How does Extension Education contribute to Agricultural Development? **Insights from Extension education of Green River Project in Nigeria**

ABSTRACT

Due to the need to explain how extension education adds to Agricultural development in Nigeria, extension service of Green River Project was evaluated. In recognition of the roles of Agricultural development in reducing poverty and promoting food security, agricultural programs with their extension services component have been implemented in Nigeria. The study examined the teaching methods and impact of the extension service of Green River Project on fish farmers in the study area. Data collection involved use of interview schedule and questionnaire to elicit information from 140 respondents. Program evaluation models reviewed include logic model, Kirkpatrick learning evaluation model and Boon programming model. A framework for planning and evaluating extension education program was generated. Results indicated that extension education of GRP had significant impact on some conditions of the farmers such as their quantity of fish produce ($t= 6.279$; $p\leq 0.05$), income ($t=7.390$) and family feeding standard ($X^2=26.5$; $p\leq 0.05$). It was recommended that there should be collaboration of GRP with other agencies that provide similar services to fish farmers in Niger Delta areas like other agricultural projects of some oil companies in the area and proper measures should be put in place to provide internet services for GRP personnel.

Keywords: Education; Extension; Nigeria; Agricultural; Development.

INTRODUCTION

Agricultural extension service is one of the means through which the desired transformations and development can be brought about in the agricultural productivity of farming communities. It can aid towards improvement of standard of living of small-holder farmers and extension clientele. For the agricultural sector to contribute its share to the economic development of Nigeria; local institutions staffed by trained manpower are essential (Haruna and Abdullahi, 2013). Rapid agricultural development requires large number of Extension Agents and farmers whose capacity is developed to understand and solve agricultural production problems (Haruna and Abdullahi, 2013). Agricultural Development can be achieved through constant development and transfer of improved agricultural technologies to farmers. Today's understanding of extension goes beyond technology transfer to facilitation, beyond training to learning, and includes helping farmers form groups, deal with marketing issues, and partner with a broad range of service providers and other agencies (Davis, 2009). Agricultural extension can thus be defined as the entire set of organizations that support people engaged in agricultural production and facilitate their efforts to solve problems; link to markets and other players in the agricultural value chain; and obtain information, skills, and technologies to improve their livelihoods (Davis, 2009). The main aim of Extension Education is to bring about all round development of rural people (Chauhan, 2007). Unfortunately, extension education in Nigeria is constrained by numerous factors. These includes shortfall and unpredictability of funding, limited institutional support for extension educators, limited on-the-job and pre-job training of extension educators, little or no evaluation of the projects, among others. The extension systems have been increasingly criticized for being not that effective for all the investment that has gone into maintaining its organization and staffing (Qamar, 2005). Some of the ways to improve the

service are to make its content more relevant to farmers, develop alternative sustainable financing option, well trained, and adequate staff, and the use of participatory extension approach under stable policy and sustainable institutional arrangement (Koyenikan, 2008). It is imperative to ensure constant evaluation of the projects and adequate funds for research and extension education in Nigeria. Hence, there is need for various agencies, international organizations, government and private sectors to be involved in financing extension education in Nigeria. Some oil companies in Nigeria also involve in extension education for farmers in their locations. Green River Project (GRP) is used by Nigerian Agip Oil Company to offer extension education to farmers in their location.

GRP is executed by Eni Corporation through their subsidiary, Nigerian Agip Oil Company (NAOC) together with its partners, Phillips Petroleum and Nigerian National Petroleum Company from the year 1999 to present. These areas are in the Niger Delta regions of Nigeria comprising: Imo, Delta, Bayelsa, and Rivers states. The goal of the project is to increase agricultural productivity and to prevent further deterioration of the soil through the use of better farming techniques; improve the income of farmers and make them more self-sufficient and increase the standard of living of rural families so as to reduce the flow of migrants to the towns (GRP, 2005; Ogbonna et al, 2016).To achieve these objectives, the technologies they have disseminated to the farmers over many years include the fish farm management technologies, feeding techniques, fish culture management techniques, pond water quality and quantity management and liming techniques (Ogbonna, Onwubuya and Akinnagbe, 2014). This study sought to ascertain the roles of the extension education of GRP in achieving agricultural development in the area. This was done through generation of framework for planning and evaluating extension education program and using it to evaluation of the impacts of the extension education of GRP in agricultural development of the training locations. Hence the questions were: what are the extension teaching methods used by GRP personnel? What are the impacts of the extension education in agricultural development of fish farmers in the study location? And what are the perceived strategies to improve the program?

The general objective of the study was to assess the contributions of extension education in agricultural development in Nigeria through the insights from GRP in Nigeria. Specific objectives of the study were to:

(1.) ascertain the extension teaching methods used by GRP for extension education in the area
(2.) explore models for evaluating extension education programs for agricultural development;
(3.) determine the impact of extension services of GRP on agricultural development and activities of fish farmers and
(4.) ascertain strategies for enhancing the effectiveness of extension services of GRP.

