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DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION
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University of Fort Hare
Together in Excellence

**An Evaluation of Participatory Irrigation and Livestock
Development Projects: A Case of BeitBridge and Mberengwa
Districts of Zimbabwe.**

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ABSTRACT

The adoption of most of the technical innovations in the selected projects was not dependent upon the type of approach used to implement the project. Aspects like the use of certified seed, inorganic fertilizer and pesticides were a function of the accessibility of farming knowledge disseminated by the AEW. Farmers in the conventionally implemented project and those with larger arable lands kept records of their farming activities more than those in the participatory projects. Asset procurement was a function of the farmer's accessibility to non-project income. Fencing as form of investment was attributed to the farmers in the conventionally implemented irrigation schemes and also to farmers with large arable land and who have access to non-project income. Cart and knapsack sprayer ownership had more to do with irrigation project. Conventionally implemented livestock projects performed better than those in the participatory ones. Generally, there were no savings from the proceeds of the projects. This is attributed to the fact the fact that the harvest supplement the yield from dry land cropping which is predominantly hard hit by erratic rainfall.

CHAPTER 1

1.1 THE OVERALL RESEARCH QUESTION

What has been the impact of PRA and conventional approaches to agricultural extension and project implementation in the districts where they were implemented?

1.2 SUBPROBLEMS

The purpose of this study is to;

- (a). Analyze and establish the methods and areas where conventional approach to agricultural extension was used and establish its impact.
- (b). to analyze the main focus of the PRA approach to agricultural extension, establish the methods and areas where it was used and discover its impact.
- (c). Is the PRA of any comparative advantage compared to the conventional approach to agricultural extension?

1.3 JUSTIFICATION OF THE STUDY

“Transfer of technology” has been a prevalent practice for developing and spreading innovations in many developing countries including Zimbabwe (Hagman *et al*, 1999). Technology transfer is a top-down approach that recommends to farmers the practices that they should adopt. The assumption is that technology and knowledge from scientists to farmers will trigger development. Present communal farming practices in the smallholder population of Zimbabwe are not environmentally viable, are unable to sustain adequate household income, and allow very few possibilities for farmers to alleviate poverty through increasing their own agricultural production (Chipika and Friis-Hansen, 2004). Farmers have been considered as the main constraint to development, as the miss-managers of their own resources rather than the potential initiators of a solution (Hagman *et al*, 1999).

Farmers' awareness and adoption of technological components are important indicators of extension services' approximate impact and they provide a back drop for assessing their impact (Gautama, 2000). Lack of progress in rural development has been associated with considering local technologies and knowledge which were promoted by the Green Revolution technology by research and extension agents (Alders, Haverkort and Veldhuizen, 1993). However, agriculture is a very complex activity with many interacting factors making it virtually impossible to determine with precision what part of any increase in development changes is due to agricultural extension (Schultz, 1956 and Benor, Harrison, Baxter, 1984). The effects of a particular investment today can persist over many future production periods, perhaps forever (Schultz, 1956). Estimating the parameters that characterize this overall dynamic research-development-adoption-non-adoption process is the most challenging empirical problem in the evaluation of agricultural extension (Benor, Harrison and Baxter, 1984). It is not so difficult however, to identify particular practices that farmers are pursuing after having learned them from the Agricultural Extension Workers (AEWs).

Many approaches to agricultural extension have been applied with the intention of bringing about economic development in the rural sector. In Zimbabwe, such conventional approaches as, the Master Farmer Training Scheme (MFT) coined in the 1930s, Group Development Area Approach (GDA) coined in the 1970s, (Hemmes and Vessers, 1988), the Radio Listening Group approach (RLG) tried in Chimanda and Nswazi communal areas (Mudiwa, 1997), the Training and Visit System (T&V system), the Farming Systems Research and Extension (FSRE) and the commodity based approach were used sequential after the other proved ineffective or unsatisfactory. Many resources, including money, have been injected into research and development in order to improve the livelihoods of the rural sector, but, most of these areas have remained poor despite the efforts by agricultural extension agents (Marumisa, 1997). The agricultural extension departments are shifting from the traditional (top-down) to the PRA (bottom-up) approach to agricultural extension with the objective of a balanced development of the rural areas.

This study seeks to find out the impact of the PRA in the development of the rural sector. The study takes the form of an evaluation of the PRA in comparison with the traditional approach to agricultural extension. The study will act as an evaluation tool on the positive developmental changes in selected communal areas brought up as a result of the two approaches to as were used for especially project implementation. The study seeks to analyze the effectiveness of the two approaches in directly and indirectly improving the level of development or livelihoods of the beneficiaries.

In the context of this study, the positive effects of agricultural extension are the standards used by the Department of Agricultural Research and Extension (AREX) such as the general positive deviation of the standard of living with emphasis on self-reliance and sustenance, re-investment ability, general increase in output on a unit area basis, adoption of innovations and survival of the projects implemented under each of the approaches. Survival of the projects will focus on the continuity of the project visa vie the level of productivity and any changes in the number of beneficiaries.

1.4 BACKGROUND OF THE STUDY

It has been discovered that adults remember twenty percent of what they hear, forty percent of what they see and eighty percent of what they discover for themselves (Masi, 2000). Farmers are learning when the AEW is not there: they have been learning all their lives without the help of the AEW (Rogers, 1992). This shows that there are higher chances of farmers retaining their own technical practices (Indigenous Technical Knowledge) as it is a result of their own discoveries and are better able to calculate the risk associated. All that the AEW can do is to help people realize their potential rather than to pump information into passive people.

According to Rogers, (1995) people adopt “innovations” according to the various stages of a normal distribution curve (figure 1).

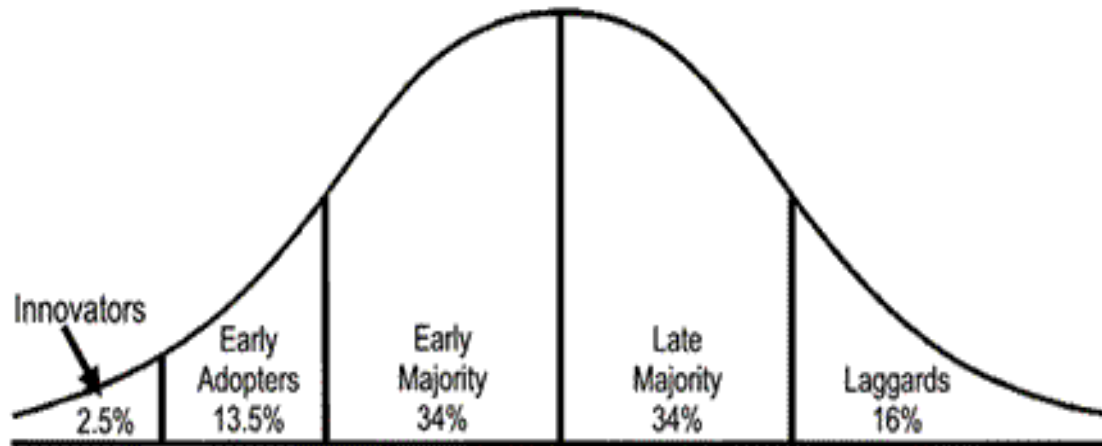


Figure 1

Innovators (the first 2.5% of the people in the organization to adopt an innovation) have a great, almost obsessive, interest in new ideas. They desire the rash, the daring and the risky. They are able to form networks beyond the confines of the local circles. They can cope with a high degree of uncertainty regarding the success of a new idea. Innovators may not be respected by the other members of the farming community, but are important to watch since they are frequently the gatekeepers in the flow of new ideas into the organization from outside its paradigmatic boundaries.

Early adopters (next 13.5%) are usually the opinion leaders in the organization, and they represent the main people that the leader should enlist in the change process. The early adopters are the role models for others who respect them for their judicious “innovation-decisions.” They are not too far ahead of the other members of the organization, in contrast with the innovators who are seen as being too far out ahead, thus, potential adopters look up to them for advice and information about the change. Early adopters decrease uncertainty about a new idea by adopting it, and then sharing their evaluation of the idea with their peers through personal relationships. This assists leaders in bringing organizational change.

