the country; and
- rural dwellers, who constitute the primary targets of the Fadama programme, often view grants under the programme as their share of the "national cake".

The main objective of this study was to assess the implementation of Fadama 111 Project within the first three out of five years of operation in Anambra State. The specific objectives were to:

- describe the socio-economic characteristics of FUG crop farmers in the study area;
- estimate the income of the FUG crop farmers before and after joining the project;
- iii. estimate the influence of socio-economic characteristics of the FUG crop farmers on their annual incomes before and after joining the project; and
- identify constraints to effective realization of the project objectives.

THEORETICAL FRAMEWORK

This study was based on the Collective Action Theory. Pandolfelli, *et al*, [5], saw collective action as both the process by which voluntary institutions are created and maintained and the groups that decide to act together. Collective action plays a vital role in many people's lives, through such areas as income generation, risk reduction, public service provision, and the management of natural resources. Integrating both women and men into collective action can lead to greater group effectiveness. In many instances, the gender composition of groups is an important determinant of effective collective action, especially for natural resource management in two key dimensions: (i) the ability of groups to meet their immediate purposes, whether that purpose is the management of a natural-resource or the disbursement of funds to members of a burial group, and (ii) the process by which the group works to meet that purpose. Specific measures of effectiveness might include tangible indicators such as economic returns to group members, compliance with rules, transparency and accountability in managing funds, or the incidence and severity of conflicts, as well as less tangible indicators, such as members' satisfaction with the group. This conforms with the co-operative principles of open membership and gender equality.

Collective action is also seen as a voluntary action taken by a group of people to achieve common interest. Co-operative, as voluntary association of independent individuals who come together in order to solve their socio-economic problems, requires collective action to succeed. Okechukwu [6] stated that all known definitions of co-operative tend to highlight the following about co-operatives: co-operation is a form of organization of people; the people are rational beings; they are together on equality basis; are there for the promotion of socio-economic interest of themselves; and are democratically managed.

Based on the premise above, the theory of collective action becomes apt in this work especially as Fadama Users' Groups are organized, incorporated and managed as co-operative organisations. This is buttressed more by Chavez [7] who opined that Collective Action Theory's definition, principles and practice directly or indirectly relate to co-operative seven internationally recognized principles of voluntary and open membership, member economic participation; co-operation among co-operatives, concern for community etc. According to Dick *et al.* [8] collective action theory is a theory that is very useful in

agriculture, rural resource management, and rural development programmes. These are the hallmark of Fadama Users Groups.

MATERIALS AND METHODS

The study area is Southeast geo-political zone of Nigeria made up of Abia, Anambra, Ebonyi, Enugu and Imo States. The study population was all the Fadama user groups' crop farmers in the Southeast geo-political zone of Nigeria. Multistage and random sampling methods were used to select three States (Anambra, Enugu & Imo) at stage I, ten L.G.A.s at stage II, 40 FUGs at stage III and finally, random sampling method was used to select 240 crop farmers from the selected FUGs at stage IV.

Primary data were collected from the crop farmer using well structured and pre-tested questionnaires, scheduled interviews and panel discussions. Primary data were collected on socio-economic characteristics of the respondents, their incomes before and after joining the project, and constraints to effective realization of the project objectives. Data on constraints were collected by means of a 5-point Likert-Type Scale. Members of the FUGs responded to any of the five response ratings of ***Strongly Agree*** (4), ***Agree*** (3); ***Disagree*** (2); ***Strongly Disagree*** (1) and ***Indifferent*** (0).

Descriptive statistics such as means, frequencies, percentages and ratios were used to analyze data on socio-economic characteristics of the respondents, their incomes and constraints to effective realization of the project objectives while Ordinary Least Squares multiple regression analysis was adopted to determine the influence of socio-economic characteristics of the farmers on income before and after joining the project.