MATERIALS AND METHOD

Sample and Participant Selection

The study was carried out in Imo and Rivers States Nigeria which are in Niger Delta region of the country. River State lies between longitude 6° 50'E and 7.00°E and Latitude 4° 45'N and 5.7°N (Ogbonna *et al,* 2016). The inland part of Rivers state consists of tropical rainforest towards the coast (Ogbonna *et al,* 2016) and major characteristics of Niger Delta

environment which include the many mangrove swamps. Total annual rainfall decreases from about 4,700 mm on the coast to about 1,700 mm in extreme north of the State (NDRDMP, 2006). The mean monthly temperature is between 25 to 28°C and the mean annual rainfall from 2032mm in the land area to 3048mm towards the coast (NDRDMP, 2006). Imo State lies within latitudes 4°45'N and 7°15'N, and longitude 6°50'E and 7°25'E with an area of around 5,100 sq km (Chikaire, Orusha, Irebuisi, Amanze *et al*, 2016).The major socioeconomic activities of inhabitants in Imo and Rivers States include farming, fishing, trading and engaging in white collar jobs. All fish farmers in Imo and River States constituted the population for the study. Multi-stage sampling technique was used to select the sample size. In Rivers State, GRP operates in Ogba/Ndoni/Egbema LGA. The LGA is divided into two zones (Ogba/Ndoni zone and Egbema/ Oguta zone) by NAOC-GRP (Ogbonna *et al*, 2016). In the first stage, the two zones were purposively selected in order to get adequate number of fish farmers for the study (Ogbonna *et al*, 2016). In the second stage, two communities in Egbema/Oguta zone (Mgbede and Okwuzi) were selected from the communities that formed the zone. For Ogba/Ndoni zone, Obrikom and Omoku were selected from the communities that made up the zone. Twenty fish farmers were selected from each community using purposive sampling technique (because the sample was drawn from the list of farmers reached by GRP) (Ogbonna *et al*, 2016). This gave a total of 60 fish farmers for the study in Rivers State. In Imo State, three communities (Etekuru, Ezi-Orsu and Oguta) out of eight communities (Umudike, Etekuru, Ezi- Orsu, Afiafor, Akrri, Enigbo-Abatu, Orsu-obodo and Oguta) that constitute the Egbema/Oguta zone in Imo State were selected using simple random sampling technique. A list of fish farmers GRP has reached in these communities was collected from the extension staff from which 20 fish farmers were selected using purposive sampling technique (because the sample was drawn from the list of farmers reached by GRP) making a total of 60 farmers for the study in Imo State (Ogbonna *et al*, 2016). Twenty GRP personnel were purposively selected based on their involvement in the fishery programme making a total of 20 personnel. Hence, a total of 140 respondents (120 fish farmers and 20 GRP personnel) was the sample for the study.

Assessments and Measures

To identify the extension teaching methods used by GRP personnel, a list of extension teaching methods was provided for the respondents to tick either "yes" or "no" on the methods they use or do not use respectively. To evaluate the impact of extension education of GRP on the agricultural development of fish farmers, farming conditions and equipments of the fish farmers were measured and compared using before and after evaluation model (Ogbonna *et al*, 2016) as shown in Figure 1 below. Some of the variables that were measured include number of fish ponds stocked, family feeding standard, degree of ease of training of wards in schools and quantity of fish harvested before and after the participation in the project. Significant differences in these socioeconomic conditions (before (in the year 1999) and after participation (in the year 2012) were used to indicate impact of extension service of GRP (Ogbonna *et al*, 2016) on them. To determine perceived strategies to enhancing effectiveness of extension services, respondents were also asked to tick "yes" or "no" on possible strategies for effective implementation of GRP provided for them. Strategies which more than 50% percent of the respondents ticked "yes" were considered as the identified strategies. Objective one and four were presented with the use of percentage, frequency count. While objective three was analyzed with mean, t-test and chi-square.

Conceptual Framework

Conceptual framework for this study was developed from other program evaluation models and approaches. Based on the models reviewed and a recall approach of before and after project conditions the conceptual framework (figure1) was generated. The framework shows how extension education program such as GRP could lead to agricultural development in the training locations. In developing the framework, ideas from the logic model was adapted. The University of Wisconsin – Extension (2003) logic model is often used as a program development tool in Extension (Franz, Garst and Gagnon, 2015). The framework for this study described the extension education program as comprising of Baseline/Situation assessment; Program planning, Implementation and Resource provision; Impact of extension education/ situation after participation; Roles of Extension Education in Long-term development and Strategies to improve effective performance of extension education (example GRP).

This framework can be adapted in different situations to plan, implement and evaluate extension education programs for farmers and other kinds of learners. Block A shows the situation of the study area before the introduction of GRP extension education program for farmers. The GRP program identified that the farmers had problems of inadequate input and facility for fish production before the extension education program was introduced. Block B, shows the activities and resources provided for the extension education program of GRP which include the staff, equipment and fund. This led to Block C, which shows the impacts of GRP extension education program in the area. Consequently, Block D considers the long term roles of extension education in development of the training locations. In order to promote the impact and long term sustainability of the program, Block E is concerned with strategies to effective performance of GRP.

RESULTS

Extension Teaching Methods Used by GRP for Extension Education in the Area

Data in Figure 1show that the GRP personnel used range of extension teaching methods. These include: organization of farmers' day (show and contest) (100%), contact groups (100%), training and visit (90.0%), small plot adoption technique (SPAT) (85.0%), posters (80%) and mass media (80%). This implies that GRP personnel mostly use farmers' day, contact group and T and V system among other extension teaching methods.

Models for Evaluating Extension Education Programs for Agricultural Development

1: Kirkpatrick-Phillips learning evaluation model

Donald KirkPatrick first proposed a four level model of learning evaluation (Figure 3) back in the 1970s (Daragh, 2013). It was later extended by an additional level to reflect the need to tie learning outcomes to a clear bottom- line impact (Daragh, 2013). As shown in figure 4 below, level 1 of this model is the basic "customer satisfaction survey" type of evaluation that should be conducted for all training program. The logic is that effective learning will not have taken place if the learners were not satisfied with the trainer/training or environment (Daragh, 2013). It is a quick and easy metric to measure and the target should be 100% satisfaction, anything else would indicate that there is a problem with the training, the training methods, or the trainers. Level 2 of the model is the standard "proficiency test" that should be part of any

