Socio-Economic Impact of the Participatory and Conventionally Implemented Irrigation and Livestock Development Projects: A Case of Beitbridge and Mberengwa Districts of Zimbabwe

By

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DECLARATION

I, Portia Ndou, hereby declare that this in my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which, to a substantial extent has been accepted for the award of any degree or diploma of the university or any other institution of higher learning, except where due acknowledgement has been made in the text.

Dated at Fort Hare University, on this 25th day of March 2008

……

Portia Ndou

Supervisor ……..

Dr A. Mushunje

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DEDICATION

I dedicate this work to my parents, Mr. J.B and Mrs. T. Ndou. You are the greatest blessing that I would ever cherish. I love you!

ABSTRACT

The purpose of this study was to evaluate the impact of participatory and conventional approaches to livestock and irrigation project implementation in Zimbabwe's Beitbridge and Mberengwa districts. The conventional livestock projects performed better than the participatory. Despite the breed for the participatory livestock projects being unsuitable for the environment, the farmers failed to utilize the drugs and surplus funding set aside for replacement of dead cattle. Farmer training was found to be of paramount importance in the establishment of the livestock projects in spite of the participatory approach used for the implementation of the projects. Also the technical backup and support for the livestock project beneficiaries is important to ensure early rectification of problems that may affect the smooth running of the projects as well as an opportunity to introduce new technical advice to boost production.

Livestock projects take long period of time to establish, i.e. for the financial turn over to be realized. It takes long time for farmers in these projects to make investments from the proceeds of the livestock projects. For this reason, there is need for the number of beneficiaries for each pass-on livestock project to take into account the number of beasts at project establishment and also the number per each beneficiary group. However, the projects should still be encouraged as they will take full operation at a later stage and be of benefit to the rural disadvantaged who cannot access other means to own cattle, which in turn play a pivotal role in crop production (through draft power, manure provision) and cash earnings that indirectly ensures food security. Regardless of approach used, livestock projects should be strongly supported because the districts under study are prone to poor crop production and hence the cattle can be a source of income and food.

Participatory irrigation projects performed better than the conventionally implemented, despite their small hectarages. This proved that farmer participation can greatly improve the efficiency of development work and eliminate many of the problems regarding proprietorship and enhance development activities at community level. Conventional irrigation projects were plagued by problems of mismanagement and theft as was reflected by poor performance and malfunction of the conventional Chingechuru and Chimwe-Chegato irrigation schemes. Fencing theft at

Chingechuru irrigation scheme had brought it to a stand still. However, the larger incomes associated with the conventionally implemented irrigation projects were the result of the larger areas under cropping for these projects. Production levels in participatory irrigation schemes were good.

Adoption of most technical innovations in livestock projects was found to be associated with the conventional approach. Asset procurement was a function of the farmer's accessibility to non-project income, like formal employment, and procurement of specific assets applied more to project type than the approach to project implementation. This study found that the approach used in implementation had a greater influence on the performance of irrigation projects than livestock projects.

Keywords: Participatory project implementation; Conventional project implementation; Irrigation projects; livestock projects.

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ACRONYMS

AEW- Agricultural Extension Worker

Agritex- Department of Agricultural and technical extension services

AREX- Department of Agricultural Research and extension

CBD- Central Business District

CFU- Commercial Farmers' Union

CSO- Central Statistics Office

EA – Extension Agent

FAOSTAT- Food and Agricultural Organisation's Statistical Office

FSRE- Farming Systems Research and Extension

GDA- Group Development Area approach

GMB- Grain Marketing Board

ICRISAT- International Crops Research Institute for the Semi Arid Tropics

LDCs- Less Developed Countries

LDS- Lutheran Development Services

LSCF- Large Scale Commercial; Farms

MFT- Master Farmer Training Scheme

NGOs- Non-Governmental Organisations

PRA- Participatory Rural Appraisal

RLG- Radio Listening Group approach

SDARMP- Smallholder Dry Areas Resource Management Program

SSCF- Small Scale Commercial Farms

T&V system- Training and Visit system

USAID- United States Agency for International Development

VET-Veterinary and Animal health services

VIDCO- Village Development Committee

ZFU- Zimbabwe Farmers' Union

CHAPTER ONE

INTRODUCTION

1.1 Introduction

The study is concerned with the assessment of the socio-economic impact of farmer participation in the identification and implementation of irrigation and livestock development projects. This chapter introduces the problem and the main objectives addressed by the study. The justification and assumptions for the study of the socio-economic impact of farmer participation in the irrigation and livestock development projects are discussed.

1.2 Background of the study

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 (Van Den Ban and Hawkins, 1988). Agricultural 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. This provision of technical information is called technology transfer, ranging from informing farmers of new technology (for simple technology) to dissemination (diffused or dispersed) and demonstration whereby farmers' own experimental process is facilitated (Mc Dermott, 1987).

The transfer of technology is based on the assumption that there is a large stock of sound scientific information and technology ready to be transferred from researchers to farmers (Farrington and Martin, 1987). Scientists determine research priorities, design experiments and conduct these under controlled conditions on research stations and hand over the results to extension for dissemination to the farming communities. The farmer is supposed to participate by adopting the technologies

through the extension service. The extension service acts as a bridge between research institutions and the farming community.

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 Agricultural Extension Worker (AEW) is not there: they have been learning all their lives without the help of the AEW (Rogers, 1992). This shows that there are greater 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. Adoption of agricultural recommendations is thus largely dependent on farmers' involvement in implementation to a certain degree. This shows that the involvement of the farmer will affect the performance perpetuity of the projects implemented for the farmers' benefit.

Active farmer participation and involvement in development programs is thus an important and should be an integral part of agricultural research, extension, project implementation and technology adoption. Effective farmer participation will therefore lead to improved efficiency of the public sector research system by addressing farmers' felt needs, the development of site specific technologies, legitimization of farmers' own indigenous research and empowerment of farmer for self-help development (Ashby, 1990). Since farmer participation builds on local knowledge, initiatives and resources, it strengthens the self-help capabilities of farmers and has the potential for augmenting and reinforcing farmers' capabilities to generate, acquire, communicate and use technical knowledge and stimulate greater reliance on their own resources (Mutimba, 1997).

However, according to Rogers (1995), people adopt "innovations" at different times leading to adopter categorization as indicated by Figure 1.1. 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 rush, 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.

Figure 1.1: Adopter categories

Source: Rogers (1995)

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, technology or development projects will find the whole range of adopters in any society. It is thus apparently safe (at least according to this analysis) to say that all innovations will be adopted at one stage or another. If all technological information and project implemented is good for the community, then, the innovators will safely serve as pioneers and automatically all other beneficiaries will follow suit.

1.3 The overall research question

What has been the socio-economic impact of participatory and conventional approaches to agricultural project implementation in the districts where they were implemented?

1.4 Objectives

The objectives of this study are:

(a) to analyze and establish the socio-economic impact of participatory and conventionally implemented livestock development and irrigation projects.

(b) to analyze if the participatory approach is of any comparative advantage compared to the conventional approach to agricultural project implementation

1.5 Purpose of the study

The purpose of this study is to

(a) determine the degree of developmental change brought up by each of the two approaches to agricultural project implementation.

(b) establish if PRA is a better approach to agricultural project implementation, which can facilitate better economic growth in agricultural development of the communal farmers.

(c) generate and provide information about socio-economic impact of the two approaches to agricultural project implementation that will lead to improvements in the future planning and implementation of similar projects in order to save time and resources, including money.

1.6 Justification of the study

"Transfer of technology" has been a prevalent practice for developing and spreading innovations in many developing countries (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' awareness and adoption of technological components are important indicators of extension services' approximate impact and they provide a backdrop for assessing their impact (Gautam, 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 interventions (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 impact of agricultural extension and agricultural development projects (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) and other external interventions.

Many approaches to agricultural extension and agricultural project implementations 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 sequentially, but, 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 participatory (PRA) (bottom-up) approach to agricultural extension and project implementation based on the notion that active farmer participation will ensure that the development programs are relevant to the farmers' needs and will enhance a balanced development of the rural areas (Pickering, 1987).

In the context of this study, the positive effects of agricultural extension interventions 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 (Agritex, 1990). Survival of the projects will focus on the continuity of the project *vis a vis* the level of productivity and any changes in the number of beneficiaries.

1.7 The hypotheses

(a) The conventional approach to agricultural project implementation is implementer biased and is ineffective with regard to the development of the rural small-scale farmers.

(b) The participatory approach to agricultural project implementation is farmer biased and more effective towards rural farmer development.

1.8 Assumptions

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

(b) 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 the implementation of each of the projects).

1.9 Delimitation of the project

-This study will not analyze socio-political impacts of the PRA
-The study will be limited to the small scale farmers of the Midlands and Matabeleland South Provinces of Zimbabwe.
-The study will cover areas where each of the two approaches to agricultural extension and project implementation has been employed.

1.10 Definition of terms

Participatory Rural Appraisal (PRA) is a family of approaches, methods and behaviours 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 (IDS, 1996). PRA emphasizes processes which empower local people. It is important to note that for the purposes of this study, the acronym 'PRA' is used in place of term 'participatory'.

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 (Van Den Ban and Hawkins, 1988). 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.

Impact evaluation is the systematic identification of the effects, positive or negative, directly or indirectly, intended or not on individual households, institutions, and the environment that can be attributed to a particular project, program or policy, in a

situation where they may be many influences on outcomes. Impact evaluation attempts to answer the question, "What would the situation have been if the intervention had not taken place?" (World Bank, undated).

1.11 Thesis outline

The dissertation is divided into 7 chapters, more or less in chronological order with regard to the way the study was carried out.

Chapter 1: The Introduction. The study is concerned with the assessment of the socio-economic impact of beneficiary farmer participation in the identification and implementation of irrigation and livestock development projects. This chapter introduces the problem and the main objectives addressed by the study. The justification and assumptions for the study of the socio-economic impact of farmer participation in the irrigation and livestock development projects are discussed.

Chapter 2: The General Overview of the Agricultural sector in Zimbabwe. The general overview of agriculture in Zimbabwe is discussed with special emphasis on the agricultural potential, land tenure, soil and vegetation type as well as their relevance to agricultural production within their respective areas of location. The chapter also describes the aspect of livestock and crop production and the agricultural research and extension services available to farmers.

Chapter 3: Literature Review. The relevant literature is reviewed with special emphasis put on the conventional and participatory forms of interventions, their focus, aims as well as their pros and cons. Some reference is also made to cases in which both approaches were made use of for development program implementations and the resultant outcomes. The overall concepts in the reviewed literature guided data collection, analysis, discussions and the recommendations made.

Chapter 4: Study Area. This chapter presents the characteristics of the study area. These include soils and vegetation types of the districts under study (Beitbridge and Mberengwa). The characteristics of these districts reflect the relevancy of the types of projects (livestock and irrigation) in these areas, thus painting a vivid picture of the seriousness with which they should be considered by both the external (development and donor organizations) and the beneficiary households. The chapter also presents the prevalent type of economic activities within the districts.

Chapter 5: Methodology. This chapter discusses the methodological approaches and specific data gathering techniques used. The chapter spells out the sources of data for use in the evaluation of the socio-economic impact of the conventional and participatory irrigation and livestock projects as well as the sampling techniques and sample sizes. Justification of the use of data analysis tools is based on previous studies that focused on the evaluation of the impact of other conventional approaches to agricultural extension. However, most of these studies did not attempt to compare changes in technology adoption or productivity with the situation that might have prevailed in the absence of the implementation of the approach under consideration. The study therefore takes the form of a comparative study (assessment) of the two approaches (conventional and participatory) to project implementation.

Chapter 6: Results and Discussions. This chapter presents the findings of the study from both the irrigation and the livestock projects. The presentation follows the classification of the projects, i.e. irrigation and livestock projects with special emphasis on whether they are participatory or conventional projects. The variables of interest are discussed based on an interpretative approach that relates all parts of the study to one another and or uses results of possible quantitative analytical techniques which were undertaken to ascertain the level of significance of the responses in the questionnaire. The chi-square and the logistic regression are the quantitative techniques that have been used for ascertaining levels of significance.

Chapter 7: Conclusions and Recommendations. . This chapter highlights the conclusions reached at, basing on the findings of the study and puts forward some recommendations which are believed to be of benefit to development and governmental organizations who intend to embark on participatory irrigation and livestock projects. Recommendations can be used as a referral point to improve the ways of implementing projects with particular emphasis on farmer participation.

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CHAPTER 2

OVERVIEW OF THE AGRICULTURAL SECTOR IN ZIMBABWE

2.1 Introduction

In this chapter, the general overview of agriculture in Zimbabwe is discussed with special emphasis on the agricultural potential, land tenure, soil and vegetation type as well as their relevance to agricultural production within their respective areas of location. The chapter also describes the aspect of livestock and crop production and the agricultural research and extension services available to farmers.

2.2 Agricultural potential of Zimbabwe

Zimbabwe covers an area of 390 757 square kilometres. Its altitude ranges between 197-2 592m above sea level but most of the country lies more than 300m above sea level, with 80% higher than 600m. Less than 5% is above 1500m and the peak is in Nyanga in the eastern highlands (Chenje *et al*, 1998). It is according to the a altitude and rainfall variations that the country is divided into 5 natural farming regions (Figure 2.1) which further explain the nature of agricultural activities that can be carried out in these regions as indicated in Table 2.1.

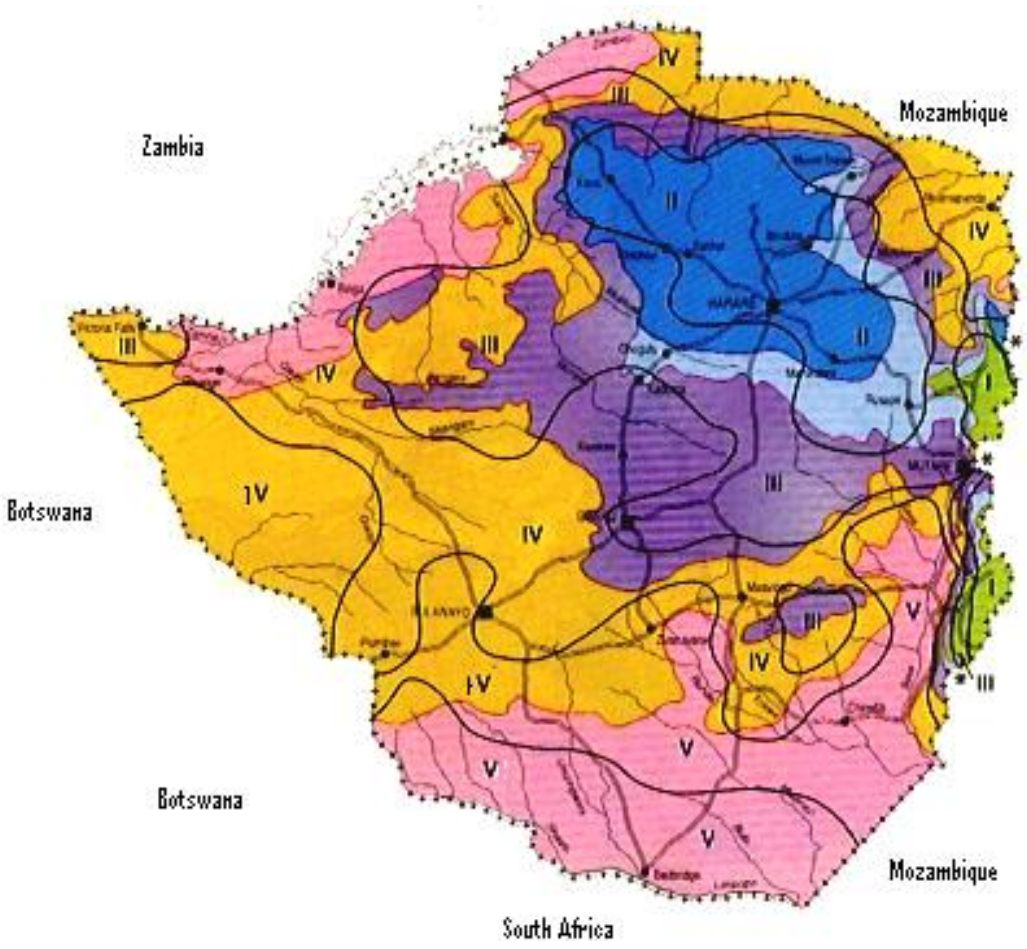

Figure 2.1: Map of Zimbabwe showing the Natural Agro-ecological regions

Source: United States Department of Agriculture (USDA), 2004

Table 2.1: Natural farming regions

Natural region	Area (km^2)	Description	Predominant type of agricultural activity
I	7 000	Characterized by a combination of high rainfall, low temperatures and high altitude. Above 1 000m above sea level. Annual rainfall is more than 1 000mm. Covers less than 2% of Zimbabwe's Eastern border highlands. Temperatures range between 20 ºC and 25ºC in July and October respectively.	Afforestation and intensive diversified agriculture including tea, coffee, deciduous fruit and intensive livestock production
II	58 600	Covers the North Eastern Highveld and represents about 16% of the country. It receives a reliable rainfall of 750-1 000mm which falls between November and March. Temperature ranges between 22 ºC -25 ºC	Intensive cropping and livestock production
III	72 900	Covers 18% of the country and is mainly in the midlands area. Annual rainfall is between 650-800mm which is characterized midseason dry spells and high temperatures (25 ºC -27 ºC)	Suitable for drought resistant crops, livestock and semi-intensive crop farming
IV	147 800	Covers about 37% of the country's low-lying Northern and Southern areas. Annual rainfall is between 450-650mm. It is characterized by seasonal droughts and severe dry spells during the rainy season. Temperature range is 25 ºC -30 ºC	Suitable for dry land cropping but fine for livestock production.
V	104 400	Covers about 27% of the country and is below 450m above sea level. The region receives erratic rainfall which is less than 650mm	Suitable for extensive livestock production and game ranching.