The early majority (the next 34%) comprise about one-third of the people, and adopt new ideas just before the average member of the organization. While they are not opinion

leaders, they do interact frequently with their peers, make decisions slowly and carefully analyze the pros and cons of a new idea before adopting it. They follow with deliberate willingness in embracing change, but seldom lead.

The late majority (the next 34%) adopt innovations just after the average member of the organization. Skeptical and cautious, they do not adopt until most others have done so, and only then in response to the pressure of their peers and the new organizational norms.

The last sixteen (16%) percent in the organization to embrace change; the laggards, possess almost no opinion leadership. Typically, they are somewhat isolated in their relationship networks, interacting primarily with others who have relatively traditional values. Their decisions are based on what has been done previously, and are typically suspicious of change and change agents.

From this analysis one can safely conclude that any innovation and technology will find the whole range of adopters in any society. It is thus apparently safe to say that all innovations will be adopted at one stage or another. If all technological information is good for the community then, the innovators will safely serve as pioneers in the implementation of the new technology.

1.5 THE HYPOTHESES

The PRA approach to agricultural extension and project implementation is farmer biased but more effective towards rural development.

1.6 ASSUMPTIONS

(a). Extension agents are competent to work within each of the approaches to agricultural extension and use each method effectively and efficiently.

(b). Projects implemented within each of the approaches to agricultural extension involved some form of interaction with the beneficiaries prior.

(c). Projects selected for the study under each of the two approaches fall sufficiently and distinctly within each of the approaches and there are no overlaps (i.e. no two approaches were involved in each of the projects).

1.7 DEFINITION OF TERMS

Participatory Rural Appraisal (PRA) is a family of approaches, methods and behaviors that enable people to express and analyze the realities of their lives and conditions, to plan themselves what action to take, and to monitor and evaluate the results. PRA emphasizes processes which empower local people (IDS, 1996).

Agricultural extension is the provision of information to farmers on agricultural production technologies designed to increase production, protect natural resources and the environment, or achieve some other objective. Extension involves the conscious use of communication of information to help people form sound opinions and make decisions by choosing from alternative solutions to their problems (Van Den Ban and Hawkins, 1988).

Evaluation is judging, appraising, or determining the worth, value or quality of proposed, on-going, or completed research, generally in terms of its relevance, effectiveness, efficiency and impact (Horton *et al*, 1993). Evaluation measures the level or degree of intended or unintended changes an intervention causes in the target population. The welfare effects should be functions of the activity that can not be accounted for in other ways.

1.8 ACRONYMS

AEW- Agricultural Extension Worker

EA – Extension Agent

Agritex- Department of Agricultural and technical extension services

AREX- Department of Agricultural Research and extension

FSRE- Farming Systems Research and Extension

GDA- Group Development Area approach

MFT- Master Farmer Training Scheme

PRA- Participatory Rural Appraisal

RLG- Radio Listening Group approach

T&V system- Training and Visit system

SDARMP- Smallholder Dry Areas Resource Management Program

ICRISAT- International Crops Research Institute for the Semi Arid Tropics

1.9 DELIMITATION OF THE PROJECT

- a) This study did not analyze socio-political impacts of the PRA
- b) The study was limited to the small scale farmers of the Midlands and Matabeleland South Provinces of Zimbabwe.

1.10 PURPOSE OF THE STUDY

- (a).To provide information that may help re-orient approach to agricultural extension in order to save time and resources, including money.
- (b). to determine the degree of developmental change brought up by either of the two approaches to agricultural extension.
- (c). To determine if PRA is a better approach to agricultural extension or project implementation, that can facilitate better economic growth in agricultural development of the communal farmers.
- (d). to learn from past experiences about agricultural extension that will lead to improvements in the future planning on agricultural extension.

LITERATURE REVIEW

2.1 Introduction

Attractive production options are largely those that enable farmers to use their land, labor and capital in a better way. Agricultural extension has a central role in facilitating this (Benor, Harrison, and Baxter, 1984). To bring research findings and new technologies or agricultural techniques to farmers, someone must teach the farmers how these practices should be employed and adopted under their own individual and resource conditions. However, agriculture is a very complex activity with many interacting factors making it virtually impossible and to determine with precision what part of any increase in economic development to agricultural extension. It is not so difficult however, to identify particular practices that farmers are pursuing after having learned them from the Agricultural Extension Workers (AEW).

Agricultural extension should not be seen only in the context of increasing agricultural output, but, it is part of the effort to achieve a balanced social and economic development of the rural areas (Adams, 1982). It is the role of the change agent, through agricultural extension, to develop the ability of the farmer to choose the best enterprise that will profit him or her most, given the input resources available (Agitex, 1990). Agricultural and rural development is an integral part of economic development. Few countries have experienced sustained economic development without growth of the agricultural and rural sectors. Failure to achieve a rapidly growing economy has been blamed on the farmers who fail to adopt new technologies (Siziba, 1996).

Sound economic development lies upon the development of the agricultural and rural sector of the nation (Siziba, 1996). Agricultural extension, through the training of farmers offer the link between research and the end users of the technology, i.e. the farmers (Agritex, 1990), but, production in the rural sector has remained very low (Marumisa, 1997). Agricultural extension helps the farmers to analyze their present and expected future situation, helps farmers to become aware of problems that arise in such an analysis

and increases their knowledge and develops their insight into problems as well as helping to structure their existing knowledge (Van Den Ban and Hawkins, 1988).

2.2 Conventional Approach to agricultural extension

The conventional approach of agricultural extension involves the provision of information to farmers on agricultural production technologies designed to increase production, protect natural resources and the environment, or achieve some other objectives. This entails the flow of technology or innovations from the research institutions through extension agents to the end-user, the farmer (Hagman *et al*, 1999).

2.2.1 Main focus of Conventional agricultural extension

The main objective of the traditional approach to agricultural extension is transfer of technology and the analysis of needs and priorities is done by outsiders (Chambers, 1983). Under all kinds of agricultural systems and in a wide range of political and economic environments, research workers are developing technologies for small scale agricultural producers, and extension officers are attempting to persuade farmers to adopt them (Cernea *et al*, 1983). Unfortunately, however, in many instances these efforts are inadequate in amount, unfocused in direction and consequently ineffective. For the adoption of technologies, the farmer needs to be made aware of the existence of technology and its characteristics and must be convinced that the adoption and use of the technology will contribute to increased earnings.

Figure 1 below illustrates the main focus of the conventional approach to agricultural extension. It is characterized by the downward flow of technical knowledge and there is no feedback. Research stations generate technical information, which is disseminated by the department of agricultural extension. Farmers are expected to adopt and adapt to the new technical information.

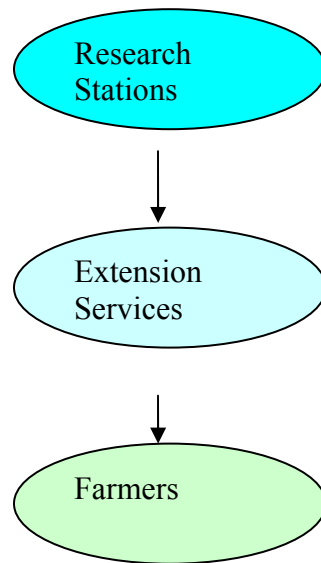


Figure 1 Main focus of Conventional extension approach

It is believed that the farmer lacks adequate knowledge and insight to recognize his problem or to think of a possible solution. If ever he has any knowledge of his problems, it is always assumed that it is abased on incorrect information because of limited experience, upbringing and other cultural factors (Van Den Ban and Hawkins, 1988).

2.2.2 Criticism of the conventional approach to agricultural extension

Farmers have not adopted technology and innovations that have been available for some time, partly because of research, poor extension and policy makers (Pembere, 1996). Subsistence farmers do not adopt innovations due to their incompatibility with farmers' needs and goals, unavailability of needed resources, influence of opinion leaders, use of ineffective extension methods by the AEW and also the farmers' perception (Agritex, 1986). Farmers are economically rational, i.e. they adopt new practices that are in their interests and reject those that are not (Schultz, 1964). Farmers resist technology probably because it is not compatible with their objectives, resources or environment, not because of their backwardness, irrationality or management mistakes (Franzel and Houten, 1992). According to Franzel and Houten (1992), nothing can be gained by reorganizing farmers' existing activities because they already manage their arable land efficiently. Instead researchers should focus on introducing new technologies to farmers.