training program. It measures the effectiveness or how well the desired knowledge has been transferred (Daragh, 2013. The assumption being that the training cannot be effective if the desired learning outcomes have not been met. Level 3 looks at the behavioral changes that have come about as a result of the training. This looks at how the learners are putting the principles into practice and applying the information that was imparted in the training. If no behavior changes are taking place, you might assume that the training was ineffective. If some changes are taking place but not as many as expected/required, the training was somewhat effective. That is why you can't skip the first two levels. Of course there can be many causes for a failure to apply the learning (management systems acting contrary to what they were trained, peer pressure, boss pressure, lack of motivation to apply learning). Level 4 looks at the results of the training, the knowledge, practice and interests (KPIs) that should be affected by changes in behavior. This is why it is important to have a baseline of KPI performance before engaging in training. What is it that people should be able to do, and what do they need to know to be able to do that? Level 5 ties all of this to the bottom line. What is the return on investment of the training? Based on the improved performance has there been an improvement in performance or productivity or an improved ability to identify and mitigate risks? What is the cost saving? Was the net bottom line impact positive or negative? These levels are shown in the Figure below 3 below.

2: Program action-logic model

A logic model depicts program action by describing what the program is and what it will do - the sequence of events that links program investments to results (University of Missouri extension, 2008). The logic model is at the center of University of Wisconsin Cooperative Extension-Extension program development (Iowa State University of Extension, 2008). It displays the sequence of actions that describe what the program is and will do – how investments link to results (Gateway Center for Giving, 2012). The Extension logic model contains six components (Iowa state university of extension, 2008). The logic model is a tool that has been used for more than 20 years by program managers and evaluators to describe the effectiveness of program (McCawley, 2001). The model describes logical linkages among program resources, activities, outputs, audiences and short-, intermediate- and long-term outcomes related to a specific problem or situation (McCawley, 2001). It illustrates a sequence of cause-and-effect relationships – a system approach to communicate the path toward a desired result (McCawley, 2001; Millar, Simeome and Carnevale, 2001). It addresses the common concern of limited control over complex outcomes of impact measurement. Logic model recognized using linear model to stimulate a multi-dimensional process. It links the problem (situation) to the intervention (inputs and outputs), and the impact (outcome) (McCawley, 2001). Logic model is used in evaluating extension education programs to match inputs with outcomes and impacts. As can be seen in Figure 4 below, the model comprise of situations, needs and assets, program input, output, outcomes and impacts and assumptions and external factor the affect the program.

3: Context input process and product (CIPP) model

CIPP evaluation model is a comprehensive framework for guiding evaluation of program, projects, personnel, products, institutions and organizations (Stufflebeam, 2002). Corresponding to the letters in the acronym CIPP, this model's core parts are context, input, process and product evaluation (Stufflebeam, 2002). Guba (2005) stressed that context evaluation deals either with the evaluation of the program's context, identification of target population and their felt needs, identifies opportunity and problems in addressing needs, and judges the responsiveness of goals,

objectives to assess needs. Input evaluation identifies and assesses alternative strategies, schedules, budgets, resources needs and procedural designs needed to accomplish the objective of a program. The process evaluation monitors implementation by recording judging activities in relations to procedural design. It also provides information for changing operational plans during implementation. Product evaluation as viewed by Webster (2004) describes and judges outcomes relating them to program's goal and objectives as well as to the needs of the target population. Product evaluation interprets the worth and merits of the programs final outcomes. It is useful for both formative and summative evaluation in area of impact assessment, reporting, structuring of program, implementation and recycling of programs.

4: Boone, Dolan and Shearon Programming Model

Boone *et al.* (2002) provided a conceptual programming model from a systems approach for organizational improvement. In this model, the program planner is seen as a change agent and decision maker through program facilitation, implementation, and evaluation (Franz *et al*, 2015). The conceptual programming model developed here represents an expansion of scope and scale of the 1971 Boone, Dolan, & Shearon model, promoting a systems approach to organizational improvement through the key sub-processes of program facilitation, implementation and evaluation (Diaz, Gusto and Diehi, 2008; Boon, 2002). There is clear emphasis on linking the organizational process to the community it aims to service, as well as understanding organizational renewal and framing the planning process within macro and micro lenses to better monitor and adapt to the changing needs of a public of interest (Diaz *et al*, 2008).The main steps in this model include understanding the organization and its renewal process, linking the organization to its publics (i.e., community), designing the planned program, implementing the planned program, evaluation, and accountability (Franz *et al*, 2015).

Impact of Extension Education of GRP on Agricultural Development and Activities of Fish Farmers

Results in Table 1point out that average quantity of ponds the farmers owned before participation in GRP was 2.00 while the average number of ponds owned after participation was 10.00 ponds. It also shows that there was significant difference (t= 13.237) in the number of ponds owned before and after participation in the extension education program. This implies that the number of ponds owned by the fish farmers after (2012) participation in GRP was higher than the number they owned before (1999). The average numbers of bowls possessed by benefiting fish farmers, before and after the extension program, were two and ten bowls, respectively, as revealed in Table 1. This implies that there was significant difference in their possession of bowls (t= 12.540) after partaking in the education program. Data in Table 1 shows that the average number of water pumping machine possessed by the farmers before and after participation was the same. There was no difference (t= 6.053) in their possession of water pumping machine. Since the mean scores are not statistically different, it implies that GRP extension education program had no impact on number of water pumping machine possessed by the farmers. Data in Table 1 show that the average number of feed grinding machine was the same for before and after their participation in the project. There was no significant difference (t= 6.013) in the number of feed grinding machine they possessed in the area. Entries in Table 1 show that the average number of giant pelleting machine, hatchery tanks and scales owned by the

fish farmers were 1.00 and 1.00, 1.00 and 6.00, 1.00 and 1.00, respectively before and after the extension education project. It also shows that there was no significant difference (t= 7.685 and 6.360) in the mean scores but there was significant difference (t= 9.906) in the mean score of number of hatchery tanks.