Source: Gambiza and Nyama, 2000, and Chenje *et al*, 1998

Beitbridge lies predominantly in natural region V while Mberengwa has a larger proportion of its area (70.26%) falling within natural region IV. In spite of the low rainfall amount received in these districts, soil types are also varied as discussed below and reflected in figure 2.2. The marked disparity is soil types also affect the type of agricultural activity each area within the country can embark on.

2.3 Soils in Zimbabwe

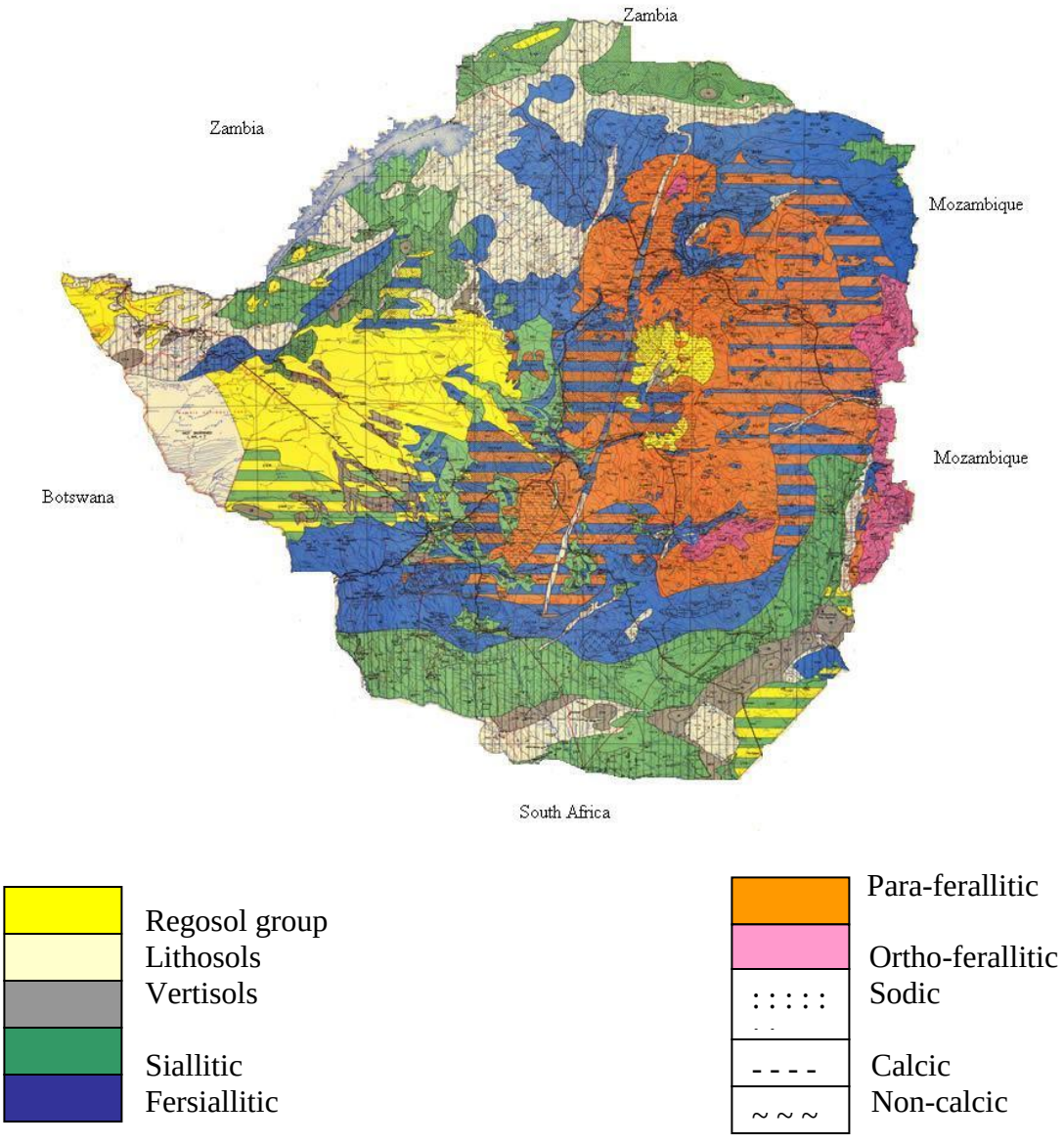

Figure 2.2: Map of Zimbabwe showing the soil types

Source: Thompson, undated

The country has a wide range of soil types including the sillatic, fersiallitic, sodic and the lithosols (Chenje *et al*, 1998). Regosols and the lithosols are found under the weakly developed soils. Regosols are deep sands with less than 15% silt and clay above 38.1 cm. The lithosols are very shallow soils, less than 25.4 cm deep, over weathering rock or gravel (Thompson, undated). These are found to the west of Beitbridge and only smaller and insignificant portions found in Mberengwa. Lithosols occur extensively on flat areas with low rainfall and are underlain by rock which is relatively resistant to weathering. In higher rainfall areas, lithosols are associated with broken and hilly terrain where the relatively high rate of erosion is partly responsible for their shallowness. Because of their shallowness, the soils are not arable. They are suitable for game reserves and national parks.

Siallitic soils are associated with low rainfall areas and in Zimbabwe these are predominant in the southeast lowveld, semi-arid south and southwest of the country (where Beitbridge lies) and in the Zambezi valley. These have high agricultural potential, especially where water is available for irrigation (Chenje, *et al*, 1998). Ranching of cattle is a suitable activity where these soils are found. This is evidence enough that irrigation and livestock projects are relevant and highly recommended agricultural activities for the Beitbridge district.

Fersiallitic soils have appreciable reserves of weatherable rock minerals, with the majority of the soils being moderately deep to deep soils. Fersiallitic have the most widespread occurrence in the country and are agriculturally the most important in Zimbabwe due to the diverse uses to which they can be put (Chenje *et al*, 1998). They are good for crop production, with the country's maize (staple grain crop) belt covered by these soils. The northern part of Mberengwa is dominated by these soils.

The sodic groups of soils are the soils whose morphology of the profile is attributable to the presence of significant amounts of exchangeable sodium and/or water soluble salts, or to the past influence of sodium during pedogenesis (Thompson, undated). The extensive areas coincide with the lowest rainfall areas of

the Zambezi and Save valleys (Chenje *et al*, 1998) with their distribution mainly affected by parent material rich in sodium-releasing feldspars. The occurrence of sodic soils in Beitbridge is very limited and is found in small pockets in association with the existence mopane trees. The calcic and non-calcic are the soils whose dominant morphological characteristics is wetness, whether permanent or seasonal. However, the calcic hydromorphic groups are mainly clays and are not mapable, while the non-calcic are mainly sands which are leached and strongly acid in reaction.

2.4 Key environmental issues

Generally, the country has severe soil erosion which is distributed more relatively to human activities than to natural vulnerability. Human mismanagement and overexploitation of natural resources has resulted in loss of faunal and floral species with some being endangered. Heavy siltation of big rivers like the Save as well as both large and small dams (Chenje *et al*, 1998) is also a common problem in most parts of the country. Contributory factors to siltation and soil erosion are road construction, deep ploughing of fragile soils, clearance of land for cultivation especially in the newly resettled farms as well as harvesting of fuel woods, overgrazing and poor farming methods including growing poor cover crops, low plant population per unit area.

2.5 Land tenure

Land tenure relations in Zimbabwe can be classified into three broad types namely, state, private and common (Moyo, 1986). State-owned land consists of state forests and farms as well as game reserves and resettlement areas. Privately held land is predominantly Large Scale Commercial Farms (LSCF) and the Small Scale Commercial Farms (SSCF). Land held in common (common property) is found in the Communal Areas. The present land tenure in Communal Areas are governed by the Communal land Act of 1982, according to which land is to be allocated “only to

persons who, according to the customary law of the community that has traditionally and continuously occupied land in the area concerned, are regarded as forming part of such a community, or who according to customary law, may be permitted to occupy or use such land" (Cheater, 1990). However, the Fast Track land reform program has led into another additional classification of land tenure. Fast track led into the formation of 2 resettlement models i.e. Model A1 and Model A2 (Makhado, 2003). Model A1 was for the generally landless people, with a villagized and self-contained variant. Model A2, on the other hand, was a commercial settlement scheme comprising small, medium and large scale commercial settlement. Land allocation in this gradation varies with agro-ecological zone with larger farm sizes prescribed as one moves from Natural Region I to V.

The District Council is a legal organ that holds and manages land on behalf of the President and is to be the only body vested with the legal authority to give out or revoke the right to use land in the Communal areas (O'Flaherty, 1998). Land disputes are resolved by the District Councils and not the traditional leaders (*ibid*). Applications for access to resources are directed first through traditional leaders. Applications for access to land are then taken up by the local representative body, the Village Development Committee (VIDCO) which will pass on applications through the Ward Development Committee to the District Council (Cheater, 1990).

The Communal Areas land holding has 4 sets of secured rights (Rukuni, 1997). The members of the community have the benefits of user rights which allow them to grow crops, trees, make permanent improvements, harvest fruits and trees. The transfer rights allow the people to transfer land or use rights i.e. rights to sell, give, mortgage, lease, rent or bequeath. The exclusion rights are rights by an individual, group or community to exclude others from the rights discussed above. Lastly, the enforcement rights refer to the legal, institutional and administrative provisions to guarantee rights. However, for most smallholder irrigated lands, the government accepts the *de facto* prevalence of customary tenure; while at the same time maintain the *de jure* state ownership, which in turn allows bureaucrats, politicians and

influential people to exercise privilege and authority over traditional land and rural communities (Bruce *et al*, 1993). Most smallholder irrigation schemes therefore are controlled and managed by state organizations. This attempts to replace customary tenure with state guaranteed individual rights (i.e. registered title deeds over plots allocated to the beneficiary farmers). However, the state imposed individualized tenure system does not offer greater security for the land users.

2.6 Crop and livestock production

2.6.1 Crop production

Greater proportion of the country, especially the natural regions IV and V, rely mostly on erratic rainfall for crop production and this is usually substantiated by irrigation facilities. Artificial water reservoirs such as dams are greatly needed for the supply of both irrigation water and animal drinking water. The communal sector especially those in natural region V rely on underground water sources for domestic purposes and even for livestock purposes.

There has been an increase in the total national irrigated hectarage from 8 712 to 9 506ha while scheme count has also increased from 132 to 150 between the years 1996 and 2000 (CSO, 2001) as reflected in Table 2.2. This is evidence of the ever rising need for food to sustain the ever growing population. The country is more prone to drought and this has seen the growing need for irrigation schemes to ensure food security each year especially with reference to the growing of the staple maize crop. More schemes are irrigated during summer than winter because most dams supplying irrigation water are seasonal dams, having abundant supplies during the annual rainfall period in summer and dry during the winter dry season. This explains the reason for the decline in hectares under crop during the winter season.

Table 2.2: Number of irrigation schemes and area under irrigation in Zimbabwe by season and year, 1996- 2000

Irrigation	Unit	1996	1997	1998	1999	2000
Irrigated in Summer	Scheme count	130	138	139	141	149
	Area(ha)	5 233	5 151	5 553	5 430	5 522
Irrigated in Winter	Scheme count	117	133	132	126	129
	Area(ha)	3 479	4 113	4 273	3 943	3 984
Total Irrigated	Scheme count	132	146	143	145	150
	Area(ha)	8 712	9 264	9 826	9 373	9 506

Source: CSO, 2001

While the area under irrigation increased (1996 – 2000), irrigation scheme count and consequently hectarage under irrigation increased with aridity of the area in which the schemes are situated (Table 2.3). Natural farming region V has more hectares of land put under irrigation as it is difficult for the poorly distributed and erratic annual rainfall amount to sustain crops to maturity under dry land production. Also, due to the seasonality of the water reservoirs (which have abundance of water during the rainy season and less if not no water in winter) in the arid Natural Region V, this region sheds the highest number of hectares under crop during winter as reflected in Table 2.3. Natural Region I has no crop irrigation facilities. This is partly due to the low temperatures which may not support the production of crops like the staple maize crop.

Table 2.3: Number of schemes and area under irrigation by season and Natural region, 2000

Irrigation	Unit	NRI	NRII	NRIII	NRIV	NRV	Total
Irrigated in summer	Scheme count	-	23	44	39	43	149
	Area(ha)	-	710	912	1 166	2 734	5 522
Irrigated in Winter	Scheme count	-	21	40	35	33	129
	Area(ha)	-	545	854	945	1 641	3 984
Total Irrigated	Scheme count	-	23	45	39	43	150
	Area(ha)	-	1 254	1 766	2 111	4 374	9 506

Source: CSO, 2001

2.6.2 Livestock production

Cattle are the most reared class of stock in the country and this is more so in the communal areas (Table 2.4). The cattle are kept in large numbers due to their multiple purposes such as source of income, milk production and draft power. It is important to note that there have been a static number of cattle between 2003 and 2005. Number of the sheep and goats has been static since 1999 and 2000 respectively.

Table 2.4: Zimbabwe statistics for livestock numbers for the period 1996 to 2005

Livestock type	Number of livestock per year									
Numbers (Million)	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Cattle	5.4	5.4	5.5	6.1	5.7	5.8	5.6	5.4	5.4	5.4
Goats	2.7	2.7	2.8	2.9	3.0	3.0	3.0	3.0	3.0	3.0
Sheep	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6

Source: Gambiza and Nyama[1], 2006

2.7 Agricultural knowledge and information system in Zimbabwe

There are several key institutions in Zimbabwe which carry out research and promote the development of forages and crops as well as giving farming advice to farmers. These include government research and extension agencies, parastatals, private sector companies, university departments and Non Governmental Organizations (NGOs).

2.7.1 Agricultural research and extension

The national Department of Agricultural Research and Extension (AREX) under the Ministry of Lands and Agriculture is the main body responsible for conducting agricultural research in all commodities in the country except for tobacco, sugar, forest products, fish, pigs and animal diseases (Mutimba, 1997). AREX is also the principal extension agency in the country. It has offices at national, provincial and district levels in addition to field extension agents operating at ward level. Each ward (the smallest administrative unit in a district) is manned by an Agricultural Extension Worker (AEW). This is also the case with irrigation schemes, i.e. there is an AEW responsible for the advisory services in farming knowledge. Though the Veterinary Services Department and the Department of Livestock Production and Development are responsible for the extension services with regard to livestock production, AREX is also giving advice to farmers with livestock within their respective wards or areas of operation.

Research is also carried out by a number of parastatals, and the other government agencies such as the Agricultural Engineering Department, the University of Zimbabwe's several departments in the faculties of Agriculture and Veterinary Sciences. The University of Zimbabwe also conducts research on rangeland management, animal production and nutrition (Gambiza and Nyama, 2000). Private seed (e.g. Pannar, Pioneer, Seed-co), fertilizer and chemical companies (e.g.

Agricura), a few non-governmental organizations (NGOs) and a number of producer associations also carry out research activities targeted at benefitting the farmers.

