FARMERS PERSPECTIVES TOWARDS THE REHABILITATION AND SUBSEQUENT INTERVENTIONS BY THE LDA IN THE IRRIGATION SCHEMES IN SEKHUKHUNE DISTRICT

BY

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DECLARATION

I declare that the mini dissertation hereby submitted to the University of Limpopo, for the degree of Master of Agricultural Extension has not previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.

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DEDICATION

This mini-dissertation is dedicated to my late Mother, Mmapeu Elizabeth Nowata who loved farming with all her heart as well as my Father who celebrated his 80th birthday in 2012.

ABSTRACT

Small-scale irrigation farming has been found to have potential to improve agricultural production of the small-scale farmers and thereby improving their livelihoods. The Government of South Africa through the RESIS programme embarked on a project to increase agricultural production through investment in new or existing small scale irrigation schemes. Contrary to expectations, most of the government supported irrigation schemes have failed to meet the expectations of both government and farmers. The objectives of this study was to determine the perceived reasons for the failure of the irrigation schemes and determine the association between socio-economic characteristic of farmers and the perceived reasons for these schemes. Farmers who participated in the scheme or had participated (in the case of failed/dysfunctional schemes) in the RESIS irrigation schemes were randomly sampled and interviewed. Multinomial regression analysis was used to determine the association between farmers' socio-economic profiles and their perceptions on the reasons for the failure of the schemes. According to farmers' ranking, economic, competition and socio-cultural factors were perceived as having a large influence on the success of the schemes. Climate/ecological and technological factors were cited as having lesser influence on the success of the schemes. Socio-economic characteristics (literacy level, age, education level) of farmers and number of beneficiaries in a scheme had influence on how farmers perceive the influence of economic, competition, socio-cultural, technological, climate and administrative/management factors.. The strategic partnership model was generally found to encourage dependency and thus discouraging the sense of ownership. The findings revealed the importance of considering the socio-economic circumstances of farmers in future planning of the irrigation schemes to enhance the success of these schemes. The findings may also have implications for other government supported projects that involve communities with diverse needs and socio-economic profiles.

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LIST OF ABBREVIATIONS

LEGDP : Limpopo Employment Growth and Development Plan
PGDS : Provincial Growth and Development Strategy
LDA : Limpopo Department of Agriculture
RESIS : Revitalization of Smallholder Irrigation Schemes
ARD : Agricultural Research for Development
SP : Strategic Partner
FAO : Food and Agriculture Organization of the United Nations
PTO : Permission To Occupy
ISRD : Integrated Sustainable Rural Development Strategy
SMME : Small Medium and Micro Enterprise
IDP : Integrated Development Plan
WUA : Water User Association
AMS : Agricultural Management Services
NTK : Noord Transvaal Korporasie
AWC : Arthur William Creighton
ARDC : Agricultural Rural Development Corporation
BIC : Bantu Investment Corporation
NSK : Noordelike Sentrale Katoen
IDEAA : Initiative for Development and Equity in African Agriculture
IDT : Independent Development Trust
ICRA : International Centre for Development-orientated Research in Agriculture
DWA : Department of Water Affairs
DRDLR : Department of Rural Development and Land Reform
SK : Strykraal
TL : Tswelopele
PT : Phetwane
EK : Elandskraal
MT : Mogalatsane
KK : Krokodile
SB : Setlaboswane

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CHAPTER 1
INTRODUCTION

1.0 INTRODUCTION

1.1 Background

South Africa has approximately 1.3 million hectares of irrigated land for both commercial and subsistence farming (Bembridge,2000; Perret, 2006). The Limpopo Province has 126 small-scale irrigation schemes (covering approximately 19 000ha) with 12 000 farmers participating (Shaker, 2000)

The Limpopo Employment Growth and Development Plan (LEGDP), which culminates from the revision of the Provincial Growth and Development Strategy (PGDS), is a policy framework that contains the strategic vision of the province. It is aimed at growing the economy and curbing the absence of sustained economic growth and job creation, which are essential to reduce poverty and improve living conditions. It also addresses the problem areas of growth, creation of descent jobs and poverty reduction within a broad economic framework.

The LEGDP is a five year plan (2009-2014) which should evolve into a long term strategy of the province, the Limpopo vision 2030. The plan is underpinned by the 14 pillars which are the key action programmes designed to achieve structural change in critical areas of the provincial economy and contribute towards achievement of the LEGDP objectives. The High Impact Growth Catalytic projects have also been identified to operationalize the key action programmes. The LEGDP requires all sector departments, municipalities, private sector and civil society to contribute towards achievement of its stated objectives.