The biggest barrier to all learning is that many AEWs do not believe that the farmers are capable without their aid (Rogers, 1992). AEWs have been taught about better farming systems, new varieties with hybrid vigor and improved livestock breeds, but then, the knowledge of changing farmers has up to now not been very much emphasized (Siziba, 1996). Knowledge can not be transferred and learning is always an act of self search and discovery, one may be stimulated and assisted but can not be taught (Rogers, 1992). The work of the AEW is not on passing on knowledge, but helping farmers to discover for themselves, to help them create their own knowledge. In far too many countries, research workers decide for themselves what topics are deserving of their attention without regard of the problems facing their cousins farming the land (Cernea et al, 1983). The organizational forms have been imported from other countries without being adapted to the cultural norms of the community to be served, or without consideration of the available capital resources (Arnon, 1989).

The conventional agricultural type of extension has been associated with the problem of poor management taking the form of, poor communication between field staff and

headquarters and vice-versa, lack of support and supervision of field works and the absence of detailed realistic plan of work (Adams, 1982). This leaves the AEWs with the problem of deciding on what to emphasize and what not to.

There also is a problem of poor communication within the system. The downward decisions are carried out by agents who do not have discretion to adjust the programs to the specific socio-economic and ecological conditions in the areas under their jurisdiction (Arnon, 1989). This is worsened by routine, ritual, unusable, unused and unread reports. Education gap compounds the problem, where the staff at headquarters are professional specialists with university graduate teams operating from well built offices with well laid-out plans, while the AEWs did not receive enough training, gets a salary that is a fraction of what his superior receive, does not know what is expected of him and without means of transport (Arnon, 1989).

Extension based on transfer of information is a waste of time and tends to destroy the indigenous learning systems (Rogers, 1992). Where central government programs and outside assistance attempt to introduce changes in traditional technologies, extension offers the possibility of adopting the technology to the rural producers' needs so that its benefits can be recognized and the change adopted (Cernea, 1983).

Agricultural Extension Workers generally have numerous roles to play including enforcement of regulations, planning, organizing and coordination in addition to preparations for demonstration plots and involvement in on-farm trials. These roles and their diversity make extension in most developing countries to be badly designed and inappropriate (Arnon, 1989). The ultimate result is absence of systematic ordering of priorities between competing demands of different programs on field staff. Unrealistic target setting is another problem, where the junior field staff is not involved in setting the targets. Lack of systematic work planning for field staff thwarts the purposes for which extension is aimed at achieving i.e. transfer of agricultural technical information to the end users, who are the farmers.

2.2.3 Related work on conventional agricultural extension

In Brazil, in the 1970s, farmers refused to use fertilizers on maize crops, but used it in other crops despite extension messages (Rivera and Schram, 1987). The AEWs at that time assumed that the use of fertilizer was rational for all crops for which there was a physical response. Farmers proved that fertilizer use was not profitable in maize production.

In Kenya, less than a quarter of the sampled population tried any of the recommendations. Levels of adoption had remained the same since 1990, except for maize (Gautam, 2000). Among the reasons why recommendations were not adopted, or discontinued, farmers cited lack of funds most often. Forty percent cited reasons such as resource constraints, including land and labor. Thirty-four percent cited reasons that could be addressed through proper extension advice. If research and extension must serve the society through the farmer, then research and extension must be in close interaction with the farmer. The farmer is critical in agricultural development – the only one who will achieve increases (Rivera and Schram, 1987).

There are several types of conventional type of agricultural extension that have been used in Zimbabwe among which are the following, Group Development Area approach (GDA), Master Farmer Training Scheme (MFT), Radio Listening Group approach (RLG), the Training and Visit system (T&V), Farming Systems Research and Extension (FSRE) and the commodity based approach.

The MFT originated in the 1930s as a way to develop competent farmers (Helmmes, 1988). Farmers who adopted and practiced improved methods were awarded badges and certificates. A few progressive farmers received extension and information which they were expected to pass on to others through farmer to farmer dissemination and demonstration. Many innovations such as the use of hybrid maize seed were adopted. The major disadvantage was that it focused on farmers who have resources and these might be

liked in the community thereby hindering further adoption and also it failed to impact on increases in yields of many African crops. Focus on better-off farmers excluded the bulk of the farmers and increased the already existing income differentials among social groups. Despite these accusations, the department of AREX is still using this approach to agricultural extension.

The Radio Listening Group approach (RLG) mainly focused on grouping farmers so that they may listen to a radio program after which they will discuss what they learnt and what they think is relevant to their location or geographical area (Mudiwa, 1997). The pilot were Nswazi and Chimanda Communal areas. This method was prone to low turn up of farmers especially in busy weekdays and busy times. Since there were a limited number of transmitters in the country, which broadcast to the whole nation, local and regional news were regarded as irrelevant. Also, any broadcast on crops could not meet all clientele because of their geographical location and the types of crops they are liable of growing e.g. listening to a presentation on tobacco production when one is located in the marginal areas of the low rainfall prone Matabeleland South region.

The Training and Visit system (T&V) was modified to use extension groups instead of contact farmers. This approach works on a fortnightly cycle (Hanyani-Mlambo, 1995). The first week is for training and the other one is for evaluation or visitations. Subject Matter Specialists acted as a link between research and extension, while regular training and visits were designed to facilitate linkages between extension and farmers. This approach proved to be effective in irrigation schemes where there are strict timetables to be followed and not in dry land agriculture. Increased cash crop production was realized in the Midlands and Mashonaland West Provinces as a result of the approach. However it was abandoned after ten years of practice as it proved inappropriate for a country whose resources are limited. It is difficult to follow strict timetables where resources are limited and also, flow of information stopped at the contact group of farmers. The system lacked flexibility to make it more relevant to the needs and environment of the smallholder farmers (Pazwakavambwa, 1994).

The Farming Systems Research and Extension (FSRE) was developed as a substitute of the other development models and technologies which, although technically sound, were not relevant to the objective and socio-economic circumstances of smallholder or were inappropriate to the agro ecological conditions. FSRE emphasized the role of constraint diagnosis and on farm trials as away of facilitating linkages among the farmers, researchers and AEWs (Mettrick, 1993). Thus, its focus was basically on problem solving, interdisciplinary and, farmer oriented and iterative. This approach was proved to be inappropriate because it drew extension considerations from practice and incorporated its findings into the extension system. It emphasized on traditional cropping systems and lacked focus on livestock production.

The Commodity Based approach focused on the production of one crop. The approach was considered to be a disadvantage because it gave monopoly power to parastatals and cropping process as well as the marketing companies leading them to making excess profits at the expense of struggling and at times poverty-stricken farmers. The system did not give farmers freedom, stifled their initiatives and they were prone to poor management or changes in terms of trade and pricing which in turn result in poor returns to farmers.

After the Turkana people of Kenya were hard hit by the 1979/1980 drought, the beneficiaries of the food aid were engaged in a food-for-work program, in which they were expected to construct large bunds of massive earth diversions meant for water harvesting (Hogg, 1988). This is a technology that originated in Israel. The scheme attracted mainly the women who were household heads, whose husbands were dead and had no herds due to drought. The large earth works they constructed were not compatible with their major farming systems i.e. goats and camel as well as sorghum production. The unconsolidated earth structures were breached by intense tropical rain storms and in cases where these were effective, they denied access of water to important forage trees and other users down slope. This is a typical example of useful technology which was introduced to an incompatible environment.

2.3 Participatory Rural Appraisal (PRA)

Participatory Rural Appraisal (PRA) is a family of approaches, methods and behaviors that enable people to express and analyze the realities of their lives and conditions, to plan themselves what action to take, and to monitor and evaluate the results. PRA emphasizes on processes which empower local people (IDS, 1996). This is directly the opposite of the conventional approach to agricultural extension, in that it is the people, (with the help of outsiders) who identify the problem and suggest possible solutions, rather than receiving prescriptions from people who do not have experience of the prevailing conditions and have not learnt the coping strategies.