Data in Table 2 reveal that 47.5%, 47.5%, and 5.0% of the respondents indicated that their knowledge of fish production techniques were poor, fair and adequate, respectively before participation. Table 2 also shows that 0.8%, 26.7%, and 72.5% of the farmers indicated that their knowledge of fish production techniques after participation were poor, fair and adequate, respectively. The Table also shows significant difference (X^2=30.0) in knowledge on fish production techniques. Field data indicate that 10.0% and 19.2 % of the farmers indicated that transferring fish farming knowledge to their workers before and after the extension education was very easy respectively. It also reveals that there was no significant difference (X^2 =7.0) in the degree of ease of training of workers. Data in Table 2 show that 47.5% and 63.3% of the farmers indicated that marketing of fish products was very easy before and after the extension education respectively. It also reveals that there was significant difference (X^2=12.5) in the ease of marketing of fish products.

Perceived Strategies for Enhancing the Effectiveness of the Extension Education

Data in Table 3 indicate that majority of the extension educators suggested the following as strategies for enhancing the effectiveness of the extension services: the provision of internet services for extension services (95.0%), assistance should be on felt need of the farmers (95.0%) and need to Increase farmers' participation in decision making (90.0%). Majority of the GRP extension personnel (90.0%) also suggested frequent training of extension personnel on more improved technologies like e-farming and training of extension agents on use of internet services for easy communication with farmers (85.0%) as strategies for enhancing their services. Also, majority of the GRP personnel suggested other strategies like: that there was need to increase youth involvement in the project (90.0%), provision of input at the right time for distribution to farmers (85.0%), need to increase the number of trained extension personnel (85.0%), need for provision of more marketing information (80.0%), need for increased education and technical competence of extension personnel (70.0%) and need to provide storage and processing facilities for the farmers (70.0%).

DISCUSSION

In the Extension education of GRP, the extension educators mostly use farmers' day, contact group and T and V system among other extension teaching methods. Farmers' day organization in GRP involves the sensitization of farmers on how GRP operates. This corroborates findings of Tawari et al (2009) wherein contact group, small plot adoption technique, demonstration and T&V, were regarded by the fishers as the most effective systems as a strategy for fisheries development and management used by agricultural agencies in Niger Delta including GRP. According to Bolorunduro and Falaye (2003), information needs of fish farmers are both diverse and dynamic and they need adequate information on improved technologies in order to undertake productive initiatives in the most cost effective manner. This has positive influence on extension services of GRP because the various extension teaching methods help to provide varied information. Hence, it enhances the contribution of GRP towards agricultural development in the area. These methods of extension teaching used by GRP personnel are shown in Figure 2 below. With the use of contact group the GRP personnel can

meet many farmers at a time. Contact groups are used in extension education to promote dissemination of teachings to large number of people not just an individual. Vargas-Lundius (2009) noted that establishment of farmer groups helps to strengthen extension services in most areas. Contact groups help to multiply the efforts of the extension worker while T and V helps them to meet the farmers individually. It is expected that, through farmer groups, communication among farmers and sharing of knowledge given through extension training programs is expanded, therefore helping to sharpen farmer decision-making abilities (Mvuna, 2010). Extension educators in GRP engage with farmers as groups to disseminate information and encourage interaction of farmers within the groups. Also T and V system was used in the extension education program of GRP in the area. Beginning in the late 1970s, the World Bank introduced the "training and visit" approach in about 70 countries to speed the dissemination of Green Revolution technologies to farmers (Swanson & Rajalahti, 2010). This approach assumed that extension educators were poorly trained and not up-to-date on the subject, poorly supervised, and tended not to regularly visit farmers (Suvedi, 2011). To address these problems, this approach introduced a system of regular training of extension staff by subject-matter specialists, regular visits by extension workers to innovative farmers in the community, and periodic interaction between farmers, extension workers and research scientists to facilitate two-way flow of communication (Suvedi, 2011). Information obtained during field observation showed that GRP extension educators were regularly trained in the GRP office. They participate in training workshops to improve their knowledge. They also visit farmers frequently to supervise their farmers, take down questions, provide advisory services and educated the farmers. The use of various teaching method is an enabler for positive results to be obtained in evaluation of the extension education project in the area.

In extension education, programs are modeled in such a way that the different stages are considered. These stages include situation analysis, program planning, implementation, monitoring and evaluation and various activities related to each stage. Program development has been defined by the Extension Committee on Organization and Policy (ECOP) as "a continuous series of complex, interrelated processes which result in the accomplishment of the educational mission and objectives of the organization" (Seevers& Graham, 2012, p. 103). The program development model most often used by Extension professionals includes (1) needs assessment, (2) program design and implementation, (3) program evaluation and reporting, and (4) stakeholder involvement (Franz &Townson, 2008). For effective implementation of extension programs and the need to ensure effectiveness of a program in providing solution to problems, program planning and evaluation models are used. Evaluation model is designed to help build up a picture of how you expect a project, initiative or service to work (Training and Development Agency, (TDA), 2009). In the last two decades, extension has increased its focus on program evaluation and reporting in program development due to cuts in public funding and increased accountability for the use of these funds (Franz, *et al*, 2015; Franz, 2009, 2011; Franz, Arnold, & Baughman, 2014; Kalambokidis, 2004, 2011). There are many approaches or models of program evaluation. This study reviewed the Kirkpatrick-Phillips learning evaluation model; Program action-logic model; Context input process and product (CIPP) model and Boone, Dolan and Shearon Programming Model. This study adapted the Logic model. The logic model describes the program's situation, inputs, outputs, outcomes, assumptions, external factors, and evaluation to visually show how the program is supposed to work. Logic models are often used to develop more detailed program and evaluation plans (Rennekamp & Arnold, 2009). In Extension, the logic model is used in program planning, implementation, evaluation and communication **(**Iowa

