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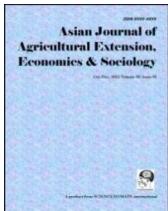
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Comparative Analysis of Farmer Participatory Extension Approaches: Case of Farmer Field Schools and Master Farmer Training in Mashonaland Central Province of Zimbabwe

Christopher Tafara Gadzirayi^{1*} and Never Mafuse¹

¹Department of Agricultural Economics, Education and Extension, Bindura University of Science Education, Lecturers, P. Bag 1020, Bindura, Zimbabwe.

Authors' contributions

This work was carried out in collaboration between two authors. Author CTG designed the study, wrote the protocol, supervised the work, managed the literature searches and edited the manuscript. Author NM managed the analyses of the study and proof read the first draft of the manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

This study made a comparative analysis of two extension approaches, Farmer Field Schools and Master Farmer Training with the objective of finding out the effectiveness of these approaches as regards farmer knowledge gains, skills empowerment, farmer adoption of recommended practices and cost effectiveness. Structured, semi structured questionnaires and informal interviews were used to collect data from farmers, local non-governmental organizations and extension workers. The results indicated that farmer field schools were more effective in terms of improvement in farmer's knowledge, skills empowerment and change in crop husbandry practices. Master Farmer

*Corresponding author: E-mail: gadzirayichris@yahoo.co.uk;

training improved farmers' marketing strategies because of assistance rendered by extension workers.

Use of farmer field schools is therefore recommended when implementing extension programs targeted at large groups of farmers inclined towards crop husbandry. Where emphasis is on change in marketing strategies use of master farmer training programs is recommended.

Keywords: *Farmer field schools; master farmer training; extension; effectiveness; communal areas.*

1. INTRODUCTION

Generally, advances in farm technologies offer opportunities for improving the quality of life of farmers in developing countries [1]. However, a major issue relates to the effective and efficient delivery of knowledge and information on these new advances [2].

In developing countries, agricultural extension is an important public good. However fiscal sustainability has been the major problem for large-scale agricultural extension systems [3,4] reviewed World Bank supported agricultural extension projects in the 1992 –1997 period and found that inadequate funds was a major problem with 76 percent of free standing projects having an uncertain or unlikely sustainability rating [5].

The shrinking of the extension budget allocations due to economic adjustment programs adopted by most Southern African countries in the 1990s called for more effective and sustainable extension systems that can reach many farmers especially the poor while requiring lower government expenditure. There has been an increasing change of thought on the best approach to extension. In recent years, a number of development agencies including the World Bank have promoted farmer field schools (FFS) as a more effective approach to extend science-based knowledge and practices to farmers [6,7]. However, government departments have traditionally placed emphasis on master farmer training (MFT) programs, while giving peripheral attention to other agricultural extension organizational approaches such as; participatory learning, participatory rural appraisals, rapid rural appraisals, participatory technology development, innovative farmer workshops, Look-and-learn tours, farmer-first, farmer-back-to-farmer, farmer-to-farmer extension, project-based extension, in which a group of farmers work on a project, such as bee production, while earning, commodity based, group development, farming systems research, radio listening groups, training and visit and Web 2.0 social media [8].

Such extension approaches promote community participation and ownership of projects within the target farmer groups [9].

Though most participatory extension approaches makes it easier to introduce agricultural development initiatives [10], extension agents have not yet fully adopted the new approaches at the operational level as they continue to find comfort in classical top down approaches [8]. Exclusion of most participatory approaches could be linked to the argument that persuasive 'participatory approaches' and 'extension' are conceptually contradictory activities [10], since the former entails own decision making yet the later is to do with predetermined technical prescriptions from expert researchers to farmers. The most common participatory extension approaches being used in Zimbabwe, among other emerging approaches, are FFS and MFT since they clearly embrace both paradigms of 'participation' and 'extension'.

This study, therefore, made an analysis of these two participatory extension approaches, FFS and MFT that are mainly practiced in Zimbabwe with the specific objectives to;

1. Determine the effectiveness of FFS as compared to MFT in terms of:
 - Changes in farmers' knowledge.
 - Change in farmers' practices.
 - Skills empowerment.
2. Find out which of the two approaches is more cost effective?

2. LITERATURE REVIEW

2.1 Farmer Field School Approach

Farmer field schools are based on a learner-centered approach in which farmers' play a central role in planning and test-driving innovations. In Indonesia, it is a method used to disseminate new agricultural innovations and it is practiced with various annual and perennial

crops [11]. Going beyond the immediate technical extension, FFS have also shown major potential as a starting point for building the capacity of rural people to solve their farming problems. This is a result of the empowering experience of solidarity, self-organization and networking encouraged in the FFS process [12].