2.3.1 Main focus of PRA

PRA was used since 1990 by non-governmental organizations in almost every domain of development and community action (IDS, 1996). PRA empowers farmers whereby the analysis of needs and priorities is done by farmers assisted by outsiders (Chambers, 1983). PRA is a means of uncovering realities and priorities of the poor people. The main focus is responding to needs of communities and target groups (Townsend, 1996). Use of PRA assures the planners that they are responding to a real need among local people, whether that is for increased income or intensive use and management. Where local people have had more say in the design of projects, they are also more likely to design activities which make full use of existing resources, improvement of existing resources rather than design activities which fit into the current livelihood strategies (Townsend, 1996).

There is need for interaction between research and extension departments and the farmers in order to facilitate adoption of technological packages and thus enhance rural development. Figure 2 below illustrates how extension messages and the platform for adoption can be facilitated as extension will be a response to identified needs for farmers.

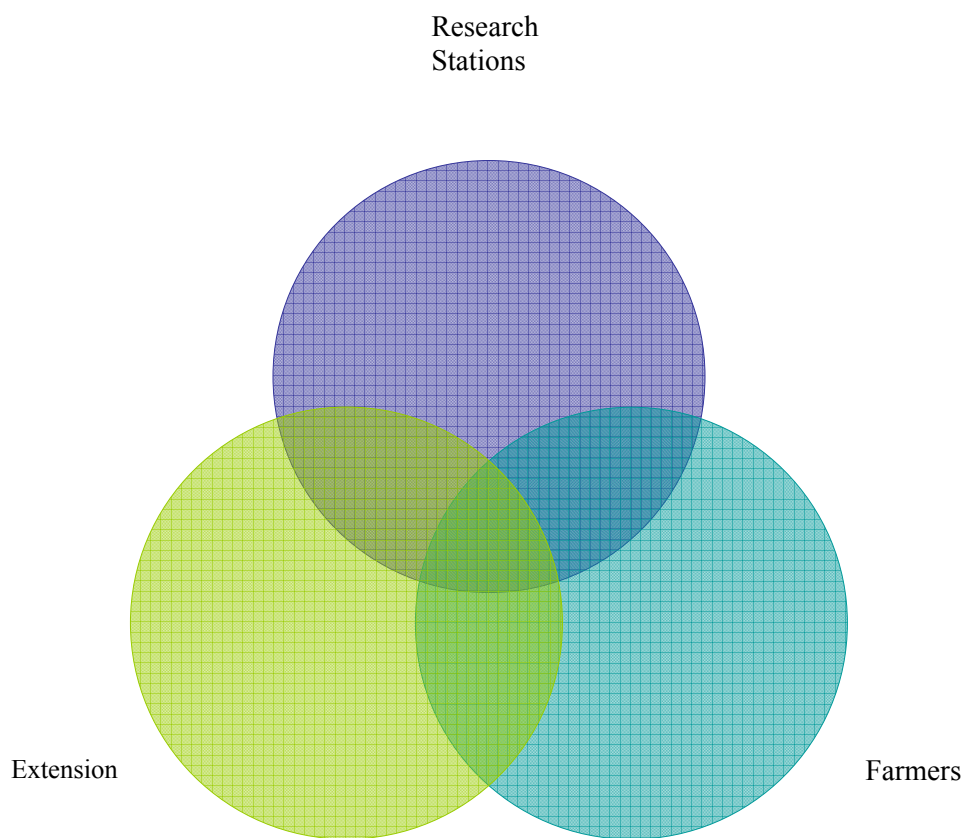


Figure 2. Interaction among players in agricultural extension

The nature of agricultural extension is dependent on who initiates the interaction (the farmer or the extension agent) and the ability of the extension agent to enable the farmer to make their own decision. There are four possible situations as shown below.

| | | | |
|----------------|--------|--------------|----|
| | | Who decides? | |
| | | Farmer | EA |
| Who initiates? | Farmer | 1 | 2 |
| | EA | 3 | 4 |

Situation 4 is a situation centered on communication strategy that is aimed at convincing farmers to improve their farming practices, e.g. using improved varieties. Situation 1 uses participatory approach, and sometimes a more service approach (Van Den Ban and Hawkins, 1988). This focuses on facilitation for improvement, and knowledge is gained through interactive learning and participants are encouraged to make their own decisions. Pre-determined packages of technology can thus be used through participatory approach in response to farmers' enquiries. PRA focuses on the promotion and emphasis of more of situation 1 on extension work and less of situation 4.

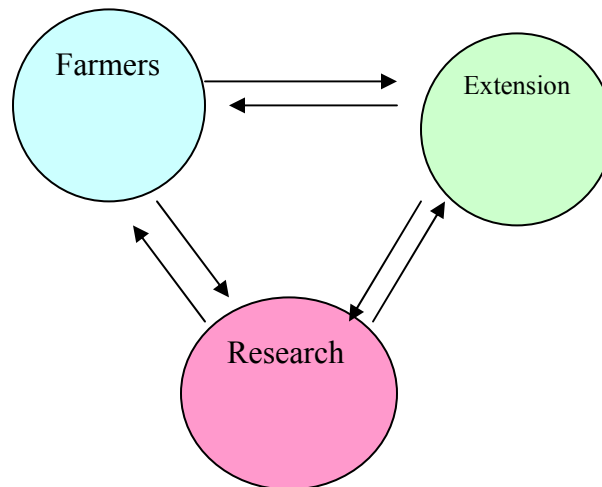


Figure 4. Illustration of interaction and feedback in participatory approach

2.3.2 The advantages of PRA

PRA forms better linkages between communities and development institutions (Townsend, 1996). The interaction between communities and outsiders can have lasting effects in breaking down the barriers of reticence and suspicion which often characterize these relationships.

While normal science generates packages, resource-poor farmers engage in farming as a continuous process (Richards, 1987). Farmers need less a standard of package of practices and more of a basket of choices; the role of extension is less to transfer technology and more to help farmers adapt; the local experts are not so much researchers as farmers themselves.

Participation of local development workers (NGOs, government and other agencies) in PRA can greatly increase the motivation and level of mobilization in support of the project or program of which it is part (Townsend, 1996). Where changes in development approaches are being introduced, such as a shift to a more integrated development planning mechanism, a PRA type of activity which illustrates how these new mechanisms will work on the ground can help to ensure better understanding and commitment by local workers. This explains the reason for the involvement of people from different administrative and organizational level. There is clarity and understanding of the priorities of workers from other disciplines as well as those of members of the community.

Development of rural areas requires substantial investments in economic and social infrastructure and farm support programs. Successful and cost effective implementation of these programs require the mobilization of the skills, talents and labor of the rural population, via decentralized administrative, fiscal and political systems conducive to their genuine participation and via private sector involvement (Binswanger, 1994). PRA process transforms the researchers and implementers of technology into learners and listeners, respecting local intellectual and analytical skills, and thus promotes visual sharing and avoids imposing external representational conventions.

PRA can greatly improve the efficiency of development work and eliminate many of the problems regarding proprietorship and development activities at community level (Townsend, 1996). Trials carried out in communities by projects run by outsiders are frequently plagued by problems of mismanagement and theft. This is usually linked to the fact that the community does not feel any responsibility for the activity and regards it as a

temporary benefit to be exploited for as much as possible while it is there. Any activity generated by a PRA will usually be managed by the community and the benefits will be clear to them.

2.3.3 Disadvantages of PRA

PRA has a problem of raising expectations within the communities which frequently can not be realized given the institutional or political context of the area (Townseley, 1996). The high expectations are a result of genuine feelings raised by the analysis of many areas of local life (Cornwall and Pratt, 2003). The problem prioritization is generally accepted as a priority of expectations.

Linked to the problem of raised expectations, is the danger of drafting of development plans which the participatory agencies cannot address (Townseley, 1996), especially in the technical sense, thus disappointing the already raised expectations. The facilitating organization must do its best to support, if requested to do so, the actions that local people have decided on.