The multiple regression model is explicitly specified as follows:

INC = f(EDU, AGE, ASI, DTM, FFS, FAS, ETV, GEN, EXP, PDR) + e

Where:

INC = Income generated by the FUG crop farmers before/after joining the project (₦)
EDU = Educational level (years)
AGE = Age of the farmer (years)
ASI = Availability of special infrastructure (dummy: available = 1; otherwise = 0)
DTM = Distance to market (kilometers)
FFS = Farmer's farm size (hectares)
FAS = Family size (number)
ETV = Extension visit (number)
GEN = Gender (Male = 1; Female = 2)
EXP = Farmer's farming experience (years)
PDR = Productive resources (available = 1; otherwise = 2).

Four functional forms of the regression model were tried with the data, namely linear, exponential, semi-log, and double-log. Output of the form with the highest value of coefficient of multiple determination (R^2), highest number of significant variables and F-statistic value was selected as the lead equation. The explicit versions of the four functional forms are given as:

Linear: $INC = b_0 + b_1EDU + b_2AGE + b_3ASI + b_4DTM + b_5FFS + b_6FAS + b_7ETV + b_8GEN + b_9EXP + b_{10}PDR + e_i$

Exponential: $lnINC = b_0 + b_1EDU + b_2AGE + b_3ASI + b_4DTM + b_5FFS + b_6FAS + b_7ETV + b_8GEN + b_9EXP + b_{10}PDR + e_i$

Semi-log: $INC = b_0 + b_1lnEDU + b_2lnAGE + b_3lnASI + b_4lnDTM + b_5lnFFS + b_6lnFAS + b_7lnETV + b_8lnGEN + b_9lnEXP + b_{10}lnPDR + e_i$

Double-log: $lnINC = b_0 + b_1lnEDU + b_2lnAGE + b_3lnASI + b_4lnDTM + b_5lnFFS + b_6lnFAS + b_7lnETV + b_8lnGEN + b_9lnEXP + b_{10}lnPDR + e_i$

The b_is are the parameters to be estimated and the e_i is the error term meant to capture errors arising from mistakes in model specification and data collection. Ln is the logarithm to base 10, and the acronyms - EDU, AGE, ASI, DTM, FFS, FAS, ETV, GEN, EXP, PDR – are as earlier defined.

RESULTS AND DISCUSSIONS

Socio-economic statistics of the FUG crop farmers

A summary of the socio-economic statistics of the farmers is shown in Table 1. Results indicated that crop production in the area was dominated (60%) by the male farmers. An average age of 46.5 years was computed for the respondents, implying that the participants were in their active age which was likely a prospect for greater productivity and higher income. The study revealed that 97.1% of the respondents were married and mean family size was 7 persons. Large household sizes have been noted to have correlation with food insecurity and poverty especially when the household head is engaged in agriculture as the main source of livelihood and income [9]. On the other hand, large family size could lead to the increase in family labour and reduction of production cost. Furthermore, the crop farmers attained an average of 9 years of formal education and 25.6 years of farming experience. This implied that the farmers were opportuned by virtue of basic educational attainment and good number of years of experience to adopt improved crop production technologies and skill to enhance their productivity, income and welfare. Average farm size and distance to

market were 0.5ha and 3.4km respectively, implying that the farmers were operating on small scale and trekking long distances to market their produce, a situation that would have negatively affected their income.

Income of the farmers before and after joining the Fadama project

Table 2 presents result of estimated income of the farmers before joining the project. The result revealed that cassava earned the highest income in the Southeast prior to the introduction of Fadama project with ₦23,500,424.5 which is equivalent to 39.73% of the total income realized by the farmers on crops, followed by yams ₦17,710,546 (29.94%), then rice ₦12,871,840 (21.76%). Groundnut took the last position with ₦248,300 (0.42%). A mean income of ₦246,473.98 was realized by the FUG crop farmers before joining the project.

After joining the project (Table 2), cassava with ₦70,541,583 (40.19%) still maintained the lead in Southeast. Rice with ₦51,916,260 (29.58%) displaced yams to the third position with ₦39,740,500 (22.64%). Groundnut maintained the last position with ₦1,102,350 (0.63%). Meanwhile, after joining the Fadama project, the FUG crop farmers realized estimated mean income of ₦731,251.53 which was greater than the mean income realized by the farmers before joining the project by ₦504,777.58 or 204.80%. This implied that the FUG crop farmers properly utilized the productive resources made available to them to enhance their income and ensure success of the project. Ugwumba and Chiekezie [10] on Gender access to Bank of Agriculture loans by cooperative farmers in Awka Agricultural Zone of Anambra State, Nigeria, reported a positive relationship between amount of productive resources (loans) and income realized by the cooperative farmers. This impressive performance was further confirmed by result of test of the hypothesis that there is no statistically significant difference between mean incomes of the FUG crop farmers before and after joining the project (Table 3), which indicated a positive and statistically significant difference between the mean incomes of the crop farmers before and after joining the Fadama project at 5% level.