state university of extension, 2008). While the term 'program' is often included, the logic model is equally helpful in planning and evaluating group work, teamwork, community-based collaborative and complex organizational processes to promote results-based performance **(**Iowa state university of extension, 2008). A logic model is most often used by Extension professionals as a tool to describe their program to stakeholders and rarely used as a program development model (Braverman & Engle, 2009). The logic model as a planning tool often does not take into account the complex context of program development. For a full critique of the logic model in Extension program planning, see Arnold's (2015) critique later in this issue (Franz *et al*, 2015). This study generated a Framework for planning and evaluating impact of extension education programs (Figure 1) by adapting the Logic model. The Framework used ingenerated and this study can be replicated to plan and evaluate extension programs in different locations.

Results show that GRP extension education impacted positively on the number of ponds owned by the fish farmers. Similar projects that can help farmers construct fish ponds by providing knowledge and fund will be adopted by farmers. This will help to increase the benefits of extension programs in developing fish farming in the locations. Results reveal that the extension education had impact on number of bowls possessed by the participants. This could be attributed to the fact that they had more harvest and used more bowls after participation in the extension education program. The extension education project had no impact on their possession of feed grinding machines. This could be because most of the fish farmers did not produce fish feed. Feed production is necessary in fish farming in order to reduce cost. Research and extension teaching should be intensified on the aspect of feed formulation in the area to reduce the cost of buying commercial feeds for fish. The extension education had no impact on number of giant pelleting machine and weighing scales possessed by the participants. It is expected that since majority of farmers do not produce feed they will not have the giant pelleting machine. This machine is used to produce pellets and make fish feed heavier for them. The extension education of the project impacted significantly on the knowledge of fish production technique possessed by the respondents end their ease of training of other workers in improved fish farming technologies. GRP extension education had positive impact on the participants' ease of marketing of fish products. This could be attributed to the fact that greater proportion of the respondents indicated that they were able to easily sell their produce maybe because of better quality or quantity of produce after participation in the project. Following the impacts measured on fish farming in the area, strategies should be put in place to enhance the impacts and ensure sustainability for agricultural development in the area

Results of the strategies to improve effectiveness of the project show that Internet services will help the GRP personnel to improve their extension services. It will help them to provide up-to-date information to the fish farmers. Proper identification of the farmers' needs will help to enhance their participation in the project. These will help to enhance the implementation of the extension services of GRP and enhance the impact of the services on the lives of the farmers. According to Alfred Ockiya *(*2000) training was necessary for extension workers not only in technical agriculture, but also in behavioral sciences which were essential if workers were to be effective in bringing about changes in the knowledge and behavior of their clientele. The result from this study agrees with that of Alfred- Ockiya (2000), that if field staff must be functionally effective, there was no substitute for proper training and competence in relevant subject matter areas, as well as in the principles and process of social change. Training of the GRP personnel in relevant areas including use of internet facilities will help to improve the effectiveness of the extension services. Involvement of youth in fish farming will help to provide

job for the youths. It will also help to sustain the positive impact of the GRP since younger generations will continue with the project. In addition, provision of input at the right time for distribution to farmers, increase in the number of trained extension personnel, provision of more marketing information, increased education and technical competence of extension personnel and availability of storage and processing facilities for the farmers will help to enhance the effectiveness of the extension services. When this is achieved, it is expected that there will be increase in impact of the extension education and long term agricultural development in the study locations. The crucial role of agricultural Extension (i.e. farmer education) in the social and economic development of the nation cannot be over-emphasized (Anaeto, Asiabaka, Nnadi, Ajaero, *et al*, 2012). There will be more interest, engagement and employment of people in Agriculture as a business and in large scale. This will promote sustainable food security, employment opportunities and poverty reduction.

CONCLUSIONS AND RECOMMENDATION

This study provided answer to the question on how extension education can contribute to agricultural development. Agricultural extension education and services play vital roles in agricultural development in Nigeria. It can be concluded that the extension education project contribute to increase farmers production and conditions. The farmers are trained and provided with input to increase which increased their equipment, improved their fish farming technologies and boosted their production. Various extension teaching methods were used in the teaching process including T&V system, demonstrations and use of contact groups. This helps to boost the participants learning of the new technologies taught in GRP. The extension education of GRP had impacted on most farming conditions of the farmers including: their farming technologies and facilities among others. However, majority of the respondents suggested there should be increase in the number of trained extension personnel and increase in technical competence of extension personnel, among other strategies. Program evaluation models studied can be used in evaluation processes to ascertain changes in participants as a result of the program.

Recommendations based on the findings include that extension educators should be given continuous training to ensure that they give farmers required technologies to boost agricultural development in the area. It is also necessary to improve youth involvement in the project which results to provision of employment for the youths. Youth engagement in agriculture is very important for sustained agricultural development in Nigeria. Getting them involved through extension education and trainings will help to improve production and employment. It is also important to note that there are other agencies that provide training on improved fish farming technologies for fish farmers in the area. Hence, there should be collaboration among the agencies and measures should be put in place to enhance sustainability and long-term development of the area through extension education.