The poor are only experts in surviving under their specific circumstances but they know little about all the mechanisms surrounding poverty as the next person (Cornwall and Pratt, 2003). Thus, the rural people have the right of choice and self-determination, but are not experts. Also, the prioritization of problems can be influenced by the PRA team, emanating from the inclinations of the outsiders (Cornwall et al, 2003).

PRA uses aggregate participation (Cornwall et al, 2003). It fails to represent every person in the community. Questions such as, who defines what and whose words are important?, are not taken cognizance of. There is failure to take into account stratification in communities whether by wealth, social status, gender or ethnic group. This usually obscured or ignored (Townseley, 1996).

The poor participate in the generating the information, which is then owned by scholars and researchers with little credit going to those who generated the information (Cornwall and Pratt, 2003).

There is a danger of distortion of “participation” versus the opportunity to advocate for change among the powerful (Cornwall and Pratt, 2003). By devolving decision-making responsibility to communities and leaving the identification and planning of activities to them, there is a real risk that particular elements in communities, especially the more educated, the wealthiest and those with authority may find it easier to “capture” the activity and monopolize its benefits (Townsend, 1996). Poor people in the community may support “community” decision which will not benefit them at all because they are supported by their wealthier and more influential patrons. Agricultural projects are more prone to as they are often proposed as a means of making better use of “common” land or water areas.

2.3.4 Related work on PRA

Farmers in Kathema sub location in Kenya, refused to supplement structures at gully and grazing land reclamation sites, and opted to use the seedlings on farm planting rather than “wasting” them on the conservation sites (Rocheleau and Hoek, 1984). During discussions participants raised critical trial technologies, many farmers showed an interest in implementing a technology they were well-versed with. Within a year, most farmers within the vicinity engaged into the technology of mulching proposed by farmers. The participants saw themselves as choosing, mixing and matching from a selection of possible agro forestry practices. As more species became available in projects and nurseries, some farmers began to trade and barter with trees. Out of all the initiatives taken and questions posed, several research directions emerged.

In India, PRA was effective in encouraging communities to undertake their own analysis and local resource- related problems and potential solutions (Chambers, 1983). Though

people from one village were hostile at first, blame was put the approach by the PRA team.

In a survey where PRA was used to establish soil fertility management strategies carried out in North East Zimbabwe, it was revealed that the cultivation of legumes for both human nutrition and soil fertility management was limited (Mapfumo, Campbell and Mpepereki, 2001). Legumes were generally regarded as women's crops and therefore minor because of men's domination. PRA also revealed that another cause was an overemphasis on maize production, poor extension thrusts with respect to legume production and poor agronomic practices. However, PRA led farmers to the adoption of pigeon pea production. In a single cropping season the crop yielded between three and nine tones of shoot biomass and up to twenty-three tones per hectare after two seasons of growth. There also was twenty-two percent maize yield increase obtained from a field that was previously cultivated with pigeon pea.

A non-governmental organization named Smallholder Dry Areas Resource Management Programme(SDARMP) conducted a PRA survey in the Gwanda (Matabeleland South Province) and Shurugwi (Midlands Province) districts with the notion that the project areas with their fragile environment required a delicate mix of increased agricultural productivity or more appropriate use of natural resources (Rivera and Alex, 2004). Generally, smallholder farmers from these districts earn very low incomes from a combination of dry land (and limited irrigated) grain crops, small stock, paid farm labor and livestock production is not environmentally viable or sustainable. SDARMP sought to improve the effectiveness of local government and ministry agencies by changing the institutional culture of conventional sector approach, which dominates most of the country's institutions.

In Gwanda, PRA results showed a need for large water projects and livestock restocking as the priorities for the communities. However, the NGO rejected the results and considered those submitted by the Gwanda District Council for SDARMP funding which were identified from the Council's rolling plans and not from the PRA process. The

projects, including, rehabilitation of garden projects previously funded by another NGO and an irrigation scheme lied in one pilot ward represented by a senior Councilor. This satisfies Townsley's argument that there is risk of capture of activities by local interests whereby the more educated, the wealthiest and those with authority may find it easier to monopolize the benefits. In Shurugwi district, the planning efforts engendered a sense of ownership in the process. Changes in the relationships between farmers and state institutions were facilitated.

A non governmental organization called International Crops Research Institute for the Semi Arid Tropics (ICRISAT) carried out a PRA survey in the Matabeleland North Province of Zimbabwe in Tsholotsho district (ICRISAT, 2001). ICRISAT convenes projects in partnership with the national agricultural extension department (AREX), the University of Zimbabwe and NGOs through the Rockefeller Foundation. The exercise saw groups of farmers setting their own trials to try out new soil and water management methods.

Improved crop varieties have long been available but adoption has been slow in Africa, including Zimbabwe (ICRISAT, 2001). Spreading the new seeds has been difficult because subsistence crops attract little attention from the commercial seed industry. A cross-sector consortium which engaged Zimbabwe's national research system, an NGO (Commuteh) and a private seed company (seed-co) was formed through special project support generously provided by USAID. Forty-five of the farmers engaged in millet seed production which they never did before and confirmed fetching twice the price of grain and some even turned their home gardens into seed production plots. The Tsholotsho farmers now have difficulty harvesting all the increased grain they have been able to grow. The Director General of ICRISAT later donated a new threshing machine to the farmers.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Study area

Zimbabwe is divided into ten administrative provinces. The research focused on Mberengwa and Beitbridge districts from the Midlands and Matabeleland South Provinces of Zimbabwe respectively, where both the PRA and the conventional approaches to project implementation have been used. Beitbridge and Mberengwa are the most arid and remote areas within their respective provinces. The PRA in these districts was conducted by one Non-governmental organization, Small Dry Areas Resources Management Program (SDARMP).

Beitbridge is located at the far south of the country and it borders with South Africa to the south, Gwanda district to the west, Mwenezi district to the North and Chiredzi district to east. Mberengwa is bordered by Zvishavane district to the north, Chivi and Mwenezi districts to the east, Insiza district to the west and Gwanda and Mwenezi districts to the south. Both districts are well connected with road transport and each has a railway line passing through. Mberengwa is well connected with electricity supply compared to its counter part.

Both districts are semi arid and highly prone to drought due to erratic annual rainfall, thus the warranty of these districts having irrigation schemes. Rainfall is predominantly conventional summer type which averages 600 millimeters per annum and is poorly distributed. This means that it is seldom adequate to sustain the staple crops like maize and in some years even insufficient to sustain the drought-tolerant crops such as sorghum and millet. Beitbridge is a flat land area and has deep fertile soils and the grazing is predominantly sweet veld. It is predominantly a livestock producing area dominated by cattle, goats, sheep and donkeys. Mberengwa is a mountainous area with predominantly shallow soils and middle veld grazing, though there are pockets of flat land with sweet veld.



KEY: BEIT Beitbridge M Mberengwa

Map of Zimbabwe showing the Provinces and district.

The main economic activity in Beitbridge is extensive cattle production. Cattle are kept as assets for the family and rarely are they produced for commercial purposes. There is some significant fishing from the district's largest dams i.e. Zhovhe and Kwalu where also are sited the some of the largest irrigation schemes. Mberengwa district is an economically vibrant district which encompasses the mining industries such as

Sandawana mines for emeralds, Buchwa mine for gold and Inyala mines for chrome. There is also some significant gold panning going on along some of the district's major rivers. Fishing from large dams such as Inyala, Mundi-Mataga are important activities within the district of Mberengwa. A grain depot (Grain Marketing Board) is located in each of the districts that saves the community either for grain supply or for the purchase of the produce. Input supply hardware shops are evenly distributed in the district of Mberengwa than they are in Beitbridge.

The PRA conducted by SDARMP is of vital importance to my study because generally, crop production through the erratic rain-fed system has resulted in years of poor food security at household level. This makes the districts suitable because under such conditions, projects are expected to play a pivotal role in the lives of both the beneficiaries and other members of the community. Since both the PRA and the conventional approaches were used to implement similar or related projects within each of the districts, it provides a better basis for the comparison of the impact of either of the approaches.