Following the encouraging Asian experience, there has been much interest in transferring and adapting FFS to the African situation [13, 14]. Some adopters have sought more efficient ways to disseminate technologies developed at research stations. Others emphasizing the empowerment and organizational elements of FFS have been interested in building an effective platform for the interaction of diverse stakeholders in a creative innovation process. There is general agreement that conventional message - based extension is insufficient for small-scale African farming environments which have spurred an interest in alternatives such as FFS. FFS increased farm productivity, improved efficiencies in use of combined pesticide and organic farming and substantially reduced hazardous synthetic pesticide use [15]. FFS also reduces poverty and improves, farm community organization, and collaborative action resulting farmer confidence and quick adoption of innovations [15]. However, application of FFS becomes difficult under conditions of command agriculture where extension programs are planned and administered by government or donors.

In Zimbabwe a pilot FFS was introduced in the late 1990s under the Training of trainers component of the Integrated Production and Pest Management (IPPM) Project under the Global IPPM facility. The global IPPM facility was started in 1999 by the United Nations (UN) to promote the use of Integrated Production and Pest Management among cotton farmers in Zimbabwe. More recently, pilot Family Field Schools have been established on integrated soil and nutrient management and dry livestock and poultry management in southern Zimbabwe.

2.2 Characteristics of Farmer Field Schools

- According to [16], FFS has the following characteristics:
- Farmers as experts.
- The field is the primary learning place.
- Extension workers are facilitators not teachers.

- Scientist and subject matter specialist work with farmers.
- The curriculum is integrated.
- Training follows a seasonal cycle.
- Regular group meetings.
- Learning materials are learner generated
- Group dynamics or team building

2.3 Setting up and Running a Farmer Field School

2.3.1 The role of facilitators

The facilitator creates conditions for farmers to learn by arranging opportunities for them to observe and interpret differences in soil conditions and crop performance, to carry out simple tests and exercises and through discussions. They encourage farmers to play an active role in the learning process. The facilitator also shares own experiences as the event occurs in the field, and how to overcome farming problems in order to get successful results. However, facilitators who may not have had training in participatory methodologies may end up playing a domineering role during the training session.

2.3.2 Requirements for a farmer field school

Political support, appropriate policies, assured sources of funding to organize and implement the FFS are essential if they are to become successful and sustainable [13]. However, adequate donor funding may be availed to government, but rejected on political grounds since donors may be misconstrued as sprucing opposition politics at the grassroots level [17]. Therefore, decision makers at both national and local levels will also need to become aware and convinced of the greater benefits and impact of these new approaches.

2.4 Challenges Faced by Farmer Field Schools

2.4.1 Monitoring and control

Once schools are operating and new ones are formed spontaneously, quality control may become a problem. Repetition of the successful technology operation in the field cause deenthuses to the facilitator. Therefore, facilitator should be changed to avoid less motivation or new technology may be provided to the facilitator. It is important to insure that the

learning process remains intact, and that demonstrations are correctly carried out.

Owing to limitations in financial and human resources, some developing countries fail to implement FFS programs. The problems are further worsened by impassable roads in farming areas. Also, most FFS programs, according to [18] include 'effectiveness' targeting criteria designed to promote inclusion of affluent and more educated farmers, with the objective of maximizing the impact of the program. While FFS programs managed to achieve the effectiveness-related inclusion objectives, some failed to fulfill the equity-related inclusion aims. This was because either conflicting targeting criteria and participant-selection mechanisms favored the rich, or the need for a minimum level of social standing precluded participation for some poor farmers. Thus FFS program participants characteristics can impact on outcome.

2.4.2 Relevant learning materials

If schools are to remain effective under ever changing physical, social and economic farming conditions, then learning materials and messages should be continuously updated. This is a challenge for FFS facilitators who must develop and provide relevant accessible materials. In situations where relevant reading materials are availed, implementation of FFS is further constrained by low literacy levels and lack of a reading culture among smallholder farmers. In Zimbabwe, attempts to establish farmer study groups started in 2006 under Zimbabwe-Dutch government cooperation [7].

2.4.3 Master farmer training

MFT is an important and inseparable component of most extension programs. The training is generally offered to groups of farmers on a regular basis through residential and non-residential courses. The objective of the training is to help farmers develop the relevant skills and attitudes in order to effectively utilize new technical knowledge and information in their specific situations. [19] Classifies farmer training into two major categories that is institutional training and non- institutional training. He had it that institutional training is carried out by subject matter specialists at research stations: Farmer training centers and agricultural universities. The weakness of this approach to farmer training in developing countries is that the formal classroom

environment is alien to those who take part. The approach can have little effect in imparting agricultural knowledge [20].