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Tables

Table 1: Distribution of respondents according to impact of GRP on fish farming equipments and credit

Variable	Before participation 1995-1999 (M)	After participation 2000-2012 (M)	T-value	P-value
Number of ponds owned	2.00	10.00	13.237*	0.021*
Bowl	2.00	9.00	12.540*	0.031*
Water pumping machine	1.00	1.00	6.053	0.102
Feed grinding machine	1.00	1.00	6.013	0.203
Giant pelleting machine	1.00	1.00	7.685	0.210
Hatchery tank	1.00	6.00	9.906*	0.050*
Scales	1.00	1.00	6.360	0.071

*****significant @ 95% confidence interval

Table 2: *Impact of GRP extension education on knowledge of fish production technique and marketing of products*

Variable	**Before participation1999 (n=120)**	**After participation2012 (n=120)**	**X^2– Value**	**Asymp Sig (2-sided)**
Knowledge on fish production technique				
Poor knowledge	47.5	0.8	30.0*	0.000*
Fair knowledge	47.5	26.7		
adequate knowledge	5.0	72.5		
Ease of training of workers				
Not easy	77.0	9.2	7.0	0.061
Easy	33.0	71.7		
very easy	10.0	19.2		
Ease of marketing fish products				
Not easy	43.3	1.7	12.5*	0.014*
Easy	47.5	35.0		
very easy	9.2	63.3		

Table 3: *Percentage distribution of respondents according to their perceived strategies to enhancing the effectiveness of the extension services*

S/No	Strategies	Frequency	Percentage (%)
1	Provision of internet services for extension services	19	95.0*
2	Assistance should be on felt need of the farmers	19	95.0*
3	Increasing farmers' participation in decision making	18	90.0*
4	Increasing youth involvement in the project	18	90.0*
5	Frequent training of extension personnel on more improved technologies like e-farming	18	90.0*
6	Provision of input at the right time for distribution to farmers	17	85.0*
7	Increasing the number of trained extension personnel	17	85.0*
8	Training of extension agents on use of internet services for easy communication with farmers	17	85.0*
9	Provision of more marketing information	16	80.0*
10	Increasing education and technical competence of extension personnel	14	70.0*
11	Providing storage and processing facilities for the farmers	14	70.0*
12	Creating more awareness of the project	8	40.0
13	Provision of transportation facilities	4	20.0
14	Increasing collaboration with external research agencies	9	45.0

*Strategies for enhancing the effectiveness of the extension services

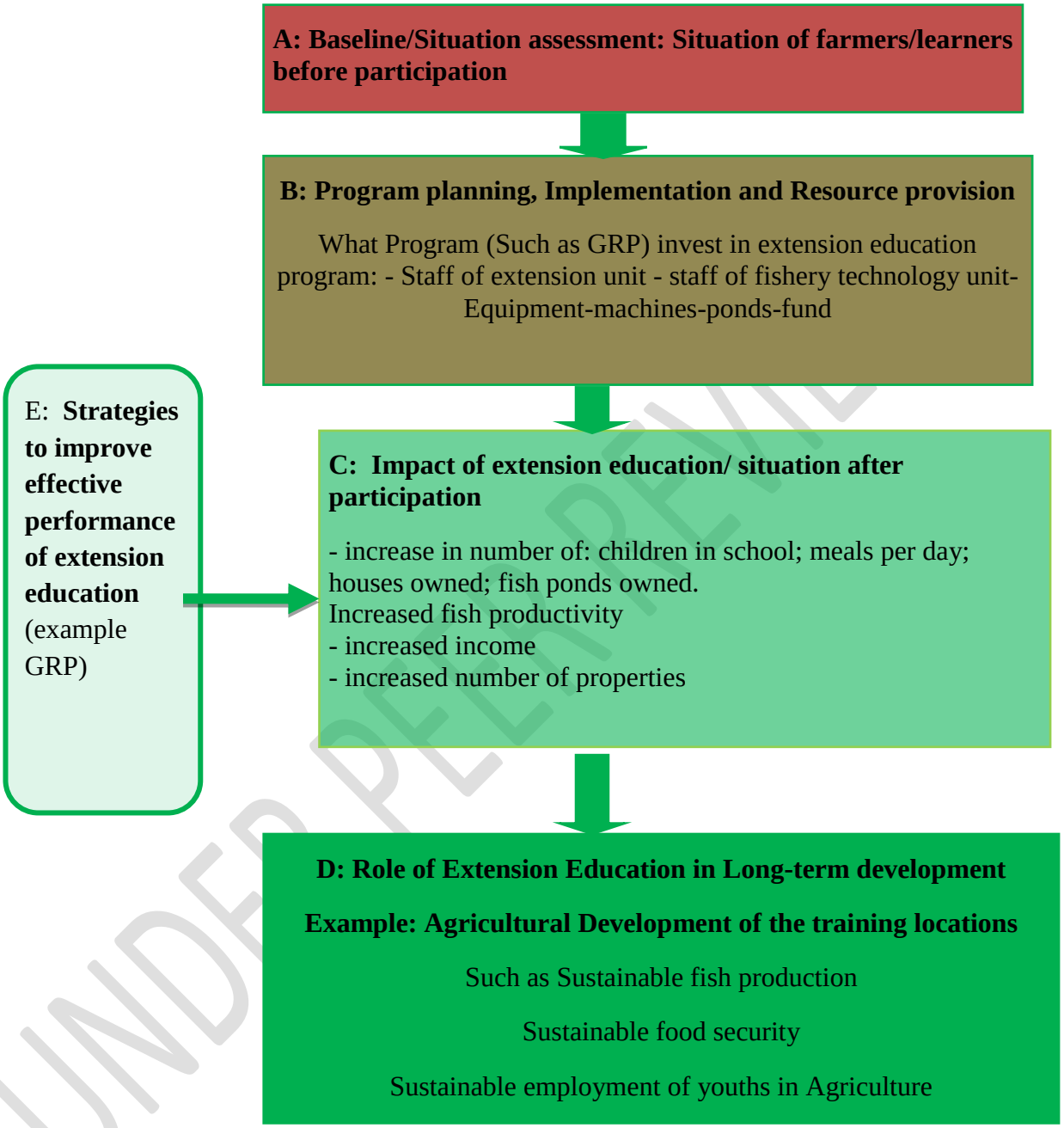

Figure 1: Framework for planning and evaluating impact of extension education programs
Source: Generated by authors