2.7.2 Farmer organizations

The Zimbabwe farming community has 3 farmers' unions, namely, the Commercial Farmers' Union (CFU), the Zimbabwe Farmers' Union (ZFU) and the Indigenous Commercial Farmers' Union. The CFU represents the large scale commercial farmers which predominantly are the white producers. CFU runs its own research and advisory services for the major crops (Mutimba, 1997). The CFU collects a yearly license fee from its members, thus, it is a strong organization in terms of both experience, financial, human and material resources.

The Zimbabwe farmers' Union (ZFU) represents the peasant and small scale producers. The union is organized through a system of clubs and farmer associations (*ibid*) covering most of the communal and small scale commercial areas. ZFU provides agricultural support services, strengthens its members' access to extension advice, information and services. It maintains a close link with AREX and support farmer-to-farmer extension through its support for field days, competitions and shows. The ZFU also lobbies for pricing, marketing and institutional policies particularly favourable to small scale producers who have been historically disadvantaged. However, the ZFU has a limited role in shaping the research agenda and priorities of government research to better meet the needs of smallholder farmers. The Indigenous Commercial Farmers' Union represents the large scale black commercial farmers.

The discussion in this chapter sheds light on the foundations and reasons for the occurrence of different types of agriculture found within the country. The geographical, soil, vegetation and climatic conditions of an area have a strong bearing on the types of agricultural production feasible within each locality.

CHAPTER 3

LITERATURE REVIEW

3.1 Introduction

In this chapter, the relevant literature is reviewed with special emphasis put on the conventional and participatory forms of extension interventions, their focus, aims as well as their pros and cons. Some reference is also made to cases in which both approaches were made use of for development program implementations and the resultant outcomes. The overall concepts in the reviewed literature guided data collection, analysis, discussions and the recommendations made.

3.2 Overview of agricultural extension interventions

Attractive production options are largely those that enable farmers to use their land, labour and capital in a better way (Benor, Harrison, and Baxter, 1984). Agricultural extension plays a central role in facilitating the adoption of technology that enhances and promotes productivity. To bring research findings and new technologies or agricultural production 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 difficult to determine with precision what part of any increase in economic or social development is due 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 interventions 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). Many extension

programs have social goals such as poverty alleviation and targeting specific groups including rural women. 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 (Agritex, 1990). Sound economic development lies upon the development of the agricultural and rural sector of the nation (Siziba, 1996). Few countries have experienced sustained economic development without growth of the agricultural and rural sectors. However, in countries were the development of the agricultural and rural sectors is highly considered as an integral part of economic development, failure to achieve a rapidly growing economy has been blamed on the farmers who fail to adopt new technologies (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).

3.3 Conventional approach to agricultural extension and project implementation

The conventional approach to agricultural extension and project implementation 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).

3.3.1 Main focus of the conventional approach

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). According to Van Den Ban and Hawkins (1998), the conventional approach generally operates under the following assumptions:

(a) The farmer lacks adequate knowledge and insight to recognize his problem or to think of a possible solution. If ever s/he has knowledge it is usually assumed to be based on incorrect information because of 'presumed' lack of experience, upbringing and other cultural factors. Thus the AEW aims at information and insight provision, e.g. technical advice on identification and eradication of a pest that might be causing a decline in yield.

(b) Farmers are usually associated with lack of motivation for them to behave in certain expected ways. Thus, the AEW's role will be to demonstrate a technical aspect of production that will help him or her to consider his or her motives.

(c) Farmers are considered to lack resources, e.g. in most Less Developed Countries (LDCs) the Ministry of Agriculture go to an extent of providing inputs such as certified seed and fertilizers and then take the responsibility to supervise the process. This, on its own, tends to turn the ministry into a donor (providing resources) than the actual role of extending farming advice though the intention is good.

(d) Farmers lack insight into how to obtain resources e.g. credit sources. Thus the AEW is responsible for the provision of the information.

The main focus of the conventional approach to agricultural extension 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.

3.3.2 Criticism of the conventional approach

Farmers have not adopted technology and innovations that have been available 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). Research is designed and conducted under controlled conditions on research stations which more often are different from environmental situations surrounding the farmers. 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, taking cognizance of the conditions surrounding them which may hamper effective adoption.

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 vigour and improved livestock breeds, but then the knowledge of motivating farmers to adopt technology has up to now not been emphasized significantly (Siziba, 1996). Knowledge cannot 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 staff 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.

The problem of poor communication within the system is worsened by the downward decisions 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 is professional specialists with university graduate teams operating from well built offices with well laid-out plans, while the AEWs do not receive enough training, do not know what is expected of them and without means of transport (Arnon, 1989). In Zimbabwe, these problems are worsened by the reduction of the number of formal training years for the AEWs from three years to one year, which is aimed at meeting the demand for extension resulting from the increased number of resettled farmers.

Extension based on transfer of information is a waste of time and tends to destroy the indigenous learning systems (Rogers, 1992). Self-search on the part of the

beneficiary farmers is necessary and the relevance of the promoted technology evaluated by the farmers under his own conditions. Most farmers are both experimental and skeptical. They will not adopt a practice until they have either experimented with it in their own system or have seen it perform in a system almost like theirs (Mc Dermott, 1987). Where central government programs and outside assistance attempt to introduce changes in traditional technologies, extension offers the possibility of adapting the technology to the rural producers' needs so that its benefits can be recognized and the change adopted (Cernea *et al*, 1983). To facilitate the adoption, farmers need to be involved rather than being passive recipients of new technology.

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 result in extension in most developing countries having badly designed and inappropriate programmes (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 are 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.

3.3.3 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 labour. 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. This shows that the farmer is critical in agricultural development – the only one who will achieve increases (Rivera and Schram, 1987).

After the Turkana people of Kenya were 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 of cattle due to drought. The large earth works they constructed were not compatible with their major farming systems i.e. goats and camels as well as sorghum production. The unconsolidated earth structures were breached by intense tropical rain storms and in cases were 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.

There are several types of conventional approach to agricultural extension that have been used in Zimbabwe as stated in section 1.6 above. The MFT originated in the 1930s as a way to develop competent farmers (Hemmes and Vissers, 1988). It is a group approach to extension designed to attain multiplier effects. 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 not 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, AREX is still using this approach to agricultural extension, mainly because the training is designed to develop progressive, commercially oriented farmers who can also serve as leaders and trainers for other farmers.

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 districts were Nswazi and Chimanda Communal areas. This method was prone to low turn up of farmers especially in weekdays and busy times. Since there were a limited number of transmitters in the country, which broadcasted 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 visits. 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 out 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 a way 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. The approach also led marketing companies to make excessive 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, resulted in poor returns to farmers.

3.4 Participatory interventions to project implementation (PRA)

Participatory interventions entails the use of approaches, methods and behaviours 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 (IDS,

1996). PRA emphasizes processes which empower local people. This is directly the opposite of the conventional approach to agricultural extension and project planning and implementation 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. Major donors and development organizations began to adopt participatory research and planning methods when the ineffectiveness of externally imposed and expert-oriented forms of research and planning became increasingly evident in the 1980s (Cooke and Kothari, 2001).

3.4.1 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). It is a means of uncovering realities and priorities of the poor people. The main focus is responding to needs of communities and target groups (Townsely, 1996). Participatory approaches to development make people central to development by encouraging beneficiary involvement in interventions that affect them and over which they previously had limited control and influence. 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 of resources. 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 (Townsely, 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. Agricultural extension should use participatory approach, and sometimes a more service orientated approach (Van Den Ban and Hawkins, 1988)

which 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. Farmers need to be exposed to practical involvement in both the initiation and the decision to implement the project for their sound performance in the future, than exposed to a strategy aimed at convincing them to improve their farming practices, e.g. using improved varieties.

However, according to Pretty, Thompson and Kiara (1995), participation has not been clearly defined as to what exactly is meant. The term has been used to mean many ways that may appear contradictory, ranging from the extent of control of the state and to promotion of local capacity strength and self-reliance. It has been used to rationalize the primacy of external decisions and to devolve power and decision-making away from external agencies as well as describing both data extraction and interactive analysis. Pretty, Thompson and Kiara (1995) identified 7 levels of participation (Table 3.1) namely, passive participation, participation in information giving, participation by consultation, participation for material incentives, functional participation, interactive participation and self-mobilization.

Table 3.1: A typology of participation

Typology	Components of each type
Passive Participation	People participate by being told what is going to happen or has happened. The information being shared belongs to external professionals
Participation in Information giving	People participate by answering questions posed by extractive researchers and they do not have the opportunity to influence the proceedings, as the findings of the research are neither shared nor checked for accuracy
Participation by Consultation	People participate by being consulted, and external agents listen to views. The external agents define both the problems and solutions, and may modify these in the light of people's responses
Participation for	People participate by providing resources (e.g. land, labor) in return

Material Incentives	for material incentives. Much on-farm research falls under this category
Functional Participation	People participate by forming groups to meet pre-determined objectives of externally initiated projects. Such involvement tend to be dependent on external initiators and facilitators, but may become self-dependent
Interactive Participation	People participate in joint analysis, which leads to action plans and the formation of new local institutions or the strengthening of existing ones. These groups take control over local decisions, and so people have a stake in maintaining structures and practices
Self-mobilization	People participate by taking initiatives, independent of external institutions, to change systems. Such self-initiated mobilization and collective action may or may not challenge existing inequitable distributions of wealth and power

Source: Pretty, Thompson and Kiara, 1995

The main concern in this study is about "interactive participation" which led to the implementation of livestock development and irrigation projects, as a response to the action plans drafted and agreed upon through a joint analysis involving the donor agency and the communities.

3.4.2 The advantages of PRA

PRA forms better linkages between communities and development institutions (Townsley, 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 (through research) 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 agricultural extension and other external interventions 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 (Townsley, 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 levels. 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 labour of the rural population, via decentralized administrative, fiscal and political systems conducive to their genuine participation and via private sector involvement (Binswanger, 1994). The participation 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 (Townsely, 1996). Trials carried out in communities through 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 through farmer participation will usually be managed by the community and the benefits will be clear to them.

The planning of large activities such as irrigation and livestock development requires a high degree of commitment on the part of women and men from the villages, and the sustainability of benefits beyond the life of the project depends upon continued management of local resources and access to external capital and state development programs through village-based groups (e.g. irrigation groups, credit management groups). Project should have a fairly high (or deep) level of participation, i.e. it aims for an intensive relationship with farmers at the early stages in decision making (Biggs, 1989; Farrington *et al*, 1993). The intensive relationship with farmers promotes the sense of belonging on the part of the beneficiaries.

3.4.3 Disadvantages of PRA

Interactive participatory approach has a problem of raising expectations within the communities which frequently cannot be realized given the institutional or political context of the area (Townsely, 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 (Townsely, 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 as 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.

The participatory approach uses aggregate participation (Cornwall and Pratt, 2003). It is a public event, open-ended and fails to represent every person in the community. Questions such as, who defines what and whose words are important, are not taken cognizance of. The use of the term 'community' in PRA discourses makes it appear as if 'communities' are homogenous, static and harmonious units within which people share common interest and needs (Guijt and Shah, 1998). The notion of 'community' conceals power relations within 'communities' and further masks biases in interests and needs based on, e.g. age, class, caste, ethnicity, religion and gender. Stratification of communities based whether on wealth, social status, gender or ethnic group is usually obscured or ignored (Townsley, 1996) yet this may negatively affect the outcomes of the development interventions and programs.

The poor participate in 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). The people's knowledge is also used to advance and legitimize the project's own development agenda, or even to negotiate its participatory approach with other stakeholders such as funders, technical consultants and senior management (Pottier, 1992).

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 (Townsley, 1996). Poor people in the community may support "community" decisions which will not benefit them at all because they are supported by their wealthier and more influential patrons. Agricultural projects are more prone to monopoly as they are often proposed as a means of making better use of "common" land or water areas.

The prioritization of problems can be influenced by the PRA team, emanating from the inclinations of the outsiders (Cornwall and Pratt, 2003). The project actors are not passive facilitators of local knowledge production and planning. While the facilitators own the research tools, choose topics, record the information and summarize according to project criteria of relevance, they also shape and direct the processes. According to Pottier (1992), "People's knowledge" is undoubtedly a powerful normative construct that serves to conceal the complex nature of the information production in "participatory" planning, especially the role of outsiders. The fieldworkers develop their own operational interpretation of both villager needs and project goals, and their own strategies of intervention, which are sensitive to the managerial and institutional environment as well as the village context in which they work (*ibid*).

It is often not clear exactly who *is* to be empowered- the individual, the "community" or categories such as "women", "the poor" or the "socially excluded" (Cleaver, 1998). The "community" in the participatory approaches to development is often seen as a "natural" social entity characterized by solidarity relations. The assumptions that these can be represented and channeled in simple organizational forms are unsatisfactory as there is considerable evidence of overlapping, shifting and subjective nature of communities and the permeability of boundaries. Such issues include the little reflection on the wealth of farmers and the overlapping interactions between extended family (rural and urban) which is a common phenomenon in most rural setups (Cleaver, 1998).

3.4.4 Related work on participatory approach

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 Van Den 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, they later cooperated as it was later noted that the problem lied with the external team.

In Zimbabwe, PRA was used to establish soil fertility management strategies in northeast Zimbabwe, after which 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 tonnes of shoot biomass and up to twenty-three tonnes per hectare after two seasons of growth. There also was twenty-two percent increase in maize yield obtained from a field that was previously cultivated with pigeon pea. It is important, however, to note that this study focused on yield increases and not the changes in the livelihoods of the beneficiary farmers.

In Zimbabwe's Gwanda (Matabeleland South Province) and Shurugwi (Midlands Province) districts, smallholder farmers earn very low incomes from a combination of dry land (and limited irrigated) grain crops, small stock, paid farm labour and livestock production is not environmentally viable or sustainable. A non-governmental organization named Smallholder Dry Areas Resource Management

Program (SDARMP) conducted an interactive participation of farmers in these districts with the notion that the areas with their fragile environment required a delicate mix of increased agricultural productivity or more appropriate use of natural resources (Rivera and Alex, 2004). 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, the 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 fell within one pilot ward represented by a senior Councillor. This confirms Townsley's (1996) 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, on the contrary, the planning efforts engendered a sense of ownership in the process. Changes in the relationships between farmers and state institutions were facilitated.

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 non-governmental organization called International Crops Research Institute for the Semi Arid Tropics (ICRISAT) carried out an interactive farmer participation in the Matabeleland North Province of Zimbabwe in Tsholotsho district (ICRISAT, 2001). 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 (United States Agency for International Development). Forty-five of the farmers engaged in millet seed production which they had never done 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 to ease their labour burdens.

It is of paramount importance to note that these studies focused much on the adoption of technologies and in certain instances the increases in yields but little (or no) emphasis was put on the livelihood changes or socio-economic benefits of the interventions to the beneficiaries.

CHAPTER 4

STUDY AREA

4.1 Introduction

This chapter presents the characteristics of the study area. These include soils and vegetation types found within the districts under study (Beitbridge and Mberengwa). The characteristics of these districts reflect the relevancy of the types of projects (livestock and irrigation) in these areas, thus painting a vivid picture of the seriousness with which they should be considered by both the external (development and donor organizations) and the beneficiary households. The chapter also presents the prevalent type of economic activities within the districts.

4.2 Specific districts under study

Zimbabwe is divided into ten administrative provinces. The research focuses on Mberengwa and Beitbridge districts from the Midlands and Matabeleland South Provinces of Zimbabwe respectively, where both the PRA and the conventional approaches to extension have been used. 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 the east (see Figure 4.1). 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.

Figure 4.1: Map of Zimbabwe showing the Provinces and districts.

Source: www.answers.com/topic/zimbabwe-geohive-gif

Both districts are well connected with road transport and each has a railway line passing through it. Mberengwa is well connected with electricity supply (throughout the whole district including most rural service centres, schools and clinics) compared to its counter part. The rural areas of Beitbridge are poorly electrified.

Both districts are semi-arid and highly prone to drought due to erratic annual rainfall, thus the warranty of these districts having more irrigation schemes. Rainfall is predominantly conventional summer type which is less than 600 millimetres per annum and is poorly distributed. Rainfall 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. This explains the reason for the highest number of irrigation schemes (which are supposed to support dry land production in addition to all-year round crop production) in the natural farming region IV and V (Table 2.3).