Estimated influence of socio-economic characteristics of the crop farmers on annual incomes before and after joining the project

The multiple regression analysis was used to establish the influence of socio-economic factors of the farmers on annual incomes. Four functional forms (Linear, exponential, semi-log and double-log) of the regression model were fitted with the data and tried using the MANITAB statistical software. Outputs of the analyses are shown in Tables 4 and 5. It could be seen from the tables that output of the linear form gave the best result in terms of number, sizes and signs of significant parameter estimates as well as R^2, R^2 (adjusted), F-statistic and Durbin-Watson statistic values. It was therefore adopted as the lead equation.

A total of 10 regressors were included in the model and four of them, distance to the market (DTM), farmers' farm size (FFS), extension visits (ETV) and productive resources (PDR) were statistically significant. The remaining six, levels of education (EDU), age (AGE), availability of special infrastructure (ASI), farmers' family size (FAS), gender (GEN) and farming experience (EXP) were not significant. Distance to the market was significant at 1% level of probability at both before and after joining the Fadama project. This factor is an important determinant of the income of any farmer in that should there be no market for his products, the products will either spoil or he will be forced to give them away at any offer without an opportunity to optimize his income from the sales. Again the nearer the market the smaller the transportation cost and the higher the net income. This is probably the reason behind the construction of Fadama markets in some communities as community projects.

Farmer's farm size, extension visits and productive resources were significant at 5% level of probability. This implies that the FUG crop farmers who used more of these resources were likely to realize more income. This result agrees with [11] who postulated that profit does vary with farm size as larger farms may be able to more efficiently use larger equipment complements or obtain discounts by buying larger volumes of inputs resulting in lower capital and/or variable input costs per acre.

Improved farming technologies such as high yielding crop varieties, chemical fertilizers, and irrigation techniques have been central in raising yields, however, farmers have been much slower in adopting these new methods because of lack of information regarding how to apply the improved inputs [12]. Consequently, access to reliable information is an integral part in any farmer's ability to raise productivity. This probably explains the significance of extension visits (EVT) in this result. Application of high yield crops, good irrigation and suitable agrochemicals will increase the productivity of any farmer; tractorization will save time and cost cumulating in improved income. This underlines why in this result, productive resources (PDR) was significant.

The R^2 values of 68.7% and 74.6% before and after joining the project respectively showed that 68.7% and 74.6% of the variations in income levels were explained by the explanatory variables while the respective differences of 31.3% and 25.4% were due to stochastic disturbance. The corresponding significant

F-statistic values of 4.79 and 8.09 implied the goodness of fit of the model and that collectively the independent variables significantly influenced the farmer's income.

Differences in effects of socio-economic variables on income of the FUG crop farmers before and after joining the project

The Chow-statistic was used to compare the parameters of regression outputs before and after joining the project, that is, whether the independent variables have different effects on the crop farmers' incomes before and after joining the project.

$$\text{The Chow-test} = \frac{\{S_{ABP} - (S_{AP} + S_{BP})\}/ (K)}{(S_{AP} + S_{BP}) / (N_{AP} + N_{BP} - 2K)}$$

Where:

S_{ABP} = Sum of squared residuals of the regression output before and after joining the project
S_{AP} = Sum of squared residuals of the regression output after joining the project
S_{BP} = Sum of squared residuals of the regression output before joining the project
N_{AP} = Number of observations after joining the project
N_{BP} = Number of observations before joining the project
K = Total number of parameters.

$$= \frac{\{3.07612 - (2.04844 + 0.8249689)\} / 10}{(2.04844 + 0.8249689) / 460} = \frac{0.02927111}{0.00624654} = 3.25$$

The Chow-statistic gave a p value of 3.25 which is greater than 0.05 at 5 percent level of significance. This shows that there is no statistical significant difference in the influence of the socio-economic variables on incomes of the crop farmers before and after joining the project.