3.2 Research and research format

No evidence of previous studies on the comparative advantage of PRA on a countrywide basis was uncovered though some work has been carried out in line with other approaches to agricultural extension. The research will not only investigate on the impact of farmer participation in project implementation, but also on how it fares as an approach to agricultural extension.

Projects upon which the PRA has been used as a means of imparting extension messages and implementing projects as well as those upon which the conventional approach was used, shall be sampled for the purpose of this study. This was allowed for easy comparison between the two approaches. This acknowledges that all elements of the population have a calculated non-zero probability of selection, thus can provide information which describes the entire population (Brannick and Roche, 1997). The

reason for choosing projects within the same locality but under either of the two approaches is to eliminate the possibility of area and people specificity or influence and bias that may influence the results. It is assumed also that projects are a form of intervention that draws farmers into a wider arena in which various social actors are pursuing their personal and institutional strategies (Cramb, 2003). Thus, adoption outcomes may be highly contingent on the interplay between these actors, including such factors as creation of a sense of obligation to a respected Agricultural Extension Worker (AEW), or the development of conflict between contending factions within a community.

3.3 Sampling

Sampling of the study area is mere random sampling out of the five districts in which PRA was conducted by SDARMP. The population identified for this study is all smallholder farmers (subsistence) of Mberengwa and Beitbridge districts of Zimbabwe who are beneficiaries of identified projects. Only a sample will be considered for the research project as it is believed that a sample is adequate for any study (Kinnear and Taylor, 1996). Records kept by the department of Agricultural Research and Extension Services (AREX) were used for identification of projects implemented under either of the two approaches to agricultural extension. After this stratum is formed, then the projects were randomly sampled. Stratified random sampling technique was used to select the projects into the following categories

- (i). Irrigation schemes
- (ii). Livestock projects meant for restocking.

Sampled projects were also stratified according to the approach used during each project implementation and the financing of the project into the following categories:

- (i). Projects that are a result of conventional extension
- (iii). Projects that are a result of PRA

3.4 Sample size

The population of interest was all members of the identified projects of interest. Sample sizes under individual projects were determined by the membership within each project but the researcher strove to make it as representative as possible. Due to time and financial constraints, the sample was limited to 30 questionnaires for each type of project i.e. irrigation(participatory and conventional) and livestock(participatory and conventional) projects, giving a total of a 120 respondents and 4 focused group interviews.

3.4 Data Collection Methods and instruments

3.4.1 Methods

Data was collected through both the primary and secondary sources. Records kept by the Department of Agricultural Research and Extension (AREX) were used to identify areas where PRA and conventional approach were used and for the identification of projects implemented under each of the two approaches to agricultural extension. Records on aggregate production form each project were also obtained from AREX offices dating five years back for irrigation schemes. This time range was permitted for easy comparison when both approaches were in use. For livestock projects, individual and aggregate group records on production were made use of to extract data on productivity. Records on production dating back to five years were made use of. This was mainly for the deduction the production trend and also to obtain data on productivity.

3.4.2 Research instruments

Both the quantitative and the qualitative methods of data collection were used. Both were used as complementary methods for data collection. The questionnaire survey was used for the quantitative aspect as it is believed to give a broader picture of the situation under investigation (Bell, 1999), though qualitative data can also be extracted. The

questionnaires were administered in person and in some cases enumerators were used to administer the questionnaires. The enumerators were a choice of literate individuals in the community e.g. teachers, environmental health technicians and village health community workers. Extension Agents were not used for this exercise so as not to compromise the quality and reliability of the information given by farmers because the presence of extension personnel may lead respondents to give false information in order to impress the AEW. The use of enumerators was an attempt to cater for the geographical distribution of the population under study. Planned and detailed interviews were conducted for the collection of qualitative data. Four focus groups from the farming community were interviewed in order to obtain a more detailed account of their attitude and perceptions of the approaches to project implementation. The questionnaire and the interview complemented each other for data collection purposes (Borg, 1963). This triangulation reduces chances of bias normally associated with one method of data collection, thus, giving greater validity and reliability.

3.4.2.1 The questionnaire Design

The questionnaire had two sections. Section one was designed to explore the participant's awareness of extension services. Open-ended questions and checklist questions will be asked. The second section focused on the exploration of the farmers' personal experience in chosen projects. Checklist questions enabled the researchers to compare the answers provided by the respondents. A ranked response sought to rate the participants' satisfaction with their experience. Facts were also extracted on the attitude of farmers towards agricultural extension and the evaluation of the impact of the intervention of several extension approaches, whether they have had a positive or negative impact. The respondents were also be asked for a "yes" or "no" answer and then asked to comment on the answer given. This was intended to explore in greater depth what the respondents' views are towards approaches to agricultural extension by allowing freedom to offer their opinions. This was permitted so that the answers given can be analyzed for recurring themes (Coolican, 1996). The questionnaire was pre-tested in order to verify its usability.

3.4.2.2 The Interview

A semi-structured focused group interview was conducted. The advantage with interviews is that all respondents are asked the same questions, in the same order and there is provision for personalization opportunity for the respondents (Cohen *et al*, 2000). Though interviews consume a lot of time, they provide a chance for the interviewer to probe further for an in-depth data collection. The interviews will be administered in person for proper probing.

The kind of data collected through interviews was mainly focusing on personal perception or attitudes of the respondents towards projects and the way they were implemented. The interview also sought to supplement the questionnaire in addressing issues relating to the performance of projects in the area. The respondents indicated their awareness of extension services and other leadership that is beneficial to the project. Respondents also indicated their opinions on the farmer involvement in decision making and implementation of projects.

3.5 Model and Data analysis

The study sought to find if farmer participation in project implementation was of any advantage in dissemination of extension messages to smallholder farmers compared to the conventional approach. The study also sought to provide evidence on the impact of the participatory approach in the livestock and irrigation schemes in the selected districts. The following models are analyzed using limited dependent variable regressions; the impact of PRA on asset procurement, impact of PRA on the adoption of improved technology the impact of PRA on household income.

A few studies have made some what quantitative assessment of the impact of some agricultural extension approaches. Dejene (1989) assessed the impact of the Training and Visit (T&V) approach noting improvements in the number of extension contacts. Due et

al (1987) assessed on the increases in technology adoption and yields brought up as an effect of the T&V system. Hussain et al (1993) argued that none of these studies attempted to isolate the effects of extension from the effects of other factors that might influence extension and contact, or even to compare changes in technology adoption or productivity with the situation that might have prevailed in the absence of the implementation of the T&V system. Hussain et al (1993) assessed therefore, the impact of the T&V system in comparison with the performance agricultural extension in neighboring districts where the T&V was not implemented. They used the logit model for the analysis of their data and it is after this that my study will also make use of the logit model as the nature of study and data to be collected and analyzed is more or less related.

PRA like all other extension approaches may affect the quality of extension advice, which in turn affects farmers' technical knowledge and skills to directly increase productivity through the use of available resources (inputs) or indirectly increase productivity through changes in input levels (Hussain et al, 1993). Also, as the main focus of the approach is, it instills a sense of belonging on the farmers which is expected to positively influence the performance of farmers. It is important to note that the quantity and quality of extension is a function of farmers' characteristics among which are farmers' age, education, arable land size, infrastructure etc which are assumed to determine the demand for extension advice (Hussain et al, 1993). Though the analysis of all these possible influences on productivity is a complex task, this study will however enable the analysis of:

- (a) the determinants of asset procurement
- (b) the determinants of adoption of improved technology as recommended by extension services
- (c) the determinants of household income

The major aspect of this study is to analyze what would have happened in the absence of PRA. In this paper two districts are chosen where PRA resulted in the implementation of irrigation and livestock projects. This study examines these two major agricultural project areas in the districts of Beitbridge and Mberengwa, in Zimbabwe. A random of sixty

(thirty from livestock and thirty from irrigation) respondents who are beneficiaries of the projects will be assessed and also the study will randomly sample another sixty (thirty from livestock and thirty from irrigation) respondents who are beneficiaries of similar projects implemented under conventional approach to agricultural extension.