In contributing to the LEGDP objectives, the Limpopo Department of Agriculture (LDA) has the responsibility to coordinate the agricultural and rural development pillar which focuses on ensuring that the contribution of agricultural sector to the provincial economy is improved. One of the mandates of LDA is to develop the emerging farmers to become successful commercial farmers.

To this effect, the LDA identified potential farming areas to be developed into commercial irrigation schemes through the Revitalisation of Small Holder Irrigation Schemes programme (RESIS).

The RESIS programme is one of the departmental programmes aimed at improving commercial irrigation schemes.

A number of irrigation schemes have benefitted from the programme through installation of modern irrigation infrastructure. In Sekhukhune District, seven (7) irrigation schemes were identified for revitalization and floppy irrigation systems were installed. The strategic partnership (SP) model was introduced to capacitate, train and mentor farmers towards commercialization of the schemes. The strategic partnership model had a clause indicating that irrigation scheme farmers and a commercial farmer should make an agreement on the following (Mothapo et al., 2012):

- skills transfer/ empowerment,
- mentorship,
- full participation from both parties, and
- how both parties will benefit.

The strategic partnership model further indicates that the incentives for the appointed strategic partner would be the profits sharing while for the emerging farmers it was a combination of factors. These factors included the strategic partner financing the inputs and machinery, providing farming skills, management and expertise, transfer of skills and mentoring, providing access to markets and bearing all the risks.

1.2 Research Problem statement

The Limpopo Department of Agriculture took a decision in 2002 to revitalize about 126 irrigation schemes (approximately 19 000 ha) in Limpopo Province. This formed part of the Department's strategy to invigorate agricultural production through investment in new or existing schemes capable of sustainable and economic production. Smallholder farming areas were supported and envisaged to be developed into commercial irrigation schemes through the RESIS Programme.

Plots of individual farmers were consolidated into larger and more economic units and irrigation systems were installed by LDA. In the Sekhukhune District, seven (7) irrigation schemes were earmarked for revitalization as indicated earlier. The strategic partnership model was implemented in all revitalized irrigation schemes in Sekhukhune district. The model was chosen because of several challenges. These included the fact that farmers were not skilled to operate the system, they did not have farming implements, and they also did not have capital to meet the production costs. Hence the government needed a model that would require lower levels of support from them.

Out of seven revitalized irrigation schemes where SP model was implemented, only one scheme is functional, that is Strydkraal irrigation scheme. This large scale failure necessitates the review of the model and the whole program. This study, therefore, attempts to find out the opinion of farmers as to why most of the revitalized irrigation schemes have failed. To date there have been no studies conducted in the province to investigate this problem and also document the best practices from the irrigation scheme which has succeeded.

1.3 Motivation of the Study

Small-scale irrigation farming is considered as having potential to improve agricultural production of the small-scale farmers and thereby improving their livelihoods. Contrary to expectations, most of the government supported irrigation schemes have failed to meet the expectations of both government and farmers. The study seeks to investigate farmers' opinions on the government's revitalization of the irrigation schemes and further assess the effectiveness of the government's subsequent interventions. It is expected that the findings of the study will shed light on the most appropriate model (s) that government and stakeholders could employ for viable and sustainable irrigation ventures.

1.4 Aim and Objectives

1.4..1 Aim

The aim of the study was to determine the stakeholder opinions (perspectives) towards the rehabilitation and subsequent interventions by the LDA in the Irrigation

Schemes in Sekhukhune District, with the view to influencing future interventions at provincial level.

1.4.2 Objectives

The objectives of the study were:

i. To determine the perceived reasons for the failure of the irrigation schemes.

ii. To determine the association between socio-economic characteristic of farmers and the perceived reasons for the failure of irrigation schemes..

1.4.3 Hypothesis

Ho: There is no association between socio-economic characteristic of farmers and the perceived reasons for the failure of irrigation schemes.

1.4 Limitations and Delimitations of study

Limitations: There are some potential weaknesses to this research study. Farmers interviewed included those in failed schemes (5) and schemes (2) that were still functional. The sampling though random was skewed more to the farmers from failed schemes. This may have an impact on the study especially as it relates to the honest and accurate responses to questions posed.