Table 1: Socio-economic statistics of the crop farmers

Variable	**Mean/Mode**
Gender	male (60%)
Age	46.5 years
Marital status	married (97.1%)
Household size	7 persons
Educational level	9 years
Farming experience	25.6 years
Farm size	0.5 hectare
Distance to market	3.4km

Source: Field survey, 2013.

Table 2: Estimated income of the farmers before and after joining the project in the Southeast

Variables	Income before Amount(₦)	% of total	Income after Amount (₦)	% of total	Difference **b/w** before & after	**% difference**
Rice	12,871,840	21.76	51,916,260	29.58	39,044,420	303.33
Yam	17,710,546	29.94	39,740,500	22.64	22,029,954	124.39
Maize	1,644,925	2.78	3,345,870	1.91	1,700,945	103.41
Cocoyam	808,750	1.37	2,752,400	1.57	1,943,644	240.32
Cassava	23,500,425	39.73	70,541,583	40.19	47,041,158	200.17
Plantain	1,241,070	2.10	2,762,145	1.58	1,521,075	122.56
Vegetable	1,127,900	1.90	3,339,260	1.90	2,211,360	196.06
Groundnut	248,300	0.42	1,102,350	0.63	854,050	343.96
Total	59,153,756	100	175,500,368	100	116,346,612	196.69
Mean income	246,473.98	-	731,251.53	-	504,777.58	204.80

Source: Field survey, 2013.

Table 3: Estimated difference in means of income of the farmers before and after joining the project

Variable	N	Mean	Difference between means	T	P	DF
IAP	240	731,251.53				
IBP	240	246,473.98	484,777.55	6.77**	0.000	238

Source: Field survey, 2013. Notes: IAP = Income after joining project. IBP = Income before joining project.

Table 4: Estimated determinants of the crop farmers' income before joining the project

Parameter	Linear	Exponential	Semi-log	Double-log
EDU	-786	-0.008342	-13622	-0.0123
	(-0.20)	(-0.58)	(-1.48)	(-0.07)
AGE	993	0.001213	6756	0.0563
	(0.54)	(0.56)	(0.61)	(1.15)
ASI	-13223	-0.001679	-2667	-0.0452
	(-0.44)	(-0.42)	(-0.54)	(-0.31)
DTM	3472	0.00822	3365	0.08996
	(1.86)*	(0.74)	(0.56)	(1.08)
FFS	40992	0.06814	188642	0.2856
	(2.39)**	(2.05)**	(2.38)**	(2.04)**
FAS	-4149	-0.006341	-2761	-0.09888
	(-0.62)	(-0.81)	(-0.46)	(-1.13)
ETV	13939	0.009956	2448	0.2496
	(2.40)**	(2.13)**	(2.11)**	(1.87)*
GEN	-21155	-0.002113	-30176	0.03842
	(-0.93)	(-0.82)	(-1.14)	(0.32)
EXP	321	0.002711	2746	0.0866
	(0.19)	(0.58)	(0.38)	(0.78)
PDR	85850	0.000145	8965	0.3049
	(1.89)**	(1.14)	(2.13)**	(2.11)**
R^2	68.7%	62.5%	65.3%	64.5%
R^2(adj)	64.7%	60.1%	62.7%	62.6%
F-statistic	4.79	4.12	4.23	4.13
D-W statistic	1.78	1.56	1.67	1.47

Source: Field survey, 2013. Notes: * = Significant at 1% level; ** = Significant at 5% level. Figures in ( ) are t-ratios. EDU, AGE, ASI, DTM, FFS, FAS, ETV, GEN, EXP and PDR are as earlier defined. D-W statistic = Durbin-Watson statistic.