Besides the obvious reason that these projects fall within the same districts with the same agro-ecological conditions and agricultural production systems, this study assumes that the effects of PRA do not “spill over” into projects implemented under the conventional approach. For each farmer, detailed data will be collected for the 2001-2006 production period in both project types, knowledge of extension recommendations and technical knowledge with respect to technical practices (e.g. livestock practices, methods used to operate them and age of animal, input use and choice, procurement of assets by farmers, use of credit facility and farmers’ perception of the projects.

The logit model will be used for data analysis. This model explains one or more dependent categorical variables. The following represent the logit model;

$$P (y_t = 1/X_t) = \frac{\exp (X_t\beta)}{1 + \exp (X_t\beta)}$$

The equivalent form can be stated as follows;

$$\frac{\exp (X_t\beta)}{1 + \exp (X_t\beta)} = \frac{1}{1 + \exp (-X_t\beta)}$$

The model focus is on the determinants of the dependent variables (asset procurement, adoption of technology and household income). The reduced form of the model is:

$$Y = b_0 + B_1X_1 + B_2X_2 + b_3X_3.....+ B_nX_n$$

Where Y = the dependent variable

X_n = the independent variables,

b₀ = constant

From this data set, the following models can be used to estimate the quality of extension advice and the impact associated.

(a). Asset procurement (this can be used as an indication of improved living standards)

Equation models the variables influencing asset procurement

$$ASS = b_0 + B_1EDU + B_2AGE + B_3FSIZE + B_4PSIZE + B_5PRA + B_6EXPER + B_7NONPRO$$

Where ASS is a binary variable (0, 1) for asset procurement in the years within which the project was operational, EDU is the number of years of formal schooling, AGE is farmers' age (in years), FSIZE is family size, PSIZE is arable land size (ha), PRA is a dummy variable (0, 1) for a PRA project, NONPRO is a non project income, EXPER is the number of years in farming. The equation follows the standard specification that young farmers adopt new ideas more readily than old farmers do (Agritex, 1986). Farming experience is also assumed to increase with age (Sjah et al, 2005). The lower the level of education and the poorer the farmer, the greater the resistance to change (Agritex, 1986) and more educated farmers will gain more benefits from improved information (Hussain et al, 1993). It follows also that the more the sources of income the better the ability to procure more assets. I hypothesize that asset procurement is more in PRA projects. This equation then measures the effect of PRA on the procurement of assets. Since ASS is a binary variable, this equation is estimated as a logit model.

(b). Effect of PRA on the adoption of improved technology

Equation 2 models variables influencing technology adoption.

$$ADOPT_i = b_0 + B_1EDU + B_2FSIZE + B_3AGE + B_4SEX + B_5PSIZE + B_6EXPER + B_7PRA + B_8PRA*EXT$$

Where $ADOPT_i$ is a variable measuring adoption or non-adoption of improved practice_i. All variables are as specified but PRA alone measures possible effects of PRA on the

quantity and quality of extension advice for farmers in PRA projects relative to the farmers in non-PRA projects. PRA*EXT assesses if farmers in PRA projects receive high quality extension advice than farmers in non-PRA projects. SEX is the sex of the household head. The analysis considers major livestock practices (castration, weaning, dosing, vaccination) and crop production practices such as certified seed and chemical use as well as record keeping for farm operations.

(c). Impact of PRA on household income

Equation 3 models variables influencing household income.

$$HHINC = b_0 + B_1AGE + B_2EDU + B_3PSIZE + B_4FSIZE + B_5AGRFA + B_6EXT + B_7NONAGRFA + B_8AVENONPROJ$$

Where HHINC is a variable measuring household income, AGRFA is agricultural fixed assets, EXT is access to agricultural extension, NONAGRFA is non-agricultural fixed assets and AVENONPROJ is the average non-project income.

Variable Description

| Variable | Description |
|--------------------|---|
| ASS | Binary variable for asset procurement within years of project |
| ADOPT _i | Dummy variable = 1 if farmer adopted technology |
| HHINC | Household income |
| EDU | No of years of formal schooling |
| AGE | Farmers' age in years |
| FSIZE | No of household members |
| PSIZE | Arable land size/ plot size |
| PRA | Dummy variable = 1 for a PRA project |
| NONPRO | a non project income or income other than from project |
| SEX | Sex of the household head |

| | |
|----------|---|
| EXPER | No of years in farming |
| EXT | Dummy variable = 1 if farmer has access to extension advice |
| PRA*EXT | PRA project farmers receive high quality extension advice |
| AGRFA | Agricultural fixed assets |
| NONAGRFA | Non-agricultural fixed assets |
| ForInco | Average non-project income |

CHAPTER 4: RESULTS AND DISCUSSIONS

Project Implementation

The irrigation projects complemented the government of Zimbabwe's efforts to ensure food security. As drought prone districts, Beitbridge and Mberengwa are worthy to receive such interventions for the benefit of farmers, as irrigation warranty the production of food crops even in seasons when rainfall is insufficient for dry land cropping. Livestock projects are also relevant because the districts have favorable conditions for cattle ranching especially the vegetation type i.e. predominantly sweet veld. The livestock projects were targeted for the poor to improve their status, promote cattle ownership which is the major income earning agricultural activity in the districts and lessen the prevalence of draft power shortage among targeted beneficiaries.

Participatory Livestock projects

From the participatory livestock projects, the research found that there were some beneficiaries who owned cattle already and in most cases these were project leaders at ward level. In some cases relatives to the ward leadership dominated the number of beneficiaries. In the case of Bietbridge district, only one ward (Ward number 1) benefited from the, while the district is made up of 14 wards of which 2 are resettlement and urban. In each of the cases the beneficiaries reported common trends with their experience with the cattle received for the pass on scheme. These are as follows:

- 1) The kind of livestock breed (Hereford) was not agreed upon with the beneficiaries. The community members identified their need for livestock but were not consulted as to the breed type they preferred.
- 2) Project monitoring was not clear and as a result farmers did not know who actually to report to with matters concerning the project. In the end the help they got were advices from the local Extension Agents which is normally rendered to

- all livestock owners within their working area during normal execution of their duties.
- 3) There was high mortality rates in both districts where the heifers were donated. Most of the heifers died within the first year of ownership. The mortality was partly associated with the kind of breed. The heifers were from an intensive type of production system and failed to abruptly adapt to the sudden change of environment into the extensive, arid area with poor grazing.
 - 4) The beneficiaries did not receive adequate training to meet high management requirements considering the fact that it was a group development project. Though drugs and apparatus (syringes etc) used for combating livestock health problems were made available, most beasts died while drugs expired in group leaders' homes without use. The drugs were a result of the beneficiaries' contributions that was a prerequisite made by the donor. This was meant for the beneficiaries to contribute something towards the project and thereby instill a sense of belonging. Part of the by-laws of the project is that in the case of death, heifers should be replaced using money contributed by farmers but none of the dead heifers have been replaced to date. Cattle prices might have gone up and the farmers' money hit by inflation, but most of the beasts died within the first year of ownership when cattle were still affordable through the money contributed by the beneficiaries. This boils back to the issue of lack of clear monitoring strategies for the project.
 - 5) Some heifers have not calved as yet. Though they were young when they were purchased in 2002, but even at full maturation some still had no calves. The very few that had calved, none had more than one calf, yet for a normal beef animal each year should have a calf born to the beast. Of the sampled projects, only one group managed to exchange their heifer after it bore a calf that died early in life.

Unlike the participatory implemented livestock projects, a similar pass on the gift scheme implemented under conventional approach by the heifer International, Manjere farms. Lutheran development Services (LDS) and the Christian Care were operating well and the insurance set was operational especially when cattle dies, there is immediate replacement. Monitoring system was sound as the project implementers (initiators) or donors are actively involved in the monitoring process and the pass on the gift process. They ensure that the by-laws still binding. Unlike the participatory which only gave one beast the conventional gave 2 beats for each beneficiary at a time.