4.2.1 Sizes of the districts

Mberengwa has a total area of 494 340ha. Of this area, 70.26% (347 340ha) falls under natural region IV while 29.74% (147 000ha) is natural region V, which was described in Chapter 1. Rock outcrops and mine dumps constitute 3 031ha, water bodies 270ha while cultivated area is 261 006ha (Chenje *etal*, 1998). Land uses can be further sub-divided into other sections as shown in Table 4.1 below. The population for Mberengwa is 183 712 (85 061 males and 98 651 females) distributed into 36 273 households.

Table 4.1: **Mberengwa land use sub-divisions**

Land use type	**Area(ha)**	**Percentage of total area**
Large Scale Commercial farming Area	18 575	3.76%
Wanezi resettlement	37 204	7.52
New Castle Farm	1 899	0.38
Bungwe resettlement	3 000	0.61
Fast Track area	58 361	11.81
Communal area	375 300	75.95
Total Area (ha)	**494 340**	**100%**

Source: AREX, 2006

Beitbridge has a total area of 1 283 863ha (Chenje *etal*, 1998). The district predominantly lies in natural region V. Land uses can further be sub-divided into the different categories as reflected in Table 4.2 below.

Table 4.2: Land categories and population distribution in Beitbridge district

Land Category	Area (Hectares)	Percentage (%)	Population	Percentage
Communal land area	677 800	53.3	94 670	79.0
Commercial farming area	468 979	37.0	7 960	6.7
Resettlement area	91 721	7.2	*	*
Tuli Safari area	22 699	1.8	-	-
Beitbridge Urban/town	8 474	0.7	17 170	14.3
Total	**1 269 665**	**100.0**	**119 700**	**100.0**

* Included in communal land area

Source: Nsingo, 2005

4.2.2 Major soils

Beitbridge has lithosols to the (west) and siallitic (to the east) types of soils (Chenje *etal*, 1998). These have been discussed in section 2.3. The lithosols and siallitic have high agricultural potential especially where water is available for irrigation. Ranching of cattle and wild life is a suitable activity where these soils are found. This is evidence enough that irrigation and livestock projects are relevant and a highly recommended agricultural activity for the Beitbridge district.

Siallitic soils are common also to the south of Mberengwa district while the northern part is dominated by the fersiallitic soil types. There also are smaller and insignificant portions of lithosols. Fersiallitic have the most widespread occurrence in the country and are agriculturally the most important in Zimbabwe due to the diverse uses to which they can be put (Chenje *etal*, 1998). They are good for crop production, with the country's maize (staple grain crop) belt covered by these soils.

4.2.3 Major vegetation type

Beitbridge has grazing that is predominantly sweet veld. It is predominantly a livestock producing area dominated by cattle, goats, sheep and donkeys. There are numerous browse species that sustain animals like goats, e.g. the Mopani trees, the acacia species and many others. Beitbridge is characterized by the drought tolerant deciduous trees including the baobab. Mberengwa is a mountainous area with predominantly middle veld grazing, though there are pockets of flat land with sweet veld.

4.2.4 Main economic activities

The main economic activity in Beitbridge is extensive cattle production or ranching. Cattle are kept as assets for the family and rarely are they produced for commercial purposes. Goats also do well in this district and are a good source of income. There also are a significant number of donkeys which provide draft power for many. Beitbridge is vibrant in informal trade of imports from South Africa. This is more pronounced in the Central Business District (CBD) though it extends to the rural areas. There is significant fishing from the district's largest dams i.e. Zhovhe and Kwalu, where some of the largest irrigation schemes are sited.

Mberengwa district is an economically vibrant district which encompasses the mining industries such as the Sandawana mines for emeralds, Buchwa mine for gold and Inyala mines for chrome. There is also significant gold panning going along some of the district's major rivers. Fishing from large dams such as Inyala, Mundi-Mataga is an important activity within the district of Mberengwa. There is a grain depot located in each of the districts that serves the community either for grain supply or for the purchase of the produce. Input supply hardware shops are more evenly distributed in the district of Mberengwa than in Beitbridge.

4.3 Agricultural production

Crop production in Beitbridge is mainly inclined towards the cultivation of the drought tolerant cereals (sorghum and pearl millet) as well as melons. Production is seasonal and is confined to summer (November- March) as the area receives rainfall during this time of the year. Livestock production is mainly ranching and cattle, goats, sheep and donkeys do well in the district. Crop production in Mberengwa is mainly of the drought tolerant cereals (sorghum, finger and pearl millet) and short season maize varieties. Livestock production is predominantly cattle ranching. Irrigation in both districts enhances the production of the staple food crop (maize) and other cash crops such as sugar beans and wheat. Irrigation is thus a relevant practice in such districts in order to boost production as well as supplementing summer rainfall.

The chapter has explored the characteristics of the study area, shedding light on the relevance of the livestock development and irrigation projects in Beitbridge and Mberengwa districts. The environmental, vegetation, and soil types of these districts justify the agricultural practices and economic activities found within these areas. The greater percentage of the total hectarage of the two districts is covered by the communal areas (i.e. 75.9% for Mberengwa and 79.0% for Beitbridge). Despite the harsh conditions for agricultural production, this vast land size need to be put into good agricultural use, and thus, the need for interventions through projects.

CHAPTER 5

METHODOLOGY

5.1 Introduction

This chapter discusses the methodological approaches and specific data gathering techniques used. The chapter spells out the sources of data for use in the evaluation of the socio-economic impact of the conventional and participatory irrigation and livestock projects as well as the sampling techniques and sample sizes. Justification of the use of data analysis tools is based on previous studies that focused on the evaluation of the impact of other conventional approaches to agricultural extension. However, most of these studies did not attempt to compare changes in technology adoption or productivity with the situation that might have prevailed in the absence of the implementation of the approach under consideration. The study therefore takes the form of a comparative study (assessment) of the two approaches (conventional and participatory) to project implementation

5.2 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 and agricultural project implementation. The study not only investigated the socio-economic impact of participatory and conventionally implemented irrigation and livestock projects, but also on how they fare as approaches to agricultural project implementation.

Participatory and conventionally implemented irrigation and livestock development projects were sampled for the purpose of this study. The study allowed this for easy comparison between the two approaches. This acknowledges that all elements of the population had a calculated non-zero probability of selection, thus could provide information which is a true representative description of the entire population

(Brannick and Roche, 1997). The reason for choosing projects within the same locality but under either of the two approaches was to eliminate the possibility of area and people specificity or influence and bias that might 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 and performance 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.

5.3 Sampling and sample size

Sampling of the study area was mere random sampling out of the five districts in which PRA was conducted by SDARMP. The population identified for this study was all smallholder farmers of Mberengwa and Beitbridge districts of Zimbabwe who are beneficiaries of identified projects. Only a sample was considered for the research project since 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 the identification of projects implemented under either of the two approaches to agricultural project implementation. Stratified random sampling technique was used to select the projects into 4 categories as reflected in Table 5.1 below. A total of 120 questionnaires were administered.

Table 5.1: Sample size and format

Project Type	**Participatory Approach**	**Conventional Approach**	**Total**
Irrigation	30	30	**60**
Livestock	30	30	**60**
Total	**60**	**60**	**120**

Due to the differences in project numbers and the number of beneficiaries between the districts, the sample for this study was not evenly distributed across the district under consideration. The actual sample from either district was varied for this study

as presented in Figure 5.2. As an example, there was one participatory irrigation scheme in Beitbridge district affecting the sample size obtained from the respective district. However, there was an equal sample for the conventional irrigation projects from both districts because of the many numbers of such projects within each district. Depending on the number of beneficiaries within each sampled project, the study strove to get a 10% sample size so as to make it as representative as possible.

Table 5.2: Actual sample distribution according to district and project type

Project Type	**Beitbridge District**	**Mberengwa District**	**Total**
Participatory Irrigation	7	23	**30**
Conventional Irrigation	15	15	**30**
Participatory Livestock	14	16	**30**
Conventional Livestock	12	18	**30**
Total	**48**	**72**	**120**

5.4 Data collection methods and instruments

5.4.1 Methods

Data was collected from both the primary and secondary sources. Secondary data was mainly extracted from the records kept by the Department of Agricultural Research and Extension (AREX). The information was 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 and project implementation. Records on aggregate production for each project were 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. Also the information was used to extract the number of beneficiaries under each of the selected projects. For livestock projects, individual and aggregate group records on production were made use of in order to extract data on productivity and production trend. Use was made of records on production dating back to five years. Records

kept by the Food and Agricultural Organization's statistical office (FAOSTAT) (Gambia and Nyama, 2006) were made use of to establish the actual numbers and trend of livestock production in Zimbabwe in general (Table 2.4). However, only commercial livestock production records were accessed from the national Central Statistics Office (CSO).

5.4.2 Research instruments

Both the questionnaire and the focus group interview methods of data collection were used. This triangulation reduces chances of bias normally associated with one method of data collection, thus, giving greater validity and reliability (Borg, 1963). 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 conducted in person and in some cases enumerators were used to administer the questionnaires. The enumerators were a choice of literate individuals in the community, i.e. 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 might have led respondents to give biased 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 used for the collection of qualitative data. Four focus groups from both districts' farming community were used in order to obtain a more detailed account of their attitude and perceptions of the approaches to agricultural extension and project implementation. Each focus group was composed of the project beneficiaries.

5.4.2.1 The questionnaire

Questionnaires have an advantage of being inexpensive, give the possibility of surveying a large population size within a short space of time, are confidential,

provide better appreciation of data analysis and interpretation and the data collected is relatively uncomplicated (Chisnall, 1997). The questionnaires give room to collect information which stretches far beyond official statistics. However, questionnaires have a disadvantage of low response rate which can be as low as thirteen percent (Malhotra, 1999). This, however, was not a problem with regard to this research as the questionnaires were administered and collected before end of each day resulting from the face-to-face interviews which were used instead of mailing the questionnaires. Mailing was avoided because of its inapplicability to a population with low literacy levels.

5.4.2.1.1 The questionnaire design

The questionnaire had 5 sections as shown in Appendix 1. Section 1 was designed to explore the participant's demographic data including such issues as sex, marital status etc. Section 2 was basically about the respondents' awareness of extension services. Choice and checklist questions were asked. The third section focused on the exploration of the farmers' personal experience in chosen projects entailing the implementation of the project and its performance and level of production. The fourth section dealt with the farmers' income from the project and investments made as a result. The fifth and last section involved a ranked response that 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 socio-economic impact of the 2 agricultural project implementation approaches, whether they have had a positive or negative impact. The "yes" or "no" answer questions and the accompanying option for comments on the answer given was intended to explore in greater depth what the respondents' views were towards approaches to agricultural project implementation. This allowed respondents freedom to offer their opinions. This was permitted so that the answers given could be analyzed for recurring themes (Coolican, 1996). The questionnaire was pre-tested in order to verify its usability.

5.4.2.2 The focus group interview

Four semi-structured focused group interviews were conducted. The interviews were administered in person for proper probing. Though interviews consume a lot of time, they provide a chance for the interviewer to probe further for an in-depth data collection. The data collected through interviews was mainly focusing on personal perception or attitudes of the respondents towards projects and the way they were implemented. The interviews also sought to supplement the questionnaire in addressing issues relating to the performance of projects in the area. There was also a need for the respondents to indicate their awareness of extension services and other leadership that has been beneficial to the projects. Respondents also indicated their opinions on the farmer involvement in decision making and implementation of projects.

5.5 Model and data analysis

The study sought to find if PRA has been of any advantage in project implementation and dissemination of extension messages to smallholder farmers compared to the conventional approach. The study sought to provide evidence on the socio-economic impact of the conventionally and participatory implemented livestock and irrigation projects in the Mberengwa and Beitbridge districts. The following models were analyzed using limited dependent variable regressions; the impact of both the conventional and participatory projects on asset procurement, adoption of improved technology and household income.

A number of studies have made some 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 interventions 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 of agricultural extension in neighbouring districts where the T&V was not implemented. These studies used the logistic regression model for the analysis of data and it is after this that this study adopted the use of the logistic regression 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). The main focus of the participatory approach is to instill 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 or intervention (Hussain *et al*, 1993). Though the analysis of all these possible influences on productivity is a complex task, this study, however, enabled the analysis of the following aspects among other variables:

(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 was to analyze what would have happened in the absence of PRA. In this study, two districts were chosen where interactive participation resulted in a joint identification and implementation of irrigation and

livestock projects. This study examined these two major agricultural project areas in the districts of Beitbridge and Mberengwa. The projects implemented under either of the 2 approaches fell within the same districts with closely related agro-ecological conditions and agricultural production systems. This study assumed that the effects of PRA do not "spill over" into projects implemented under the conventional approach. For each farmer, detailed data was collected for the 2001-2006 production period in both project types. The logistic regression model used for data analysis explains one or more dependent categorical variables. The following equation represents the logistic regression model;

$$\rho\left(\gamma_t = 1 \middle/ \chi_t\right) = \frac{\ell^{(\chi_t\beta)}}{1+\ell^{(\chi_t\beta)}}$$

The equivalent form can be stated as follows;

$$\frac{\ell^{(\chi_t\beta)}}{1+\ell^{(\chi_t\beta)}} = \frac{1}{1+\ell^{(-\chi_t\beta)}}$$

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:

$$\gamma = b_0 + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 \ldots\ldots\ldots\ldots + \beta_n + \chi_n$$

Where γ= the dependent variable

χ_n= the independent variable,

b_0 = constant

β_n= is the odds ratio corresponding to a one unit change in the independent variables

From this data set, the following models could be used to estimate the impact associated with such interventions in the implementation of irrigation and livestock projects.

5.5.1 Asset procurement (used as an indication of improved living standards)

$$ASS = b_0 + \beta_1 EDU + \beta_2 AGE + \beta_3 FSIZE + \beta_4 PSIZE + \beta_5 APPROACH + \beta_6 EXPER + \beta_7 NONPRO$$

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), The equation follows a hypothetic specification that older farmers procure more assets than younger farmers due to prolonged exposure to the opportunity to invest in assets. FSIZE is family size and is hypothesized to negatively relate to asset procurement due to the commitments the proceeds are put into, PSIZE is arable land size (ha) and is assumed to positively relate to asset procurement (i.e. the larger the plot size, the higher the sales and the corresponding likelihood to invest in assets), APPROACH is a dummy variable (0 if project is PRA and, 1 for a conventional project), EXPER is the number of years in farming and is 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 the more educated the farmer, the more s/he is likely to benefit from improved information (Hussain et al, 1993). NONPRO is non project income, and the variable assumes that the more the sources of income the better the ability to procure more assets. It is herewith hypothesized that asset procurement is more in PRA projects. This equation then measures the determinants of the procurement of assets. Since ASS is a binary variable, this equation is estimated as a logistic regression model.

5.5.2 Effect of participatory and conventional approaches on the adoption of improved technology

This study examines the influence of a number of exogenous variables on the adoption of agricultural production technologies. Given that farmers are either under conventional or participatory only, this study sought to analyze the determinants of agricultural practices using "adoption of technology" as the dependent variable.

Equation 2 models variables influencing technology adoption.

$$ADOPT_i = b_0 + \beta_1 EDU + \beta_2 PSIZE + \beta_3 AGE + \beta_4 SEX + \beta_5 APPROACH + \beta_6 EXPER + \beta_7 FKNOW$$

Where, $ADOPT_i$ is a variable measuring adoption or non-adoption of improved $practice_{i.}$ This was measured on the basis of access of the farmer to extension advisory services (Yes/No answer). AGE is farmers' age (in years), and it is hypothesized that younger farmers adopt new ideas more readily than older farmers do (Agritex, 1986). SEX is the gender of the household head. APPROACH represents the extension approach used for implementing the projects, either participatory or conventional. FKNOW is the access of the farmers to extension advisory services. The analysis considered 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. These practices were measured on the basis of whether a farmer put the practice in use or not (Yes/No answer).

5.5.3 Impact of participatory and conventional project on household income

Equation 3 models variables influencing household income.

$$HHINC = b_0 + \beta_1 AGE + \beta_2 EDU + \beta_3 PSIZE + \beta_4 FSIZE + \beta_5 AGRFA + \beta_6 FKNOW + \beta_7 AVENONPROJ$$

Where HHINC is a variable measuring household income, AGRFA is agricultural fixed assets which are assumed to positively affect amount of income for a household, FKNOW is access to agricultural extension advisory services, and AVENONPROJ is the average non-project income.