Table 5: Estimated determinants of the crop farmers' income after joining the project

Parameter	Linear	Exponential	Semi-log	Double-log
Constant	644672	2.7812	-23614	1.9431
	(1.81)	(13.14)	(-0.98)	(4.07)
EDU	-16054	-0.00813	-13438	-0.0112
	(-1.80)	(-0.63)	(-1.25)	(-0.08)
AGE	6233	0.00213	5667	0.0449
	(1.23)	(0.55)	(0.73)	(1.13)
ASI	-10398	-0.00412	-1769	-0.0461
	(-0.12)	(-0.47)	(-0.57)	(-0.42)

DTM	9755	0.00916	2887	0.0761
	(1.98)*	(0.77)	(0.61)	(1.11)
FFS	39989	0.07116	176178	0.2671
	(2.40)**	(2.07)**	(2.09)**	(1.98)**
FAS	-15795	-0.00043	-2476	-0.0891
	(-0.85)	(-0.68)	(-0.52)	(-1.14)
ETV	8322	0.08341	23641	0.2187
	(1.83)**	(2.14)**	(2.08)**	(1.94)*
GEN	-68232	-0.00781	-33672	0.0271
	(-1.09)	(-0.69)	(-1.08)	(0.46)
EXP	-2776	0.00347	2697	0.0674
	(-0.61)	(0.64)	(0.51)	(0.83)
PDR	55461	0.00136	7729	0.1973
	(2.15)**	(1.12)	(2.11)**	(1.96)**
R^2	74,6%	68.4%	65.9%	70.7%
R^2(adj)	70.4%	64.4%	63.4%	68.2%
F-statistic	8.09	4.21	4.14	7.04
D-W statistic	1.86	1.58	1.63	1.92

Source: Field survey, 2013. Notes: * = Significant at 1% level; ** = Significant at 5% level. Figures in ( ) are t- ratios. EDU, AGE, ASI, DTM, FFS, FAS, ETV, GEN, EXP and PDR are as earlier defined. D-W statistic = Durbin-Watson statistic.

Table 6: Constraints to project realization

Variable	Mean score	Rank
Irregular fund disbursement method	3.83	1st
Inadequacy of facilitators	2.61	6th
Late release of government cash contribution	3.44	2nd
Demand for users' cash contribution	3.12	3rd
Non-payment of counterpart fund by beneficiaries	3.09	4th
Poor leadership/management by officers of FCAs/FUGs	1.40	9th
Inadequate logistics for extension staff/officers	2.60	7th
Misconception of the project by benefiting communities	2.82	5th
Internal wrangling/suspicion among benefiting communities	1,56	8th

Source: Field survey, 2013.

CONSTRAINTS TO REALIZATION OF PROJECT OBJECTIVES

Fadama User Groups'(FUGs) crop farmers within Southeast have posited that Fadama III Project could have recorded more successes if not for some constraints such as; irregular fund disbursement method, inadequacy of facilitators, late release of government cash contribution, demand for users' cash contribution, non-payment of counterpart fund by the beneficiaries, poor leadership/management by officers of FCAs/FUGs, inadequate logistics for extension staff/officers, misconception of the project by benefiting communities, and internal wrangling/suspicion among benefiting communities. The result as presented in Table 6 showed that the crop farmers considered irregular fund disbursement method as the most serious set-back with a mean score of 3.83. The other problems were listed in descending order of seriousness with their mean scores as: late release of government cash contribution 3.44; demand for users' cash contribution 3.12; non-payment of counterpart fund by the beneficiaries 3.09; misconception of the project by benefiting communities 2.82; inadequacy of facilitators 2.61; inadequate logistics for extension staff/officers 2.60; internal wrangling/suspicion among benefiting communities 1,56 and poor leadership/management by officers of FCAs/FUGs 1.40.

CONCLUSION AND RECOMMENDATIONS

The Fadama III project in Southeast Nigeria was successful with the Fadama User Groups' crop farmers since it was able to increase their mean income by 204.80%. Introducing the principles of comparative advantage, by the provision of credit facilities to the farmers in the five States that make up the Southeast, only for those crops that earned them the highest income should be encouraged. In addition, timely disbursement of funds, payment of counterpart funds, recruitment of more facilitators, and provision of logistic supports to the extension agents will ensure further improvement in earned income and programme sustainability.

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