Under the participatory livestock projects the arrangement was that the each beast given to a group of beneficiaries has to remain in one home until each member has received a calf. Each member knows when his or turn will come for the receipt of the calf. Management and care of the beast has to be a joint activity especially with issues such as health monitoring and supplementary feeding. The beneficiaries of the project whose beasts are still alive presented some dissatisfaction with the arrangement claiming that other members tend to relax and leave the whole burden with the person at whose home the beast stays. This can also be attached to the lack of a clear cut system of project monitoring.

The major difference between the participatory and the conventionally implemented projects is that the conventionally implemented projects were implemented through government initiation while the participatory projects were implemented by non-governmental organizations (NGO). In both situations however there were by-laws set for the proper performance of the projects. In both cases by-laws were set with the consent of the farmers. In all irrigation project cases by-laws were binding except for the 5 farmers who sited reasons that their project was no longer operational. There was however cases with the participatory projects in which by-laws were never observed as problems that developed early into the project never received any attention as per the by-law stipulations.

Participatory irrigation projects had a limited number of non-project beneficiaries than the conventional ones. The conventionally implemented project had a larger plot size per individual beneficiary household (predominantly averaging 0.5 hectares) than the participatory which ranges from 0.1 to 0.2 hectares per household. The produce from the participatory projects end up benefiting the farming households than the community, not even with informal employment as the family can provide labor for the activities.

The Logistic regression of asset procurement

The approach used for the implementation of the project had nothing to do with the procurements of most assets within the target group of respondents except for fencing. There was a high degree of association (0.0024) between fencing and conventional approach. The farmers with larger arable lands were three times more likely to own fencing than those with smaller fields. Farmers without formal income were less likely to own fencing than those with formal employment. Farmers who are formally employed have greater chances of purchasing fencing as they have better and stable sources of income than their counter parts.

FENCING OWNERSHIP

Analysis of Maximum Likelihood Estimates

| Parameter | DF | Standard Estimate | Wald Error | Chi-Square | Pr > ChiSq |
|-----------------|----|-------------------|------------|------------|------------|
| Intercept | 1 | 0.0639 | 0.5711 | 0.0125 | 0.9108 |
| Approach CONVEN | 1 | 0.8238 | 0.2718 | 9.1847 | 0.0024 |
| FieldSize | 1 | 0.6547 | 0.2392 | 7.4884 | 0.0062 |
| ForIncom 0 | 1 | -0.6661 | 0.2877 | 5.3610 | 0.0206 |

Odds Ratio Estimates

| Effect | Point Estimate | 95% Wald Confidence Limits |
|-----------------------|----------------|----------------------------|
| Approach CONVEN vs PA | 5.194 | 1.790 15.075 |

| | | | |
|-----------------|-------|-------|-------|
| FieldSize | 1.925 | 1.204 | 3.076 |
| ForIncom 0 vs 1 | 0.264 | 0.085 | 0.815 |

The procurement of different assets used for the study was associated with other factors besides the approach to implementation of both types of projects. The procurement of a knapsack sprayer had a high degree of association with irrigation project (0.0032) and the availability of formal income. The association of the sprayers with the irrigation schemes could be a result of the nature of the project. There is intensive pest control in irrigation schemes which demand regular chemical sprays. The association of sprayers and formal income is a because the farmers who have ample on-project incomes are likely to purchase equipments for use in the project than those without other sources of income

SPRAYER OWNERSHIP

Analysis of Maximum Likelihood Estimates

| Parameter | DF | Standard Estimate | Wald Error | Chi-Square | Pr > ChiSq |
|---------------|----|-------------------|------------|------------|------------|
| Intercept | 1 | -2.3837 | 0.6286 | 14.3799 | 0.0001 |
| Project Irrig | 1 | 0.6814 | 0.2453 | 7.7185 | 0.0055 |
| FamilySize | 1 | 0.1950 | 0.0865 | 5.0776 | 0.0242 |
| ForIncom 0 | 1 | -0.5079 | 0.2386 | 4.5331 | 0.0332 |

Odds Ratio Estimates

| Effect | Point Estimate | 95% Wald Confidence Limits |
|-------------------------|----------------|----------------------------|
| Project Irrig vs Lstock | 3.907 | 1.494 10.218 |
| FamilySize | 1.215 | 1.026 1.440 |
| ForIncom 0 vs 1 | 0.362 | 0.142 0.922 |

CART OWNERSHIP

Analysis of Maximum Likelihood Estimates

| Standard | Wald |
|----------|------|
|----------|------|

| Parameter | DF | Estimate | Error | Chi-Square | Pr > ChiSq |
|---------------|----|----------|--------|------------|------------|
| Intercept | 1 | -6.6139 | 1.4125 | 21.9252 | <.0001 |
| age | 1 | 0.1241 | 0.0278 | 19.8726 | <.0001 |
| mstatus M | 1 | 1.8265 | 0.4623 | 15.6108 | <.0001 |
| mstatus O | 1 | -1.6225 | 0.5990 | 7.3369 | 0.0068 |
| Project Irrig | 1 | 0.6869 | 0.2580 | 7.0865 | 0.0078 |

Odds Ratio Estimates

| Effect | Point Estimate | 95% Wald Confidence Limits | |
|-------------------------|----------------|----------------------------|--------|
| age | 1.132 | 1.072 | 1.196 |
| mstatus M vs S | 7.619 | 1.102 | 52.690 |
| mstatus O vs S | 0.242 | 0.024 | 2.479 |
| Project Irrig vs Lstock | 3.950 | 1.437 | 10.861 |

The high degree of association between irrigation projects and the ownership of carts is a result of the need for the transportation of the produce to the market place or even to the residential areas after harvesting. The older the farmer becomes the more the likelihood of owning a cart. The married were more than 52 times to own a cart than the single. Also, the divorced and the widowed were more than two times likely to own a cart than the single parents. Agricultural products are bulky and thus will need mode of transport that is affordable and convenient for the producers. For the livestock projects, animals are merely drawn to the market place.

Cattle, harrow and plough ownership increased with the increase in age of the farmer. This could be a result of the successive means of investment that the farmer might have made during the years of his farming life towards the purchase of the asset as it is crucial. The farming activities are timely done when one has the necessary implements to use within his her reach early enough into the season. Harrow ownership was also prevalent or common among the old farmers with large size of fields. These were bought long back before the projects were operational.

$$\text{Log(Harrow Ownership)} = - 8.4459 + 0.1761 \text{ Age} - 0.9569 \text{Field size}$$

HOUSE OWNERSHIP

Analysis of Maximum Likelihood Estimates

| Parameter | DF | Standard Estimate | Wald Error | Chi-Square | Pr > ChiSq |
|------------|----|-------------------|------------|------------|------------|
| Intercept | 1 | -4.6109 | 1.2342 | 13.9575 | 0.0002 |
| age | 1 | 0.1262 | 0.0281 | 20.1754 | <.0001 |
| ForIncom 0 | 1 | -1.0877 | 0.3022 | 12.9572 | 0.0003 |

Odds Ratio Estimates

| Effect | Point Estimate | 95% Wald Confidence Limits |
|-----------------|----------------|----------------------------|
| age | 1.134 | 1.074 1.199 |
| ForIncom 0 vs 1 | 0.114 | 0.035 |

The older the farmers become the more the likelihood of them owning a house. This can also be attached to the opportunities available to the farmer to make investment through out his farming life. Formal employment also is greatly associated with the ownership of a house. This is also for the obvious reason that there is an extra income besides income from the project to substantiate investments by the farmer. Farmers without formal income are ten times less likely to own a house compared to their counterparts. The approach used for implementing a project had no impact towards house ownership as a measure of investment.

There was no association between the type of project implementation and the adoption of pesticides and certified seed use as determinants of technological practices emphasized by the extension agent. Instead, logistic regression analysis revealed that the use of certified seed was a function of the farmer's access to extension messages regardless of the form of project implementation. Farmers under the projects that were implemented through the conventional approach were better record keepers than their counterparts, with a probability of less than 0.01%. Also record keeping increased with the increase in arable land size. This can be attributed to the diversity of the production activities in the case of large farming land which may require proper planning and allocation of resources

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