5.5.4 Determinants of irrigation project income at plot level

Equation 4 models the variables influencing irrigation performance at plot level.

$$PPERF = b_0 + \beta_1 PSIZE + \beta_2 FSIZE + \beta_3 APPROACH + \beta_4 DISTRICT + \beta_5 FKNOW + \beta_6 CREDIT + \beta_7 CERTSEED + \beta_8 FERTUSE + \beta_9 PESTICIDE + \beta_{10} POPERAT + \beta_{11} EDU + \beta_{12} ENTERPRISE + \beta_{13} AGE$$

Where, PPERF is a variable measuring the irrigation projects income at plot level. The determinants, PSIZE, FSIZE, APPROACH, and FKNOW are as specified in the above equations. DISTRICT is district where the projects fall, 1 if in Beitbridge and 2 if in Mberengwa; POPERAT is the tenure status- 1 if farmer fully operates the plot and 0 if otherwise, Plot rank (relative to other plots or other arable land, 1 if it is farmer's only plot, 2 if s/he has other field. This is reflected by the variables PSIZE and FSIZE. ENTERPRISE is the type of crop grown in the irrigation scheme, 1 if wheat, 2 if vegetables, 3 if maize grain and 4 if Sugar bean. CERTSEED, FERTUSE and PESTCIDE describes whether the farmer adopted technologies or practices recommended by AEW i.e. use of certified seed, fertilizer use and use of pesticides respectively. CREDIT denotes the access of the farmer to credit facilities.

5.5.5 Livestock project performance

The model is specified as follows

$$LPROJ = b_0 + \beta_1 CATTLE + \beta_2 POPERAT + \beta_3 FKNOW + \beta_4 DOSE + \beta_5 DEHORN + \beta_6 CASTR + \beta_7 VACCINE + \beta_8 WEAN + \beta_9 CREDIT + \beta_{10} APPROACH + \beta_{11} DISTRICT$$

Where, LPROJ is the success of the livestock projects, 1 if the project was a success and 0 if otherwise. CATTLE is the number of cattle at the start of the project, POPERAT is the ownership status- 1 if farmer is a fulltime beneficiary of the project

(i.e. not operating on behalf of the other), DOSE, DEHORN, CASTR, VACCINE, WEAN describe the farmer's adoption of technologies or practices recommended by AEW- i.e. dosing, dehorning, castration, vaccination and weaning respectively. Other variables are as specified in the above stated models.

The model took into consideration the number of cattle at the start of the project and the minimum numbers of cattle expected of each project taking into account that the cow is expected to bear a calf each year and also the actual number of cattle in each project or group of farmers. The descriptions of the variable used for this study are given in Table 5.3 below.

Variable description

Table 5.3: Variable description

Variable	Description	Code used
Asset procurement	Binary variable for asset procurement within years of project (Yes/No)	ASS
Adoption of Technology	Dummy variable for adoption of technology, 1= adopted	$ADOPT_i$
Household income	Amount of money available for the house hold	HHINC
Gender	Sex of the household head	SEX
Access to extension	Dummy variable = 1 if farmer has access to extension advice	FKNOW
Number of cattle	Number of cattle issued at onset of livestock projects, Actual numbers	CATTLE
Age	The age of the house hold head	AGE
Farming experience	Number of years in farming	EXPER
Family size	Total number of household members	FSIZE
Arable land size	The size of the arable land or plot size in the case of irrigation farmers	PSIZE
Average project income	Income available to the family from project proceeds	AVEPR OJ
Agricultural fixed assets	Agricultural fixed assets	AGRIFA
Access to credit	Dummy variable, 1 if farmer has access to credit,	CREDIT

	or else, 0	
Use of certified seed	Binary variable for farmer's use of certified seed, (Yes/ No)	CERTSEED
Use of fertilizer	Binary variable for use of inorganic fertilizer, (Yes/ No)	FERTUSE
Use of pesticides	Binary variable for the use of pesticides, (Yes/ No)	PESTCIDE
Land tenure	Plot tenure- 1 if its farmer's only arable land	POPERAT
Dehorning of livestock	Dummy variable, 1 if farmer practice dosing, or else, 0	DEHORN
Castration of livestock	Dummy variable, 1 if farmer practices castration, or else, 0	CASTR
Vaccination of livestock	Dummy variable, 1 if farmer practices vaccination, or else, 0	VACCINE
Weaning of calves	Dummy variable, 1 if farmer practices weaning, or else, 0	WEAN
Dosing of Livestock	Dummy variable, 1 if farmer practices dosing, or else, 0	DOSE
Non project income	Average non-project income	AVENONPROJ
Livestock Project	Success of the livestock projects	LPROJ
Crops grown in irrigation schemes	The type of crop grown in the irrigation scheme; 1 if wheat, 2 if vegetables, 3 if maize grain and 4 if sugar bean	ENTERPRISE
District wherein project falls	DISTRICT is district where the projects fall, 1 if in Beitbridge and 2 if in Mberengwa	DISTRICT
Irrigation project	Irrigation income at plot level	PPERF

The data collected through the use of the tools of choice was adequate to give a clear picture of the parameters under consideration and the comparative analysis of the two approaches to project implementation concerned with this study. Collected and analyzed data was presented in tabular and graph form. Descriptive presentations were also used.

CHAPTER 6

RESULTS AND DISCUSSIONS

6.1 Introduction

This chapter presents the findings of the study from both the irrigation and the livestock projects. The presentation follows the classification of the projects, i.e. irrigation and livestock projects with special emphasis on whether they are participatory or conventional projects. The variables of interest are discussed based on an interpretative approach that relates all parts of the study to one another and or uses results of possible quantitative analytical techniques which were undertaken to ascertain the level of significance of the responses in the questionnaire. The chi-square and the logistic regression are the quantitative techniques that have been used for ascertaining levels of significance.

6.2 Demographic information

6.2.1 Age distribution of household heads

The majority of the farmers in irrigation projects were within the age bracket of 28 to 40 (Table 6.1). Participatory livestock projects had no respondent beyond the age of 60 years.

Table 6.1: Age distribution of household heads

Age Group	PRA Irrigation	Conventional Irrigation	PRA Livestock	Conventional Livestock
28-40	11	10	15	3
41-50	6	8	9	8
51-60	6	7	6	13
61+	7	5	0	6
Total	**30**	**30**	**30**	**30**

6.2.2 Household characteristics of farmers

The average household sizes ranged from 5.5 to 7 members as shown in Table 6.2. The conventional irrigation projects had the highest average number of female headed households i.e. 73.3%, while participatory irrigation projects had an average of 56.7%. As shown in Table 6.2, participatory livestock had the least average farming experience (19.3 years). The average number of farming years (experience) of the project beneficiaries used for this study is also reflected in Table 6.2.

Table 6.2: **Average household size for the farmers in the sampled projects**

Variable	**PRA Irrigation (N=30)**	**Conventional Irrigation (N=30)**	**PRA Livestock (N=30)**	**Conventional Livestock (N=30)**
Average household size	7	6.3	5.5	6.8
Female Headed	17	22	9	11
Male headed	13	8	21	19
Average Household heads' Farming Experience (years)	28.47	27.9	19.27	27.3

6.3 Arable land size holdings

Fifty percent of the conventional irrigation farmers from Mberengwa district rely solely on the irrigation lands and have no dry land fields (Table 6.3). This is because most of these farmers had their fields displaced during the implementation of the irrigation schemes. Generally, a greater proportion of the target farmers have their arable fields ranging between 2.1 and 3.0 hectares as reflected in Table 6.3. Production from the dry land farms is a means of food security and the farmers with both irrigation and dry land arable fields stand a better opportunity to sell the irrigation proceeds than those without fields beside irrigation plots.

Table 6.3: Arable land sizes

Arable Land Size (ha)	Beitbridge District		Mberengwa District	
	Irrigation Farmers	L/Stock Farmers	Irrigation Farmers	L/Stock Farmers
0-1.0	1	0	11	1
1.1-2.0	3	5	7	6
2.1-3.0	9	10	17	21
3.1-4.0	4	7	5	5
4.1+	5	5	0	0
Total	**22**	**27**	**38**	**33**

6.4 Irrigation projects

6.4.1 Relevance of irrigation project

The irrigation projects complement the Government of Zimbabwe's efforts to ensure agricultural development, rural development and food security. These projects enhance agricultural productivity, raise income, generate rural employment and ensure a reduction in risk of total crop failures. As drought prone districts, Beitbridge and Mberengwa are worthy to receive such interventions for the benefit of farmers, as irrigation guarantees the production of food crops even in seasons when rainfall is insufficient for dry land cropping. The implementation of these projects promoted the involvement of women (65%) in projects as was reflected by a proportion of 21 men to 39 women in the irrigation project sample (Table 6.2).

6.4.2 Technical support

Each irrigation scheme has a fulltime AEW who facilitates the production processes and programs. The donor provided support for extension staff in terms of equipment used in delivery of services. The AEWs could also use the kit donated to all staff members by Small Dry Areas Resource Management Program (SDARMP) during the PRA exercise which contained such useful materials as knapsack sprayers,

augers, scales and many others including electronic devices. Motorcycles were also handed over to some staff members to better service their working areas and on average it was six cycles and a vehicle per district.

Both types of projects (conventional and participatory) receive extension services from AREX. Each irrigation scheme has an AEW manning the production activities regardless of the approach used to implement the project. The AEWs are fulltime engaged in impartation of extension messages to the irrigation farmers. Also, the AEWs are the centre of production program planning within their respective irrigation schemes of operation. This creates a favourable environment for the better performance or success of each irrigation scheme though some of the conventional types (e.g. Chimwe-Chegato and Chingechuru) performed badly under the exposure to technical back-up which should boost production than otherwise.

6.4.3 Indirect irrigation project beneficiaries

Participatory irrigation projects had a limited number of non-project beneficiaries as the areas under crop are small, sufficing in most cases only the plot holder families, than the conventional ones. This scenario is clearly indicated by a few examples of irrigation schemes in Table 6.4. The conventionally implemented projects had larger plot size per individual beneficiary (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 rather than the community, not even with informal employment as the family can provide labour for the activities.

Table 6.4: Number of indirect beneficiaries of selected irrigation schemes

Name of scheme	Approach used	Area (ha)	No of Plot holders	Plot size/ household	No of indirect beneficiaries
Dombolidenje	PRA	5	51	0.1	120
Chimwe	Conventional	64	124	0.5	3 500
Zvavachari	PRA	9.8	49	0.2	1 000
Biri	Conventional	35	58	0.6	2 000
Bingura	PRA	2.1	36	0.1	100
Chimanyure	PRA	5	12	0.2	120
Muchembere	PRA	24	48	0.2	1 300

Source: AREX, 2006

6.4.4 Irrigation project performance

6.4.4.1 Planning

Some irrigation schemes that have been planned and implemented with full farmer participation were still doing better than those implemented otherwise. Despite their being small in terms of hectarage, they were smooth running with satisfactory production. The sense of belonging might be attributed to their success. Most projects implemented without farmer involvement (conventional) were not performing well, especially Chimwe-Chegato and Chingechuru in Mberengwa. Despite Chimwe-Chegato being a large scheme (64ha), the production is not up to standard with some plots lying idle, uneven crop stands, poor and varying size and condition of crops, leading to poor yields. Most beneficiaries had no other option than to take up the plots allocated to them on the basis that their former arable land fell within the land marked out for the irrigation scheme. This might be an effect of these beneficiaries having no alternative crop production option to choose from and thus might have accepted irrigation plots that they wouldn't have managed. Other beneficiaries who are professionals (mostly civil servants) from neighbouring wards have no fulltime commitment to the project and thus their delegated work suffers negligence by those appointed to do duty, whose sense of belonging might be

questionable. Other conventional schemes like Biri and Kwalu had good crop stands and portrayed full utilization of the land at the time the survey was conducted. These schemes performed better than other conventional irrigation schemes.

6.4.4.2 Type of management

Each irrigation scheme has a committee comprising, of the chairperson, secretary, treasurer and other committee members. These are expected to work hand in glove with the AEW to ensure quality production standards and implementation of programs agreed upon. These are mandated to ensure the smooth running and implementation of the drafted programs as well as ensuring that the water bills are settled in time and help in the collection of production data from individual producers for record keeping. However, though positive outcomes of the efforts of the committees are realized, especially with information dissemination, production data collection and production program drafting and dissemination for implementation by plot holders, there are certain elements within the schemes who act contrary to expected. This was a familiar phenomenon in the conventional schemes and included problems such as failure to meet deadlines, not abiding with the drafted cropping program and failure to meet financial commitments for the smooth running of the schemes. The committee might be blamed for relaxing the by-laws meant for good performance of the production.

6.4.4.3 Input accessibility and procurement

Farmers in irrigation schemes face problems of ever increasing prices of inputs such as fertilizers, certified seed and pesticides. However, the Grain Marketing Board (GMB) has strategized an input credit scheme that has eased farmers' problems in that all irrigation farmers are eligible to receipt of these inputs on credit on condition that they sign a contract or agreement to sell their produce to the board. The GMB will then deduct their dues during the buying and selling transactions. This is

manageable for most farmers as there are no interest charges and is a good security measure towards continued production against input scarcity and price hikes.

6.4.4.4 Farmer training

Farmer training on crop production is highly practiced. Planting demonstrations are held in order to educate farmers on how they should establish their crop for a good stand ensuring high production levels. Field days are also held on irrigation schemes where farmers gather (including non-irrigators) and specialists share extension messages with farmers. The Master Farmer Training (MFT) scheme intended to give the farmer necessary technical skills and knowledge to enable him or her to utilize the land, capital and labour to best advantages (Agritex, 1990) is also carried out in irrigation schemes by responsible AEWs. The MFT aims at developing the ability of the farmer, given the input resources available to him or her, to choose that enterprise that will profit most by using the technique of budgeting and record keeping. The training facility is carried out in either of the project types.

6.4.5 Problems faced by irrigation farmers

Irrigation project beneficiaries sited a problem of heavy dam siltation. The silted dams are the only sources of irrigation water as well as for livestock drinking. Construction of silt traps was identified as of great importance. A serious case was that of Bingura dam in Mberengwa which is seriously silted.

Participatory irrigation project beneficiaries had a problem low yields resulting from the small hectarages allocated to each beneficiary. Though in some cases there is ample land for expansion (e.g. Dombolidenje in Beitbridge and Bingura in Mberengwa), dam capacity might not suffice such a move. Schemes with underdeveloped irrigation facilities also sited failure to procure irrigation equipment as a challenge they are facing, e.g. Bingura irrigation scheme, where some parts of the scheme have to be watered with buckets as the siphons cannot reach some

portions of the plots. Kwalu irrigation scheme in Beitbridge had a problem of malfunctioning water pump (engine).

Most irrigation plot holders had a problem of transportation of their produce to the points of sale. These producers are contracted by the Grain Marketing Board (GMB) through provision of inputs on condition they deliver an agreed amount of produce for sell to the board, but they find it hard to transport their produce to the depots.

6.4.6 Irrigation project incomes versus the non-project incomes

It is important to note that all income dealt with in this study are based on the 2006 financial year during which the survey was carried, and the inflation in Zimbabwe was at 1100%. Participatory irrigation farmers had little income from project sales rarely exceeding ZW$50 000 on average as shown by Figure 6.1. Most of these sales are from the crops that need to be sold in their fresh state and cannot be stored in bulk for future use, e.g. green mealies and green vegetables, which the extension agents promote in order to instill a culture of production for commercial purposes. Otherwise, the harvest that does not need speedy disposal and utilization resulting from high perishability and low shelf life like dry beans and groundnuts is used for supplementing dry land production. The small sizes of plots allocated for each beneficiary family (ranging between 0.1 and 0.2 hectares) result in low production levels. The farmers from the conventional irrigation schemes had much of their income from the sales of the produce as reflected by Figure 6.1. This can be attributed to the plot size which is larger for the conventional than for the participatory schemes. The majority of the farmers had no or little income from non-project sources. This can be attributed to the demanding nature of irrigation project which keep the beneficiaries fully employed in the irrigation activities leaving little if any time for extra income generation activities. It was noted that the farmers who have non-project income exceeding the project income were the formally employed who had other commitments that also resulted in them giving little attention to the irrigation activities.

Most of the conventional irrigation farmers had little non-project income sources and even in times when they had access to these sources the average annual income from these sources rarely exceeds $50 000,00. However, there has not been much difference between the two sources of income (project and non-project) with regard to the participatory farmers.