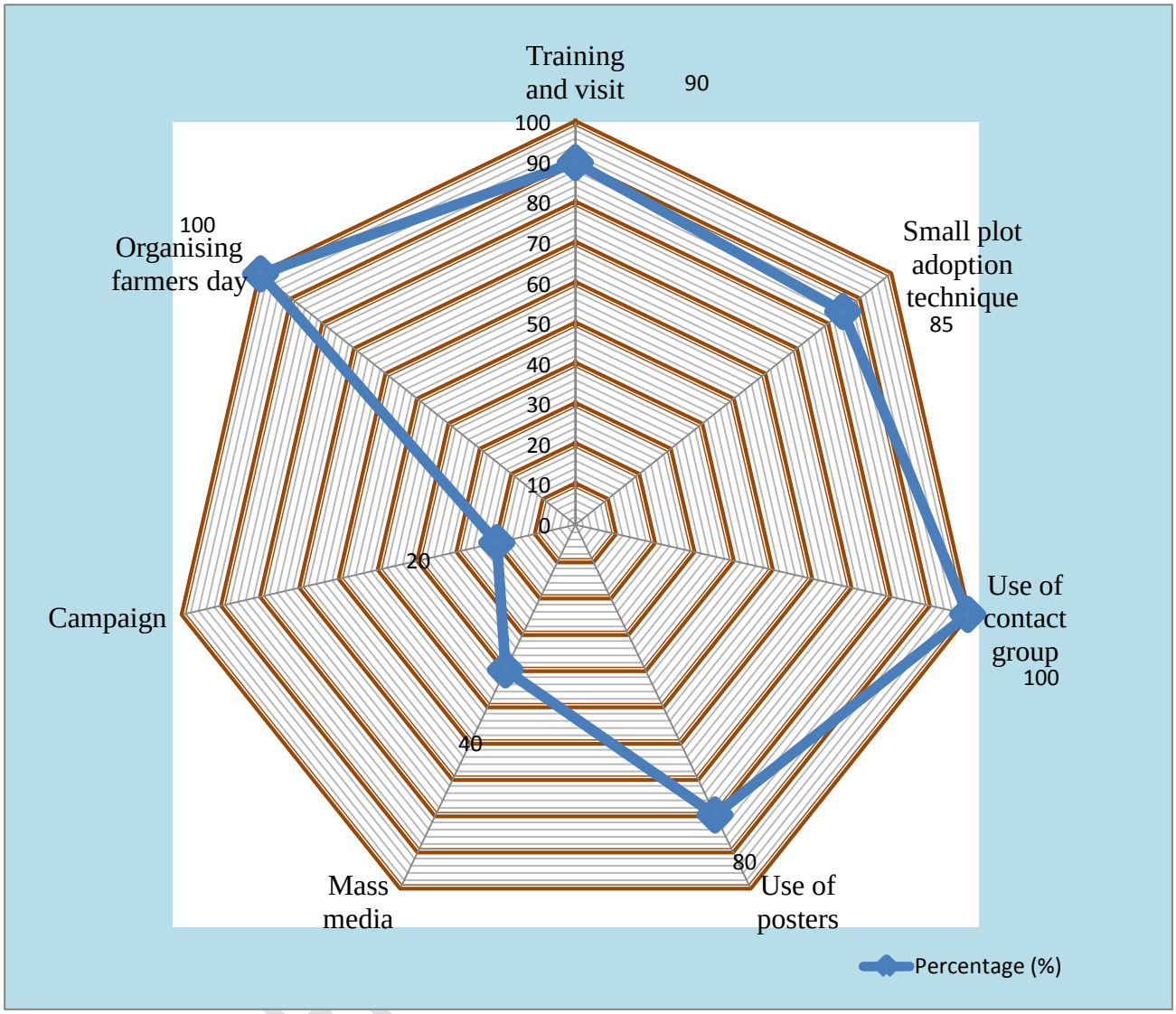

Figure 2: Radar showing different extension teaching methods used by GRP personnel