Non- institutional training seems to be the effective approach to farmer training in developing countries since the farmers are provided with the training in situ. This was further asserted by [18] who indicated that poorer farmers benefit more when they participate directly in programs than when they receive knowledge and skills under conventional classroom conditions. The main features of this type of training are demonstrations on farmers' fields, visits by subject matter specialist's teams to the villages and group discussions in the fields.

2.4.4 Master farmer clubs

It has been found necessary in the Zimbabwean communal areas that qualified master farmers form clubs, master farmer clubs. Two main reasons have been put forward to justify the formation of master farmer clubs. The first reason is that the few master farmers in the peasant communities can adopt new ideas and practices up to a point. Where they go too far beyond the norms of their societies, community's pressure is applied on them to obtain conformity with the majority. [19] aptly notes that the development authority attempting to introduce change in communal areas is faced with the problems of training the community to a social climate in which the individual is allowed or encouraged to use the new practice [1] reports that the formation of master farmer clubs combining individuals into groups that are able to form opinions and exert social pressure has done much to resurrect the master farmer movement. The second reason for forming master farmer clubs is to enable the qualified master farmers to train farmers in their communities.

3. RESEARCH METHODOLOGY

3.1 Study Area

The study focused on communal areas in Mashonaland Central province of Zimbabwe. The major characteristic of this area is that it falls under natural region 2b, which is a major crop-producing zone. Areas under region 2b receive an average rainfall of 700-900 mm per annum; experiences average temperatures of 18-25 degrees Celsius and engage in cotton, maize, soybeans, and tobacco production.

3.2 Sampling

The sampling frame consisted of all small-scale farmers who have been involved in FFS and MFT in Madziva, Guruve and Dotito districts. A multi -stage purposive sampling procedure was used to select farmers and extension agents for the survey. First, two districts were purposively chosen as a stratum for the selection of the villages. These include Madziva and Dotito District. After which two villages were purposively selected within each district where FFS have been implemented. These villages were chosen in conjunction with the Department of Research and Specialist services (DRSS) and Farmers and Chiefs Investment Group (FACHIG).

3.3 Selection of Household Respondents

A list of all farmers, their places of residence, and their farm sizes were obtained from FACHIG and Department of Agricultural Research and Extension (AREX). A sample consisting of 30 people (15 from each training program) was chosen using a simple random technique, that is, those who have been involved in FFS and MFT. The two extension programs were implemented independently in the two districts. However, the two districts lie within the same agro-ecological region 2b with similar edaphic and socio-economic factors. The survey was carried out between mid-January and mid -March 2006.

3.4 Data Collection Tools

Structured questionnaires were administered to household heads through personal interviews and they were used to capture information from FFS and MFT participants. Reliability and validity of the research instruments was ensured through pre-testing of the questionnaires with farmers within similar environmental conditions. Structured questionnaires mainly consisted of continuous variables, and therefore ratio scales were used as the measurement scale. Information relating to effectiveness of FFS against MFT in terms of improvement in farmer's knowledge, skills empowerment and farmer adoption of new or recommended practices was collected.

Semi-structured questionnaires were also developed for key informants namely AREX and FACHIG coordinators to validate the data. Participatory rural appraisals were also used to find out community's perspectives on the effectiveness of the two approaches that is FFS and MFT in terms of their impact on farmer's

knowledge, skills empowerment and farmer practice change.

3.5 Analytical Tools

Friedman Rank Test was used to rank FFS and Master Farmer Training in terms of their effectiveness to skills empowerment, farmer practice change and farmer's knowledge. In the Friedman, values for variables are ranked for each case. Low ranks correspond to low values of the variables. The Friedman's Rank Test was used because the variables captured in the study were mostly quantitative therefore found appropriate for the non-parametric tests. Pilot testing was done to validate the data collection instruments. The independent samples -T-test was used to determine the cost effectiveness of the two approaches by comparing the means of the means of two variables.

4. RESULTS AND DISCUSSION

Table 1 indicates that FFS have a higher rank than MFT in terms of farmer practice change ($P<0.05$). Farmers under FFS showed that the training programme influenced their practices whereas those who went through MFT did not demonstrate a clear linkage between their practices and the MFT programme. This is in agreement with [15] who found out that FFS are effective entry points for participatory behavioral change among farming communities.

Table 2 indicates that FFS has high effectiveness in terms of improvement in farmers' knowledge in crop husbandry than MFT ($P<0.05$). This could be attributed to the fact that FFS involves hands-on farmer experimentation, which educates farmer participants about Agro-systems analysis. There was no difference in change of marketing knowledge between the two programs.