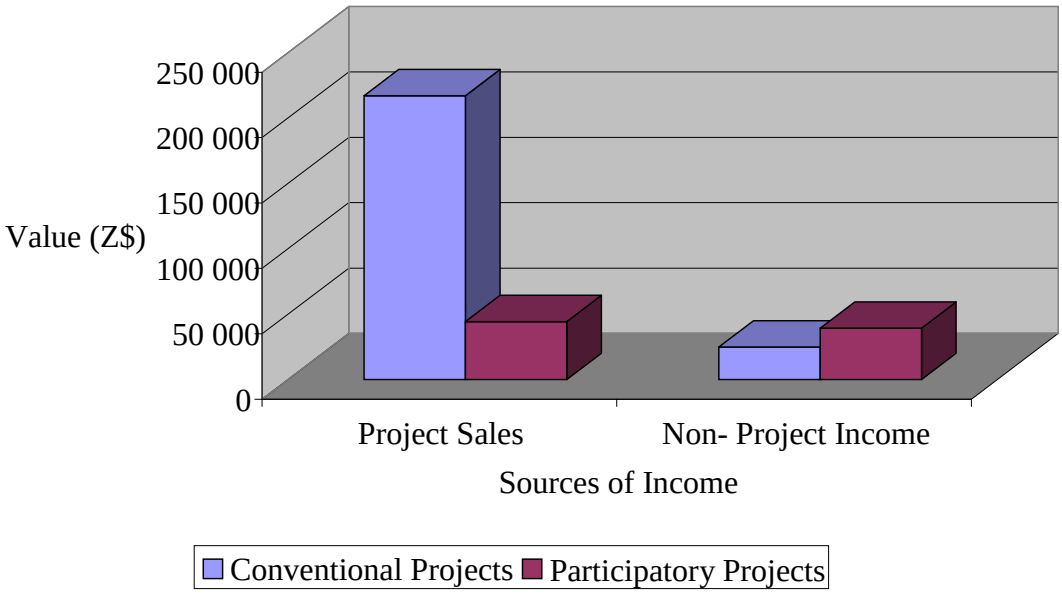

Figure 6.1: Comparison between average value of irrigation sales and non-project income

6.4.7 Average value of sales from irrigation projects by category of farmer

Master farmers from the conventional irrigation schemes had better value sales than the other two categories and this can be attributed to the training they undergo (Figure 6.2). This might be a reflection of the relevance and effectiveness of the MFT scheme for better productivity. However, there was not much difference between the master and trainee farmers under the participatory projects. The trainee farmers are basically those who have enrolled for MFT and are still undergoing the training process i.e. they have not obtained certificates farming.

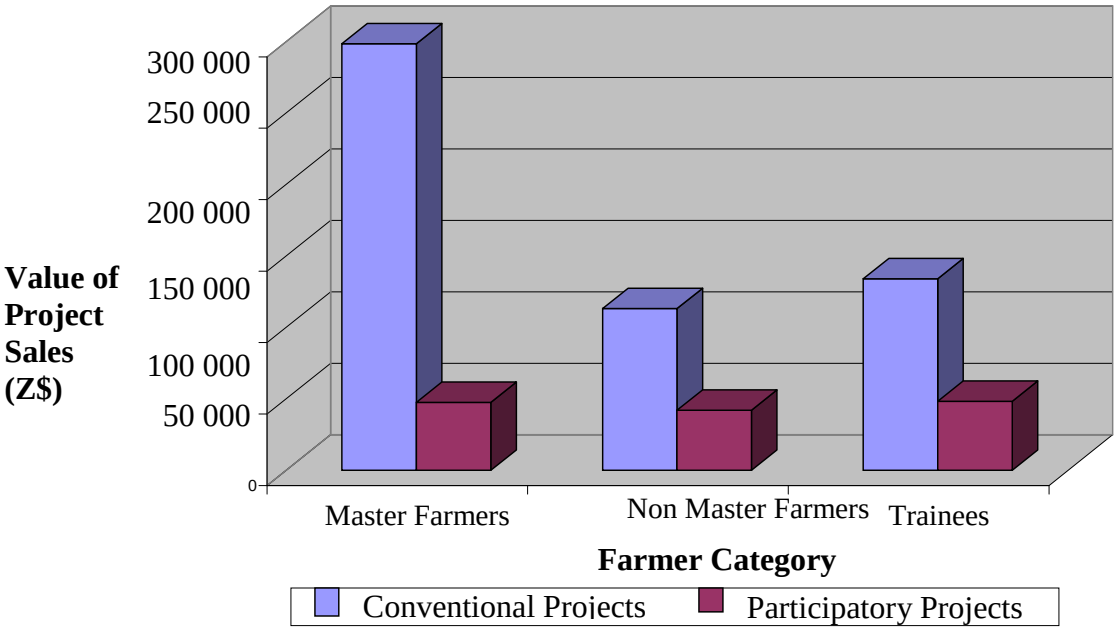

Figure 6.2: Average value of sales from participatory and conventional irrigation projects by category of farmer

6.5 Credit use in projects

Seventy-five percent (N=60) of irrigation farmers used credit as compared to the livestock farmers (23.4%, N=60) as reflected in Table 6.5. Of the 75% irrigation farmers who used credit for their farming enterprises, 65% accessed the credit from the Grain Marketing Board (GMB). All of them procured farming input i.e. seed, insecticides and fertilizer. This figure could be associated with the ease with which farmers' access agricultural inputs from the board and terms of agreement. Farmers agree to sell their produce to the board while at the same time the GMB deducts the value used by each farmer for the access of inputs. All the farmers (100%) who secured credit from relatives, shopkeepers and the Agribank wanted cash, while 100% of those who consulted GMB procured inputs (mostly crop seed). Agribank appears here as the only bank that lends to smallholder farmers because it is a government bank and is inclined to boost agricultural production.

Table 6.5: Use of credit in irrigation and livestock projects

Source of credit	No of livestock farmers (%)	No of irrigation farmers (%)	Kind of credit	
			Cash (%)	Agricultural inputs (%)
AGRIBANK	5	3.3	100	0
Shopkeeper	5	0	100	0
NGO	1.7	1.7	50	50
Relatives	11.7	5	100	0
GMB	0	65	0	100
Total Credit Use (%)	**23.4**	**75**	**N/A**	**N/A**

6.6 Livestock projects

6.6.1 Relevance of livestock projects

Livestock projects are also a relevant form of development intervention because the two districts under study have favourable 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 communal areas. The implementation of these projects took into consideration the issue of gender with women also taking part as active beneficiaries. Of the random sample taken for the purpose of this study, the proportion of men to women is 40 to 20, showing a 33.3% of women as project beneficiaries, of which 50% were either widowed or single parents.

6.6.2 Livestock project performance

This study found that some of the beneficiaries in the participatory livestock projects owned cattle prior to benefiting from the projects 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 Beitbridge district, only one ward (Ward 1) benefited from the program, yet the district is made up of 14 wards. From each of the districts, this study unveiled that the participatory livestock project beneficiaries had some common experiences with the cattle received for the pass on scheme among other shortcomings. These are as follows:

i) The kind of livestock breed (i.e. the 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.

ii) 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 was advice from the local extension agents which is usually rendered to all livestock owners within their working area during normal execution of their duties.

iii) There were 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.

iv) 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 cattle died while drugs expired in group

leaders' homes without use. The drugs were procured through beneficiaries' contributions that were 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 have gone up and the farmers' money hit by inflation, but most of the cattle died within the first year of ownership when cattle were still affordable through the money contributed by the beneficiaries. This can be attributed to the issue of lack of clear monitoring strategies for the project.

v) 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 calved twice, yet for a normal beef animal each year should have a calf born to the dam (NDA, 2000). This is not a good scenario and the farmers need the backup of technocrats to curb such outcomes before the problem worsens. Such problems may lead the farmers not to trust any development interventions of the same nature with the preconceived notions that the previous experiences might catch up with them.

Livestock project performance was also considered on the basis that each beast is expected to bear a calf each year. When the expected total number of beasts for each project is obtained, then there has been a 100% development in the project performance and thus the project is fully or smoothly functioning as expected. From Figure 6.3 the participatory livestock projects achieved far less than 50% of the average number of beasts expected of the projects since the time of establishment. Generally, on average, the conventional project types had 3 beasts while the participatory had less than 1, compared to the minimum expected of 8 and 5 respectively. The focus interviews revealed that none of the conventional livestock projects had a complete failure i.e. there was no beneficiary group that experienced 100% mortality of stock.

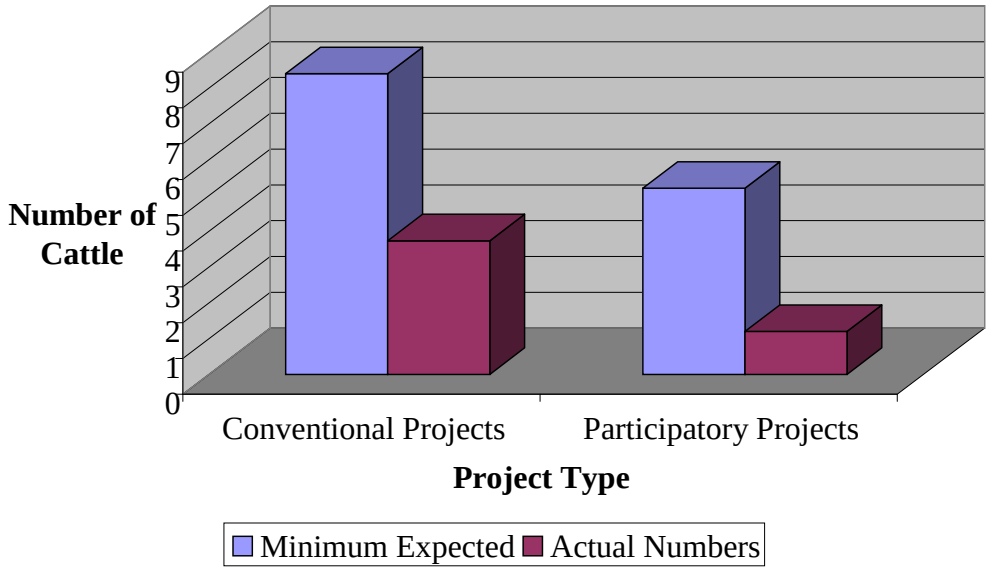

Figure 6.3: Comparison of actual versus minimum expected number of cattle in livestock projects

The summary production in livestock projects is shown in Table 6.6. The average calving percentage over the production period has been 20% for the participatory and 47.4% for the conventional livestock projects. This is too low a calving percentage and will in turn affect the process of passing on the gift to the next beneficiary. This relates well to the reflections on Figure 6.3 above. In spite of the low calving percentages in all projects, there virtually had been no sales to date in all projects (conventionally and participatory projects). The projects sales are hampered by the terms of running the projects. Each beneficiary benefits or receives a calf or heifer each time the dam calves down and until all beneficiaries benefit a crop, no beast can be sold. Since there are 5 group members in each project on average, it means that the calf is got after a long wait which in turn is affected negatively by the low calving rate.

Table 6.6: Livestock production summary

Project Category Year EST		Total No (At project onset)	No of farmers	No died	Calves born	Average Calving %	Calve mortality	Total to-date
PRA	2002	152	228	11	5		0	146
	2002	107	300	36	24		0	95
	2002	120	36	4	61		3	174
	2002	105	525	10	22	**20**	2	115
	2002	75	225	1	0		0	74
	Total	**559**	**1 314**	**62**	**112**		**5**	**604**
Conv	2002	28	14	0	0		0	28
	1999	112	56	8	40		0	144
	1999	22	11	2	45		3	64
	2001	82	41	3	30	**47.4**	5	104
	2000	20	10	6	2		0	16
	2001	8	4	2	12		4	14
	Total	**272**	**136**	**21**	**129**		**12**	**370**

Source: AREX, 2006 *EST = Established

6.6.3 Technical support

Both types of projects (conventional and participatory) had access to extension services and support from AREX, Veterinary Services and the Livestock Development and Production department like all other ordinary people in the community. The conventionally implemented livestock projects received support from the project management coordinators set in place by donor organizations during project implementation, who continued to revisit the beneficiaries for progress monitoring and rectification of any anomalies which is not so with the participatory projects.

6.6.4 Underlying factors to livestock project performance

6.6.4.1 Planning

Livestock projects implemented through farmer participation were not doing well with a bulk of the heifers having died within the first year of ownership. The conventionally implemented had management set in place for proper or smooth running i.e. the establishment of Project Coordinators. This form of planning can be attributed to their success. With the participatory livestock projects, each group of beneficiaries had to see how to put matters in place and there is no clear cut top management to coordinate the smooth running of the projects.

6.6.4.2 Type of management

After passing on the heifers to the participatory beneficiaries, no arrangements were made in most cases on which the Department will have an upper hand in the running of the projects. AREX, VET and Livestock Development and Production department have overlapping if not duplicate roles towards livestock production but none has seriously committed themselves to the farmers' rescue which is contrary to Townsley's (1996) argument that participatory approach forms better linkages between communities and development institutions.

Under the participatory livestock projects, the arrangement was that 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 her 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 of he heifer. The beneficiaries of the projects whose beasts were 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. Monitoring

system was sound with conventional livestock projects as the project implementers (initiators) or donors are actively involved in the monitoring process and the pass on the gift process through identified coordinators. They ensure that the by-laws are still binding and adhered to.

6.6.4.3 Input levels

Unlike the participatory livestock projects which only gave one beast to project beneficiaries, the conventional gave 2 beasts for each beneficiary at a time. The conventional beneficiaries were on a better footing than their counterparts as the chances of having the survival of the heifers are higher than when it is one. However, the participatory project had a full veterinary kit with drugs bought for them to combat disease outbreak but still their beasts died when everything was in place. Farmers contributed money towards the purchase of the drugs. In spite of very few of the drugs being used for combating diseases, the high mortality of the beasts can still be attributed to the type of breed of the cattle. The heifers were from an intensive type of production system and might have failed to abruptly adapt to the sudden change of environment into the extensive, arid area with poor grazing.

Both the participatory and conventional livestock projects had some form of insurance to cater for untimely death of a beast. 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 such that the death of cattle attracted an immediate replacement. The insurance fund set for the participatory livestock projects was never put into use.

6.6.4.4 Farmer training

Farmers in participatory projects did not receive any training on livestock production. Coupled with the problem of breed unsuitability and lack of training, most of the beasts died within a year of ownership despite the availability of drugs. Farmers failed even to secure replacement stock though funds were set aside for their benefit. The fund was set aside from contributions made by farmers and was managed by a set committee.

Farmers from the conventional cattle projects received training on animal health management and other related subjects during workshops organized by the donors in collaboration with the Departments of VET and AREX. Beneficiaries attended the workshops which involved lessons and practical demonstrations, e.g. lessons on disease diagnosis and carrying out a post mortem. The workshops were run for a number of days at ward level and sometimes farmers from adjacent wards with similar projects would join and camp within the host ward.

6.6.5 The adoption of technically recommended livestock production practices

Most of the practices recommended by the AEWs are put into practice by farmers e.g. 100% (N=30) of the farmers in conventional projects practice vaccination and over 50% (N=30) from the same category practice dosing, dehorning, and weaning. However, over 50% (N=30) of the participatory farmers did not practice weaning, dehorning and castration (Figure 6.4). It is however important to note that these practices are associated with calving and thus their practice could have been affected by the low calving rate in the participatory beef cattle projects.