Delimitations:

The original intention was to get all stakeholders (farmers, Department of Agriculture officials, local municipality officials, strategic partner etc) in the same meeting to discuss their different perspectives but this was never achieved. Having stakeholders together in the same meeting would enhance the quality of the study's findings.

1.5 Study Outline

Chapter 1 gives the background and study objectives

Chapter 2 presents the literature review relevant to the study

Chapter 3 presents the research design, data collection and analysis

Chapter 4 is a presentation of results of the findings

Chapter 5 gives the discussions of the findings.

Chapter 6 present the conclusion and recommendations.

CHAPTER 2

LITERATURE REVIEW

2.1 Pre-amble

A large number of poor people in South Africa live in rural areas. According to the South African Government statistics(2011), 70% of the poor live in rural areas. Most people in these areas live below the poverty line, a situation that perpetuates underdevelopment in these areas (Sishuta, 2005). Food insecurity and malnutrition have been found to be highest in provinces with large rural populations, such as KwaZulu-Natal, Limpopo, Eastern Cape and the Free State (Oni et al., 2011). The government of South Africa through the Rural Development Strategy seeks to reverse the poverty situation in rural South Africa through the support of rural farmer co-operatives, assistance of emerging farmers to access markets and support for increased commercialisation of small-scale irrigation schemes.

2.2 Irrigation and Rural Livelihoods- a global perspective

Agriculture plays a critical role in the economy of most developing countries. The sector makes significant contribution in providing food for the human population, raw materials for domestic industries and exports that generate foreign exchange (Hasnip et al, 2001). Though immensely important, the performance of the sector in the developing world has been very disappointing as the sector is unable to produce sufficient food which has resulted in food insecurity, malnutrition and famine among many communities. Irrigated agriculture has been identified as a sector that can make an important contribution to food security, improved nutrition and rural prosperity (FAO, 1995, Smith 2004). Brabben et al, (2004) indicate that irrigated agriculture can have a major influence on freeing rural people from the preoccupation of survival to focussing on other development issues. Increased food security and wealth from irrigation enables greater involvement in community-based projects to improve local infrastructure. From a livelihood perspective, smallholder irrigation schemes are assets that can be used to increase and diversify the livelihood activity of plant production.

This usually lead to improved livelihood outcomes, either directly in the form of food or income for plot holders, or indirectly by providing full or partial livelihoods to people who provide goods and services in support of irrigated agriculture on these schemes (Van Averbeke & Mohamed, 2006).

According to Dinku (2004), rainfed agricultural production is not a dependable enterprise and as such smallholder irrigations are very important especially in those areas where insufficient and erratic rainfall is a recurrent phenomenon.
Irrigation has played a key role in feeding expanding populations (Oni et al., 2011). It increases the yields of specific crops, but also prolongs the effective crop-growing period in areas with dry seasons, thus permitting multiple cropping where only a single crop could be grown (FAO, 1997). With the security provided by irrigation, additional inputs such as pest control, fertilizers and improved varieties are needed to intensify production and enhance economically viability. The risk of these expensive inputs being wasted by crop failure resulting from lack of water is significantly reduced by irrigation (Lipton et al. 2003).

Hasnip et al (2001) and Lipton et al (2003) identified the following direct and indirect benefits of irrigated agriculture over rain-fed agricultural production:

a) Improved levels and security of production, employment and incomes for rural farm households and farm labour.
b) Linkages to, and multiplier effects within, the rural economy. Improved farm productivity can lower food prices, yielding pro-poor and pro-growth benefits and improved nutrition.
c) Increased opportunities for diversification of livelihoods in the non-farming sector. Irrigation can stimulate diversification, improve livelihoods and reduce vulnerability to external shocks.

The best known case of irrigation contributing to poverty reduction is the green revolution implemented in India, Pakistan and other parts of Asia in the 1960s and 1970 (Mellor, 2001). Irrigation was a key component of the revolution. Cereal production improved substantially leading to improved rural livelihoods and greater access to affordable food supplies.

According to Hussain and Hanjra (2004), the significant reductions in poverty could not have been achieved without substantial investment in irrigation.

Van Averbeke and Khosa (2007) in their evaluation of the small-scale irrigation project at Dzindi in Thulamela Municipality, Limpopo Province, South Africa found a positive impact of irrigated agriculture on homestead income when the scheme was compared with a selection of rural dry land settlements.. In contemporary dry land farming, the overall mean contribution of agriculture (in cash and kind) to rural homestead income typically ranges between 6% and 12% while at Dzindi, agriculture contributed a mean of 30% to total homestead income. Similar positive contributions of irrigated smallholder agriculture to livelihoods have been observed in other parts of South Africa.