FFS have a greater impact in terms of farmer skills development in crop husbandry than MFT. This observation is consistent with [1] who noted that FFS are effective platforms for generating new knowledge through inter-personal networks. [11] also found out that farmers' knowledge on agricultural practices, information sharing and farmer cohesiveness increased greatly due to FFS.

FFS utilize participatory methods to help farmers develop their analytical skills, critical thinking and creativity and help farmers learn to make better decisions. In FFS, extension workers do not

come up with the curriculum, instead farmers are involved in curriculum development. However, in terms of marketing skills, MFT was better than FFS (Table 3). This could be attributed to the fact that MFT programs are endowed with marketing information supplied through extension workers. In the FFS approach, farmers contribute to what they learn as compared to MFT. This is achieved through dialoguing with extension staff and deciding what kind of trials they want to do. Experiments and demonstrations are simplified so that farmers find it easy to grasp the required concepts.

The FFS participants said they participated in every part of the extension process including even facilitating the transfer of knowledge to extension and to other farmers. Contrary to the above, farmers said they contribute less to what they learn in MFT since the extension officers tend to play a central role in crucial decision making, learning aids selection and the control of group discussions (Table 4). This is probably due to the fact that in MFT approach, extension staff feels that there is a syllabus, which has to be completed.

Table 5 shows that FFS approach is less costly in terms of extension officer time than MFT. The most probable reason being that in FFS, the extension officer plays a facilitative role as opposed to instructional under MFT. This is in line with [18] who established that FFS are more cost effective when teaching innovative ideas than other extension approaches.

FFS trained a higher number of farmers per year than MFT (Table 6). This could be due to relative ease in implementation of FFS programs. Thus in line with [18] who indicated that, farmers could be trained as facilitators under FFS and that offers the possibility for scaling up training than would otherwise happen, under restricted training by government agents in MFT programs. Farmers work in their own groups in carrying out the experiments, analyzing and discussion of the results. They will only consult the facilitator when the need arises. However, it is not all that easy to train farmers under MFT since extension officer will act more like a supervisor who determines the activities to be done.

Table 1. Effectiveness of farmer field schools and master farmer training in influencing farmer practice

Behavioral change due to master farmer	Effectiveness of farmer field schools and master farmer training in influencing farmer practice	
	MFT	FFS
Change in farmer practices related to crop husbandry	2.03	3.10
Change in marketing practice or strategies	1.80	3.07

Table 2. Comparison of knowledge improvement among farmers

Changes in knowledge level	Comparison of knowledge improvement among farmers	
	MFT	FFS
Change in farmer knowledge related to crop husbandry	1.77	3.18
Change in marketing knowledge	2.55	2.55

Table 3. Comparison of extent of farming skills development to farmers

Farmers skill development	Comparison of extent of skills development to farmers	
	MFT	FFS
Extent of empowerment in crop husbandry	1.72	3.14
Change in marketing practice or strategies	2.22	2.16

Table 4. The extent to which farmers participate in curriculum development

Farmers responses to extension approaches	The extent to which farmers participate in curriculum development	
	Likert scale mean rank (P< 0.05)	
	MFT	FFS
Extent to which farmers participate in crop husbandry curriculum	1.82	3.2
Extent to which farmers have a say in marketing	1.78	3.2

Table 5. The cost effectiveness of the MFT and FFS in Madziva and Dotito Districts of Zimbabwe

Factors measured in extension approaches	Cost effectiveness of the two approaches in Madziva and Dotito Districts in 2005 over 5000 square kilometers	
	MFT (ZW\$)	FFS (ZW\$)
MF Extension officer transport cost	1969933	942266
Wages	1812200	615000
Farmer opportunity cost (time invested in training)	487000	650000

Table 6. The average number of farmers trained per annum

Number of farmers trained	Average number of farmers trained per annum	
	Mean number	
Number of farmers trained per year by MFT	33	
Number of farmers trained per year by FFS	63	

5. CONCLUSION

FFS are more effective in terms of farmer adoption of new or recommended practices, farmer skills development and farmer practice change with respect to crop husbandry than MFT. No difference was noted in knowledge on available markets. MFT was more effective in terms of change in farmers' marketing strategies because of assistance rendered by extension workers. It was established that FFS have the capacity to train many farmers at a lesser cost than MFT.

6. RECOMMENDATION

The research recommends use of FFS when implementing extension programs within Zimbabwe and environs of similar conditions if the major thrust is on crop husbandry and training of large groups of farmers. MFT is more appropriate under command agriculture where the agricultural system is centralized.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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