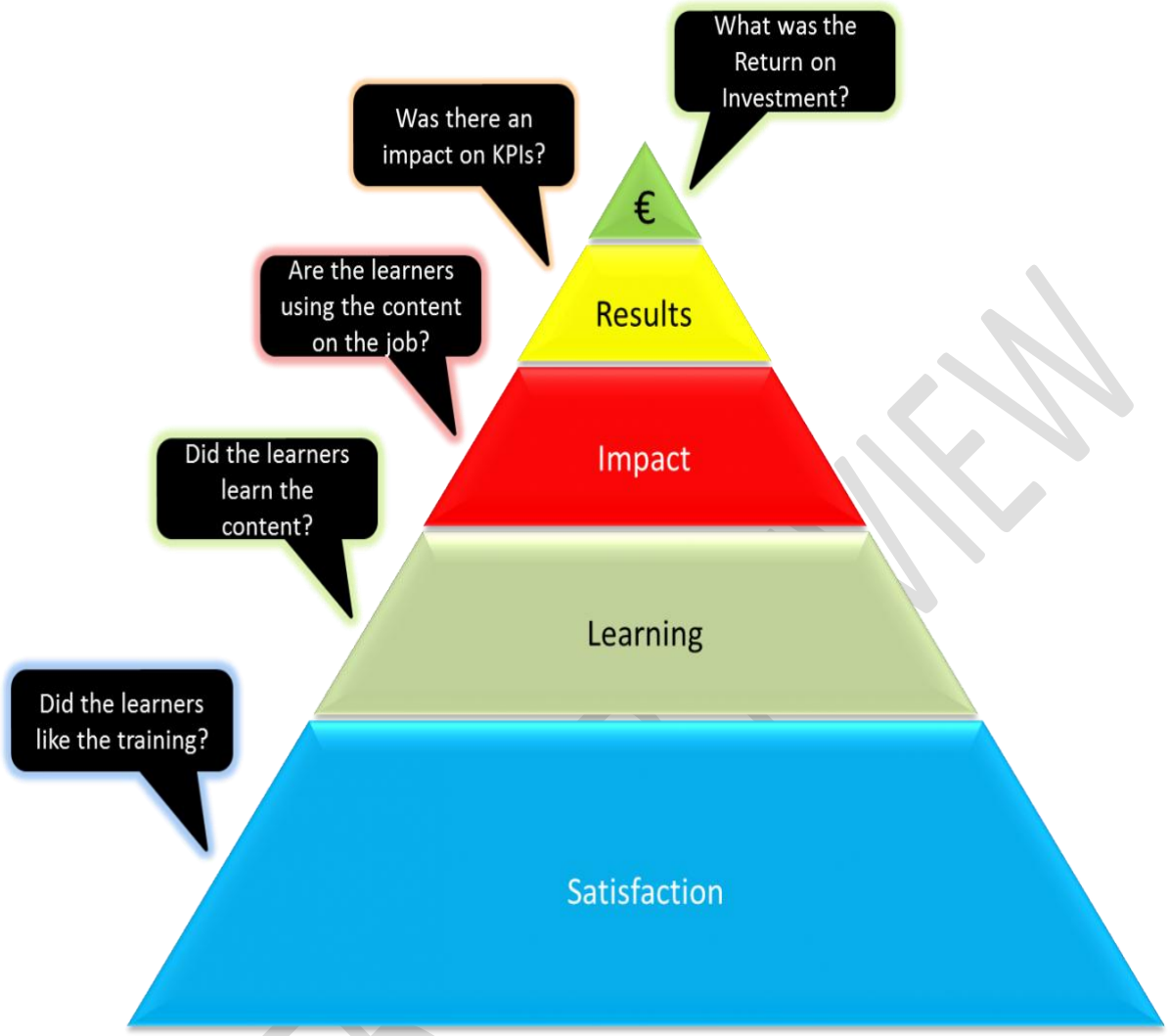

Figure 3: Kirkpatrick-Phillips learning evaluation model (Source: Daragh, 2013)

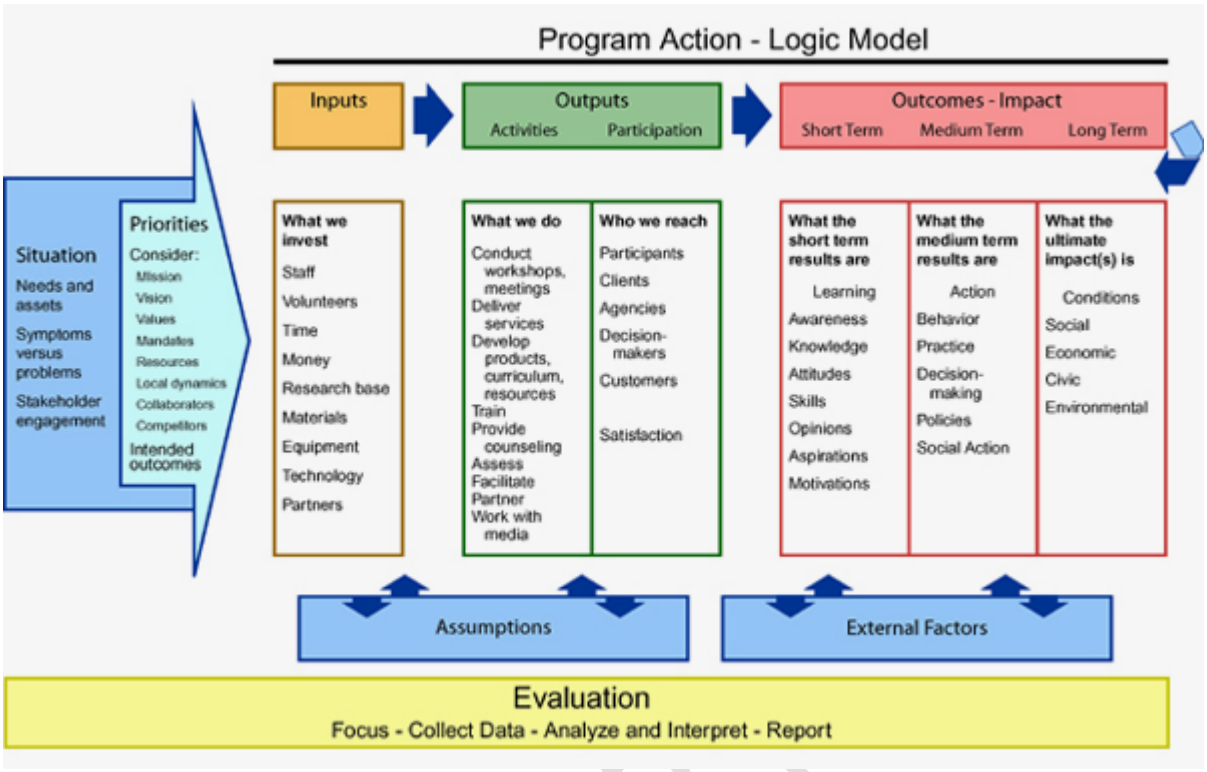

Figure 4: Program action logic model (Source: University of Missouri extension, 2008)