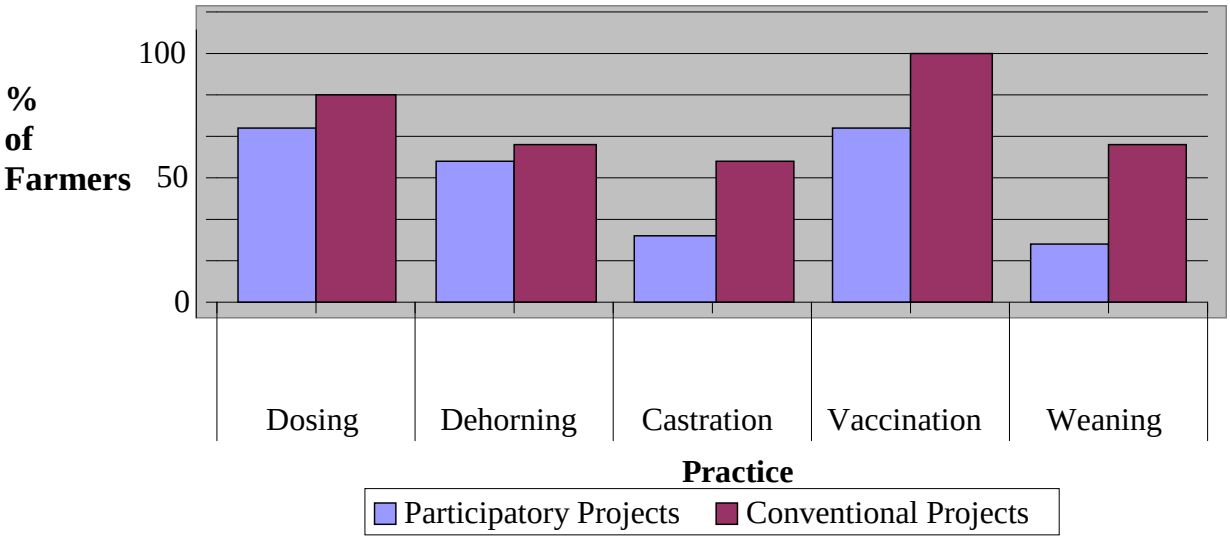

Figure 6.4: Percentage of farmers practicing recommended technical innovations

6.6.6 Problems faced by livestock farmers

Farmers from both the participatory and conventional projects had a problem with regard to the procurement of drugs or vaccines for their cattle. The beneficiaries of participatory projects had problems with their by-laws which were no longer binding. The farmers had limited access to soft loans for restocking or replacement of dead beasts. Degradation of grazing lands and stock theft were problems threatening the performance of all livestock projects.

6.7 Changes in the pattern of living standards

The percent changes in ownership of both the sanitary and adequate housing are reflected in Table 6.7 below. Housing was assessed according to the AREX standards for adequate accommodation used in MFT. A higher percentage change was realized more in the irrigation projects than the livestock projects. A greater percentage

change in living standards was found in the conventional irrigation projects. The small changes in cattle projects can be attributed to access to other sources of income which are independent from the project earnings (which in turn are minimal), as there are no sales yet in these projects.

Table 6.7: Change in pattern of living standards

Project type	Before Project (%Respondents)		After Project (%Respondents)		% Change	
	Sanitary Latrine	**Housing**	**Sanitary Latrine**	**Housing**	**Sanitary Latrine**	**Housing**
Conv Livestock	53.3	36.7	54.7	40.0	1.4	3.3
PRA Livestock	49.9	46.7	49.9	50.0	0	3.3
Conv Irrigation	53.3	36.7	66.7	46.7	13.4	10.0
PRA Irrigation	24.6	26.7	25.3	33.3	0.7	6.6
Average	**45.3**	**36.7**	**49.2**	**42.5**	**3.9**	**5.8**

Note: Number of observations for each project type= 30
Total number of observation = 120

6.8 Empirical results

The statistical regression analysis

The Chi-Square and Coefficient estimates of Predictor Variables to Response Variables are summarized in Table 6.8. Livestock project success or development, adoption of recommended production practices in livestock projects, record keeping and fencing (as a form of investment) had a significant association with the conventional approach to project implementation. 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. The study unveiled that formally employed farmers had greater chances of purchasing fencing as they have better and stable sources of income than their counterparts.

Table 6.8: Chi-Square and coefficient estimates of predictor variables to response variables

Response Variable	Predictor Variable	Coefficient Estimate	Probability
Fencing	Approach- Conventional Field size Formal income	5.194 1.925 0.264	0.0024 0.0062 0.0206
Sprayer ownership	Project type- Irrigation Family size Formal income	3.907 1.215 0.362	0.0055 0.0242 0.0332
Cart ownership	Age household head Marital status of household head Project type- Irrigation	1.132 7.619 3.950	<.0001 <.0001 0.0078
House ownership	Age of household head Formal income	1.134 0.114	<.0001 0.0003
Certified seed use	Access to extension	5.333	0.0182
Record keeping	Approach -Conventional Field size Marital status- M	0.002 0.144 6.7920	<.0001 0.0001 0.009
Use of pesticides	Access to extension	3.9718	0.0463
Irrigation project income	District Approach-Conv Plot size Age Education	-69676 59628 201382 59628 25649	<.0001 <.0001 0.0029 0.0699 0.0002
Adoption of recommended production practices in livestock projects	Access to credit Other cattle besides project Weaning Castration Approach Conventional District	0.7691 0 0.8473 0.6190 -1.6093 -0.5465	0.0056 1.0000 0.0026 0.0222 <.0001 0.0413
Livestock Project success/ development	District Approach Conventional Ownership of other cattle Access Extension	3.3937 30.0000 6.0000 0.8571	0.0654 <.0001 0.0143 0.6514

The procurement of different assets used for the study was associated with other factors besides the approach to implementation of both types of projects with the exception of fencing. The procurement of a knapsack sprayer had a significant 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 explains the fact that the farmers who have ample non-project incomes are likely to purchase equipments for use in the project than those without other sources of income. It is however important to note that some farmers use knapsack sprayers to chemically (spraying) control ticks on livestock due to the erratic dipping regimes, resulting from unavailability of dipping chemicals.

The significant 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. Irrigation products are bulky and thus will need a mode of transport that is affordable and convenient for the producers. The older the farmer becomes the more the likelihood of owning a cart. The married farmers were more than likely to own a cart than the single.

Cattle, harrow and plough ownership was associated with 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 timeously done when one has the necessary implements to use within his or her reach early enough into the season. Harrow ownership was also prevalent or common among the old farmers with large size of fields. However, these were bought long back before the projects were operational.

House ownership increased with the increase in the farmers' age. This can also be attached to the opportunities available to the farmer to make investment throughout his farming life. Formal employment also is greatly associated with house ownership. 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 were ten times less likely to own a house compared to their counterparts.

6.8.1 The determinants of the success of the livestock development projects

The significance of all the determinant factors was calculated at the 5% probability level. Thus all significant variables are indicated in asterisk (*). The results of the test of significance of the determinants of the success of the livestock projects examined in this study are shown in Table 6.9. Credit, calf weaning, castration, conventional approach, access to extension services and district, were found to be significant at the 5% probability level. It is likely that the use of credit boosts the funding of drug procurement and weaning also facilitates length of the time between two calving periods. The reason for the better performance of livestock in Beitbridge in Mberengwa district can be attributed to the grazing (veld) pasture which is predominantly sweet veld and is highly nutritious for the grazers.

Project under conventional approach were better performing than their counterparts. As specified earlier on in section 6.6.4.4, these beneficiaries received training which in turn might explain the association of cattle project success with access of farmers to extension services. The association of project success and weaning could be a result of the shortening of the calving interval brought up by the weaning process. Success was also associated with ownership of the projects. Those who managed their own projects had better performing projects than those who engaged on such activities on behalf of others or their relatives.

Table 6.9: Parameter estimates of the logistic regression for the livestock project performance

Variable	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
INTERCEPT	-3.0209	0.0501	21.43	<.0001
CREDIT	0.7691	0.2775	7.6805	0.0056*
CATTLE	0	0.2582	0.0000	1.0000
WEAN	0.8473	0.2817	9.0457	0.0026 ****
VACCINE	-0.0667	0.2583	0.0666	0.7964
CASTRATE	0.6190	0.2707	5.2300	0.0222 *
APPROACH CONV	-1.6093	0.3464	21.5838	<.0001 *
DISTRICT BB	-0.5465	0.2679	4.1617	0.0413 *
POPERAT	1.2424	0.3545	12.2812	0.0005*
FKNOW	0.947	0.361	6.870	0.009*
DOSE	0.8370	0.3545	5.5734	0.0182*
DEHORN	0.0099	0.3642	0.000	0.978

6.8.2 The determinants of the irrigation project income at plot level

Sex of household head, district, approach (conventional), family size, arable field size, plot size, and wheat enterprise are highly significant (95% confidence level) determinants of higher income from the irrigation projects (Table 6.10). Higher irrigation income was associated with conventional approach which coincidentally relates to the large plot sizes in these projects. Male headed families had higher incomes from the irrigation schemes. The greater the number of family members in a household, the better the harvests and this could be attributed to the resultant labour force that the family provides. Most smallholder farmers do not attach cost to labour provided by family members.

Larger arable land sizes give the households an opportunity to sell the produce from the irrigation schemes as they might be obtaining higher yields from the fields and thus accounting for the significance of field sizes. Also, the larger the plot sizes the higher the harvests and thus the higher the amount of cash that can be fetched from the proceeds. More irrigation project incomes are associated with Mberengwa

district than Beitbridge. This scenario might be attributed to the fact that Mberengwa has a greater portion of Natural Region IV which might favour better crop production than Beitbridge which is predominantly Natural Region V, which is suitable for extensive livestock production and game reserves (Table 2.1). This suggests that the proceeds from the irrigation schemes in Beitbridge might be used to supplement the harvest from the dry-land productions. Wheat as an enterprise fetches the highest prices. Also this study discovered that it is one of the crops that the government highly promotes through provision of loans through the Grain Marketing Board (GMB), which in turn, contract the farmers to sell the produce to the board. This is supported by the amount of credit sought from the GMB by most of the irrigation farmers (Table 6.5).

Table 6.10: Determinants of irrigation project income at plot level

Variable	Parameter Estimate	Standard Error	F Value	Pr > F
INTERCEPT	-13009	10501	81.34	<.0001
DISTRICT	-69676	10072	47.85	<.0001*
APPROACH (Conv)	59628	10567	31.84	<.0001*
PSIZE	201382	64717	9.68	0.0029*
ENTERPRISE (Wheat)	14648	1614.556	82.31	<.0001*
EDU	-13007	1946.121	44.67	<.0001*
CERTSEED	36.572	10.061	13.21	0.0006*
PESTUSE	-11.382	6.530	3.04	0.0869
FKNOW	-10.91158	6.35243	2.95	0.0915
CREDIT	28.57648	8.50109	11.30	0.0014*
FERTUSE	130.89583	22.36488	34.25	<.0001*
AGE	-586.98624	317.87978	-1.85	0.0699
FSIZE	25649	6449.90526	3.98	0.0002*
POPERAT	-69627	1611.656	84.34	<.0001*

6.8.3 Parameter estimates of the logistic regression for household income

It is important to note the anomaly in education being negatively related to household income (Table 6:11). Under normal circumstances one would expect education to positively influence household income. This might reflect a true situation on the ground in Zimbabwe as informal trading has taken the country by storm and regularization of prices is difficult if not impossible. There is a positive relationship between household income and non-project income.

Table 6.11: Parameter estimates of the logistic regression for household income

Variable	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
INTERCEPT	-1.54	0.793	3.644	0.010
AGE	0.058	0.052	1.22	0.269
EDU	-1.990	0.793	6.303	0.012*
PSIZE	0.932	0.337	7.65	0.060
FSIZE	0.647	0.202	10.242	0.001*
AGRFA	-0.544	0.339	2.56	0.109
FKNOW	0.471	0.400	1.381	0.239
NONPROJ	0.451	0.133	11.523	0.001*

6.8.4 Logistic regression results of asset procurement

Asset procurement was significantly associated with level of education, age of the farmer, farming experience and access to non-project income (Table 6.12). Access to non-project sources of income helps the farmer stand a better chance to invest in assets.

Table 6.12: Logistic regression results for the procurement of assets

Variable	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
INTERCEPT	-1.943	1.264	2.360	0.124
EDU	0.034	0.014	6.06	0.014*
AGE	-0.463	0.252	3.373	0.056
FSIZE	0.619	0.334	3.427	0.064
PSIZE	0.289	0.487	0.35	0.553
APPROACH	0.260	0.215	1.466	0.226
EXPER	0.084	0.041	4.144	0.042*
NONPROJ	0.873	0.368	5.560	0.017*

6.8.5 Logistic regression results for the adoption of recommended practices in livestock projects

Most of the determinants of the adoption of the recommended technical practices in livestock production were significant at the 5% significance level (Table 6.13). It is important however, to note that dosing, vaccination and weaning were significantly associated with the approach to agricultural project implementation. As mentioned earlier on in section 6.6.4.4, the training of conventional cattle farmers involved in-depth lessons on cattle management practices of which the practices under investigation were covered.

Dosing was significantly associated with the farmers' experience, access to farming knowledge from extension agents as well as his or her level of education. Dehorning was positively associated with sex of farmer and the farmers' access to extension messages form AEWs. Level of education and experience in cattle keeping influenced the adoption of vaccination as a livestock management practice. Early calf weaning was also significantly associated with the farmers' age, experience in cattle keeping as well as access to farming extension messages. Sex was the only determinant factor positively influencing the adoption of castration by farmers.

Table 6.13: Adoption of technical practices in livestock projects

VARIABLE	DOSE	DEHORN	VACCINE	WEAN	CASTR
INTERCEPT	(1.2424) 0.0005	(5.3192) <.0001	(1.487) 0.879	(-3.64) -12.70	(-3.889) 0.0001
AGE	(0.33040 0.471	(2.040) 1.260	(0.34) 2.78	(1.018) 0.020*	(2.748) 1.184
EDU	(5.3192) <.0001*	(0.2433) 0.834	(-3.235) 0.001*	(1.030) 0.22	(1.32) 3.62
SEX	(-0.25) -0.07	(- 1.9569) 0,0001*	(1.95) 0.89	(0.504) 0.493	(2.069) 0.008*
APPROACH	(1.0889) 0.015*	(0.055) 0.958	(1.461) 0.04*	(0.3400) <.0001*	(-0.050) 0.0253
EXPER	(-3.0379) <.0001*	(0.088) 0.286	(0.3890) <.0001*	(-2.71) 0.01*	(1.361) 1.121
FKNOW	(-1.9361) 0.0001*	(0.013) 0.006*	(28.813) 0.582	(0.577) <.0001*	(18.792) 0.488

6.8.6 Logistic regression results for the adoption of recommended practices in irrigation projects

The results of the test of significance of the determinants of the adoption of recommended practices in irrigation projects are shown in Table 6.12. Record keeping was highly associated with conventional approach and farmers with larger arable lands. This might explain the need for records for the proper allocation of resources linked to the diversity of the production activities faced by the farmers with large fields. Access to farming knowledge from AEWs and the age of the farmer positively influenced the keeping of farm records. Certified seed use was associated with the farmers' accessibility to farming knowledge from the AEWs.

Fertiliser use was associated with accessibility to farming knowledge from AEWs as well as the level of education of the farmer. The more educated the farmer was, the more the likelihood of him or her using fertilizer as an input in crop production.

Table 6.14: Logistic regression results for the adoption of recommended practices in irrigation projects

Variable	Certified Seed use	Fertilizer use	Pesticide use	Record keeping
INTERCEPT	(0.3545) 0.0005	(2.5734) 0.6711	(1.3192) 0.72	(1.3222) <.0001
FKNOW	(0.3545) 0.0182*	(3.0056) 0.0830**	(3.9718) 0.0463*	(3.9718) 0.0463*
EXP	(0.453) 0.12	(0.5633) 0.59	(2.134) 0.160	(3.6141) 0.136
PSIZE	(0.8370) 0.063	(1.746) 0.36	(2.354) 0.36	(0.5034) 0.0001*
SEX	(0.3535) 0.5521	(0.3535) 0.5521	(0.0008) 0.9778	(1.3024) 0.2538
AGE	(0.3340) 0.5633	(0.3340) 0.5633	(0.0235) 0.8782	(6.7920) 0.0092*
EDU	(2.6748) 0.523	(2.6748) 0.1019**	(0.5822) 0.4455	(0.7272) 0.3938
APPROACH CONV	(0.1113) 0.7386	(0.1113) 0.7386	(0.6345) 0.4257	(0.7375) <.0001*

*, ** significance at 5% and 10% level respectively

From the findings outlined in this chapter, participatory projects can have a positive impact on the development of the status of the farmers, food security, income earnings and also benefit other community members who only benefit indirectly from the proceeds of the projects. Should the identified anomalies be addressed, the projects can go a long way in impacting a change in people's livelihoods. The number of livestock project beneficiaries per group should also be reduced where possible so as to ensure early attainments of the benefits brought forthwith.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter highlights the conclusions of this study, based on the findings of the study and puts forward some recommendations which are believed to be of benefit to development and governmental organizations who intend to embark on participatory irrigation and livestock projects implementation. Recommendations can be used as a referral point to improve the ways of implementing projects with particular emphasis on farmer participation.

7.2 Conclusions

Conventional approach has proved to give better livestock project performance as compared to the participatory approach, and none of the project groups had a total failure. Despite the fact that the projects yielded less than the expected number of cattle over time, management and leadership ensured a sustainable outcome from the projects.

From the poor performance of the participatory livestock projects, it can also be concluded that a multiple of factors usually work together against adoption of recommended technical practices e.g. unavailability of needed resources cannot be singled out to be the cause of non-adoption of the practices. Despite the availability of drugs for animal health, the stock died. Thus, while access to and availability of resources and/or inputs is essential for the adoption of good production practices, there is need to look beyond such provisions. Based on the findings of this study, there is need to consider the breed of cattle allocated to the participatory livestock project beneficiaries, to affirm if it really suits the conditions of the new area.

Although the drugs were brought to the reach of the participatory livestock project beneficiaries, little was put into use and many project heifers died. This was worsened by the lack of full commitment from the governmental departments responsible for development within these areas as responsibility for technical support on these projects was not clearly delegated after implementation. Thus, the approach to project implementation is not adequate for better project performance without other support services, especially farmer training, even after implementation of the projects. Despite the approach used for project implementation, there is need to provide technical back-up for the farmers. Though the approach focuses on empowering the local people, project implementation needs to go deeper than the supply of the heifers, and consider the technical aspects among other factors.

Planning of large activities such as irrigation and livestock development projects requires a high degree of commitment on the part of women and men from the villages, for the sustainability of benefits beyond the life of the project. Continued management of local resources and access to external capital and state development programs through village-based groups (e.g. irrigation groups, credit management groups), (Biggs, 1989; Farrington, Bebbington, Wellard and Lewis, 1993), and continued external back-up and assistance are necessary. The adoption of technical practices recommended for high production levels proved that the accessibility of the farmers to the extension workers, despite the approach used for project implementation, is of paramount importance. Farmers need technical back-up and continued support with their project production activities regardless of the approach used for project implementation. This is a means for early rectification of problems that may affect the smooth running of the projects as well as an opportunity to introduce new technical advice to boost production. Extension provides production options that will largely enable farmers to use their land, labour and capital in a better way.

The lack of association between asset procurement and livestock projects might be a result of the low turnover of the livestock projects. It takes long to realize the output

(calves) and worse still the projects have been performing badly. Also since they are a pass-on the gift type of project, it takes time to obtain returns from the investment. However, the projects should still be encouraged as they will take full operation at a later stage and be of benefit to the rural disadvantaged who cannot access other means to own cattle, which in turn plays a pivotal role in crop production (through draft power, manure provision) and cash earnings that indirectly ensures food security. Regardless of approach used, livestock projects should be strongly supported because the districts under study are prone to poor crop production and hence the cattle can be a source of income and food.

The involvement of farmers who already owned cattle prior to benefiting from the pass-on the gift scheme is an indication that the more participatory development issues are, the more subject to abuse they become. Since agricultural projects are often proposed as a means of making better use of "common" land or water, it is difficult to avoid 'capture' and monopoly of the benefits by those with authority, the educated and the wealthier (Townsley, 1996). However, it should be part of the external development agents to ensure equity and fairness in benefits.

The associations of knapsack sprayer and cart (as forms of assets) ownership with irrigation projects are an indication that the demands of the production affect the procurement of certain assets that are uniquely necessary for the performance of the projects. The government, local authorities and NGOs active in the implementation of the projects should ensure the availability of such important assets or instruments (within the reach of the average famers) coupled with affordable purchase terms to boost production levels.

Farmer participation can greatly improve the efficiency of development work and eliminate many of the problems regarding proprietorship and enhance development activities at community level. Despite the small hectarage in the participatory irrigation projects, the general performance was good. On the contrary, development projects implemented by outsiders without beneficiary involvement are frequently

plagued by problems of mismanagement and theft as was reflected by poor performance and malfunction of the conventional Chingechuru and Chimwe-Chegato irrigation schemes. Fencing theft at Chingechuru irrigation scheme had brought it to a stand still. 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 through farmer participation will usually be managed by the community and the benefits will be clear to them.

7.3 Recommendations

7.3.1 Recommendation on record keeping

While record keeping is part of farmer training by the AEWs, it also is of paramount importance to have the development and governmental organizations keeping records on implementation, costs, performance and benefits of the projects. The governmental departments in Beitbridge district involved in the implementation of the participatory livestock projects (AREX and VET) had no records on the statistics and current situation of these projects. This was saddening considering the fact that these departments should be the ones helping farmers. It is very difficult to analyze the impact and relevance of such development interventions without written proof that keeps track of events on the ground and the extent to which they have changed the livelihoods of the beneficiaries.

7.3.2 Project sizes

Participatory interventions to irrigation project implementation should take into account the size of plots for each farmer beneficiary as this also has a bearing on the production levels and the resultant incomes from the enterprises. Despite the commitment that the beneficiaries may show towards a development project, it will make a great difference if the hectarage is increased to match the commitment

whenever other factors are not limiting, especially the availability of irrigation water and land for expansion of hectarage. This should be seriously considered, especially where the beneficiaries would largely depend on irrigation outputs for their food and income.

It is important also to consider the number of beneficiaries per group in livestock projects. Reduction of the group size enhances early benefit of all group members within the (pass on the gift) project. Alternatively, the number of heifers per beneficiary group can also be raised.

7.3.3 Farmer training

Despite the privilege granted farmers on choice of projects to be implemented, there is need for farmer training on production aspects e.g. participatory livestock farmers failed even to secure replacement stock though funds were set aside for their benefit. With the fund set aside from contributions made by farmers and drugs bought for project beneficiaries to combat disease outbreak, still their heifers died.

7.3.4 Recommendation on improvement in choice of project beneficiaries

The group targeted by the development projects should be clearly delineated specifying the indicators and definitions of such a class of people within the community. As the project identification is done with the people, it is also imperative to carry out the choice of beneficiaries with the community when all the qualifications of benefitting people are spelt out clearly. Stakeholders such as governmental departments responsible for development activities within the communities (such as AREX, Veterinary Services, etc) can be used to advantage in the selection of beneficiaries as they have representative staff who are in constant contact with the local community and are well-versed with the people within their areas of operation.

7.3.5 Recommendation on development organization (Donor) support

The donor organizations should not withdraw from the farmer clientele too early after project implementation. Time should be spent in understanding issues that affect participation of the poor farmers in specific development projects in a community, analyzing how the project has taken off, how it fares, challenges, and opportunities that can be mobilized for the benefit of the rural poor.

7.3.6 Improved networking between NGOs, government departments and project leadership

All stakeholders involved in conducting PRAs leading to project implementation should delegate the responsibilities to government departments to help farmer beneficiaries towards the sustainability of the projects, especially the livestock. After passing on the heifers to the participatory beneficiaries, arrangements should be made in most cases on which department will have the upper hand in the running of the projects. Though AREX, VET and Livestock Development and Production departments have overlapping if not duplicate roles towards livestock production, arrangements should be made as to which ones would seriously commit themselves to the farmers' rescue.

The intervention of private sector in development projects implementation does not necessarily reduce the role of the public sector, but facilitates and allows better priority setting and ease achievement of goals set for community development. The donors (in this case, SDARMP) provide financial support (for procurement of heifers) and thus the local government and other government structures should take over on management as they will still remain within the community promoting development after the withdrawal of the financiers. Development projects are meant to benefit the community which is served by the extension agents and should not be associated with the donor agency as the proceeds will not benefit the sponsors but the rural poor.

The project group leadership should be set so as to have a clear cut link with top management to coordinate the smooth running of the projects. The small group leadership set by the external agencies should complement the already existing institutional organizations so as to create an environment of participation thereby eliminating hindrances to development. Occasional and regular meetings with the project beneficiaries should be promoted so as to curb problems at their budding stage. This improves communication which the participatory approach is trying to improve, through promotion of farmer involvement.

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APPENDIX 1: QUESTIONNAIRE

UNIVERSITY OF FORT HARE

FACULTY OF AGRICULTURE

DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION

QUESTIONNAIRE FOR THE INVESTIGATION ON THE IMPACT OF PARTICIPATORY RURAL APPRAISAL (PRA) AS AN APPROACH TO AGRICULTURAL EXTENSION: A COMPARATIVE STUDY

TASK	NAME	DATE
a) Interviewer		
b) Province		
c) District		
d) Village		
e) Project name		
f) Status of farmer [Master Farmer (MF),Trainee (T) or Non Master Farmer (NMF)]		
g) Questionnaire Reference number		
h) Time taken for the interview		

This Questionnaire is meant for data collection to be used in an academic research and all information provided herein will be treated with strict confidentiality.

SECTION ONE: DEMOGRAPHIC INFORMATION

Age ---------- Years

Sex (Tick) Female/ Male

Marital status (Tick) Married□ Single□ Other□

Education (Tick) Can not read and write□ Primary education□
Secondary school□ College level□

Employment (Tick)….. Employed□ Unemployed□ Retired□ Self employed□ Other□

If other, state your occupation …… ……
…….

Indicate the number of dependents you have in the following categories (Tick)

0□ 1□ 2□ 3□ 4□ 5□ 6□ 7□ □8 9□ 10□

SELECTION TWO: Farming Experience and Awareness of extension services

1. Indicate the sizes of the fields you have in table below

Field number	Area in Hectares (ha)	Year started operating land
Field number 1	---------- ha	
2	---------- ha	
3	---------- ha	
Private garden	(Yes/No)	
Nutritional garden (plot)	---------- ha	
Irrigation plot	---------- ha	

3. Indicate the crops grown last season: ----------
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4. Indicate the problems you normally experience with the crops given above---------

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5. How did you obtain access to the field/plots? (Encircle in appropriate box below)

	Field 1	Field 2	Field 3	Private garden	Nutritional garden	Irrigation Plot
Bought from other person	1	2	3	4	5	6
Rented from other household	1	2	3	4	5	6
Inherited from parents	1	2	3	4	5	6
Given by village headman	1	2	3	4	5	6
Randomly given during plot allocation	1	2	3	4	5	6

6. How do you obtain the knowledge of farming? (Tick)

AEW□ Other farmers□ none of the above□

7. What would you consider to be the benefits from extension department? (Tick)

New farming knowledge□ Access to Donors□ No idea□

8. Who does most of the decision making for the farming activities? (Tick)

Self□ AEW□ Members of family□ other farmers□

Group leaders□ Local leaders□ Donors□

Other (specify) □----------

9. Who finances the farming activities? (Tick)

Self□ Donors□ Group members□ None□ Other (specify) ----------

SECTION THREE: PERSONAL EXPERIENCE IN PROJECTS

3(a) Project Implementation and Membership

10. Indicate whether you operate the project full-time or part-time (Tick)
Full-time□ Part-time□

11. Was the project your own initiative? Yes□ No□

12. Tick the organization which helped you to establish the project (Tick). Donor□ Government□ AEW□ Family□ Community + outsiders□ Community□

13. If Donor initiated how did you find it? Good□ Bad□ Neither good nor bad□

State the reasons for your opinion……..
..…….....……
……

14. Indicate the organizations that played an important role in the project's activities and show how they have helped? (Tick against the appropriate box)

Organization	**How they have helped (Tick)**			
	Financially	**Farming knowledge**	**Farming equipments**	**Other (specify)**
1				
2				
3				
4				
5				

15. How was the project funded …… (i) Wholly donor funded □

(ii) Partly donor funded □ (iii) Community sponsored □

(iv) Self sponsored □ (v) Government funded □

16. Who plans the programs of the project? AEW□

AEW + Farmers□ Farmers□ None□

17. Are there any By-laws for the project? ……Yes□ No□

18. Who drafted the by-laws? (i) Farmers□ (ii) AEW□ iii) AEW + Farmers□

(iv)Donors + Farmers + AEW□ (v) Donors + Farmers□

19. Are the by-laws still binding? ..... Yes□ No□

If "No", how are they not binding? ……

……

……

20. Do you keep any records for your project activities? Yes□ No□

What kinds of records are kept? (i)……

(ii) …….

(iii) …….

21. Are there any practices you used to do during the early days of the project that you are no longer doing now? Yes□ No□

If "Yes", which ones and why? ……

……

3(b). Project performance and production

22. What have been the production levels for the past 5 years from the project?

Irrigation Project

Year	Crop type produced	Yield produced (kg)	Retention (kg)	Total sales (kg)	Amount of Sales (Z$)
2001/02					
2002/03					
2003/04					
2004/05					
2005/06					

23. Complete the following table to reflect year production inputs on crops between 2002 and 2006

Kind of Crop Cultivar: Surface-area:	**2002/03** ---------- ----------		**2003/04** ---------- ----------		**2004/05** ---------- ----------		**2005/06** ---------- ----------	
Production inputs	Qnty /ha	Cost /ha	Qnty /ha	Cost	Qnty/ha	Cost /ha	Qnty/ha	Cost /ha
Seed Purchased -Retained	------ ------	--------- -------	--------- -------	--------- -------	---------- ---------	--------- -------	---------- ---------	---------- ----------
Fertilizer -Lime -Compound -AN - Manure Other(specify- ----------	------ ------ ------ ------ ------	--------- --------- --------- --------- ----	--------- --------- --------- --------- ----	--------- --------- --------- --------- ----	---------- ---------- ---------- ---------- ------	--------- --------- --------- --------- ----	---------- ---------- ---------- ---------- ------	---------- ---------- ---------- ---------- ---------
Sprays								

-Pests - Diseases	------ ------	--------- -------	--------- -------	--------- -------	---------- ---------	--------- -------	---------- ---------	---------- ----------
Miscellaneous (Cost)	XXXX		XXXXXX		XXXXXXXX		XXXXXXX	

25. Livestock Project

Year	Total Number of cattle	No of oxen	No of cows	No of bulls	No of calves born	No died	No sold	Amount realized (Z$)
2001/02								
2002/03								
2003/04								
2004/05								
2005/06								

Indicate the livestock management practices that you do

Practice	**Yes/ No**	**Method used**	**Age of animal**
Dosing			
Dehorning			
Castration			
Vaccination			
Weaning			

26(a) Complete the following table to indicate the availability of credit for the project activities.

Source of credit	**Used (Yes/No)**	**Type of credit**	**Interest rate**	**Collateral required (Yes/No)**	**Collateral used**	
					Cattle	**Other**
AGRIBANK						
Shopkeeper						
NGO						
Relatives						

Friend/Neighbor						
Other----------						

(b). Complete the following table to indicate what the above credit was used for

Source of credit	**Used for**
AGRIBANK	
Shopkeeper	
NGO	
Relatives	
Friend/neighbor	
Other----------	

27. Who benefits from the project? (i) Project members□

(ii) Project members + community□ (iii) Community□

(iv) Other ……

How do they benefit? Money□ Produce□ (iii) other……

SECTION FOUR: INCOME AND INVESTMENT

28. Is the project your---- major income source□ Supplementary income source□

Leisure activity□ not interested at all□

29. Indicate the activity through which you earned non-farm income during the past year

Activity	**Cash Income during the past year**
Temporary work(e.g. work in someone's fields)	
Hiring out farming equipment or oxen	
Handcraft	
Pension payment	(Indicate per month)
Salary from formal employment	(Indicate per month)
Brick making	
Building and repairing houses	
Retailing	

Other(Specify) ----------	

30. Investment in capital equipment and other assets.

Asset	**Yes/No**	**Year Owned**	**Number owned**
Plough			
Scotch cart			
House			
Harrow			
TV set			
Knapsack sprayer			
Cattle			
Fences			
Car			
Tractor			

31. Do project members save with any savings club? …Yes□ No□

SECTION FIVE: GENERAL

33. What do you think should be done by local authorities (e.g. District council, local leaders) and the government to help improve the performance of your project? Answer by completing the following table, starting each time with the most important action to you.

Solution by government	**Solution by local authority**
1	1
2	2
3	3
4	4
5	5

APPENDIX 2: THE FOCUS GROUP INTERVIEW

1. Which project are you involved in?
2. To what extent has the project changed your life?
3. Are the project leaders supportive?
4. What are the current problems that you are facing?
5. Are you aware of the presence of extension staff around?
6. To what extent have they influenced the thriving and survival of the project?
7. In your own opinion, are you getting enough technical support?
8. Are you finding satisfaction in the project?
9. Why/ Why not?
10. Do you see any need for government/Donor/Development authorities to consult beneficiaries for choice of projects and where they should bee implemented?
11. Are you happy with the way the project was implemented?
12. Why/ why not?
13. In your own opinion, what is the role of farmer participation in decision-making?
14. Do you feel any great need to promote such projects in the community?
15. Why/Why not?
16. How in your own opinion, can this be made effective?