2.3 Small-Scale Irrigation in South Africa

Small-scale irrigation dates back to the homeland period during the past political dispensation (Sishuta, 2005). The concept of small-scale irrigation was promoted as a means of alleviating poverty and enhancing economic development in black communities. Many of these irrigation schemes failed to achieve their intended objectives. The schemes had a combination of technical, institutional and organisational challenges. The major contributing factor towards failure of the schemes was the organisational structure that was not suited to people's needs and aspirations (Sishuta, 2005). The organisational structure was such that farmers could not affect and influence the management of the irrigation schemes. Turner (2004) points out that externally imposed and managed schemes are usually less successful than irrigation schemes that are initiated and controlled by the farmers.

Policy and practices governing smallholder irrigation schemes should aim at optimizing institutional flexibility on smallholder irrigation schemes in order to create the necessary social room for farmers to pursue their particular farming objectives (Van Averbeke & Mohamed, 2006). Guijt and Thompson (1994) pointed to the importance of knowing the livelihood strategies of intended beneficiaries of the irrigation scheme as this has a bearing on how the schemes should be modelled.

Van Rooyen and Nene (1996) pointed to a number of factors contributing to the failure of small-scale farming development in South Africa including insufficient farmer participation, lack of ownership, adhoc participant selection, lack of property rights to farmland and inadequate support services.

All these factors seem to have one way or the other contributed towards the unsustainability of the small-scale irrigation schemes in the former homelands of South Africa.

Due to the failure of the irrigation schemes to deliver on improving the livelihoods of the rural poor despite considerable government (homelands) injection of funding; the post-apartheid government ceased funding resulting in the dereliction and closure of many irrigation schemes. However, given the realization by the new democratic government that increased agricultural production can play a major role in the livelihoods of many South Africans who rely on agriculture for livelihoods, a new policy framework was put in place to revitalise the irrigation schemes. To avoid the failure of these schemes as had previously happened, the policy was such that the irrigation schemes were to be totally owned, managed and maintained by the primary farmers themselves.. LDA took the lead in implementation of this policy by launching a major programme for the RESIS-. This is a provincial and national programme to combat poverty and joblessness in the rural areas (Botha, 2005).

The Revitalisation Programme was implemented in terms of the following national and provincial policy guidelines:

- National Policy and Strategy for Revitalisation of South Africa Agricultural Water Use.
- Provincial Growth and Development Strategy.
- Strategic plan of the Limpopo Department of Agriculture 2001/02.
- Integrated Sustainable Rural Development Strategy.
- Provincial vision 2020, and
- Community Public Private Partnership Principle.

2.4 The RESIS Programme

The RESIS objective was to enable rural households to exercise much more control over their daily lives and especially their economic activity. Farmers were given authority over management and expenditure on their irrigation scheme infrastructure and farming choices, supported by training, capacity building and mentoring.
Additionally, other areas of production such as access to farming inputs and services were addressed. Upgrading and redesigning of infrastructure was also implemented (Botha, 2005). In line with the above objective 126 irrigation schemes covering 19000 hectares and held by 12 000 farmers were identified under the RESIS Programme.
The irrigation schemes are located within the communal areas which are mostly registered in title as state land allocated to various tribes (Mphahlele et al, 2009). Farmers within these schemes were allocated individual plots averaging 0.8 – 6 ha either through Permission to Occupy (P.T.O), lease contract or letter of occupation from traditional authorities. A comprehensive consultation of farmers and their communities about their problems, needs, fears and aspirations, leading to an agreed Development Plan between the farmers, communities and the Department for each RESIS was done before inception of the scheme.

2.4.1 Expected Outcomes from the RESIS Programme

The LDA envisaged the following outcomes from the RESIS programme (LDA, 2005):

a) Sustainable and increased economic agricultural production by smallholder farmers through the harnessing of available natural resources such as soil, water, climate as well as the judicious and profitable use of production inputs of labour, financial, scientific knowledge and infrastructure resources.
b) Increased production from smallholder's land units that should lead to the ripple effect into the local, provincial and national economy.

2.4.2 Development Principles of the Revitalization Programme

In an effort to minimise the risk of repeating the mistakes of the past which led to collapse of irrigation schemes, the following are some of the key development principles that were envisaged to be applied in the RESIS programme (LDA, 2002):

Poverty alleviation priority. The programme is to l give priority to schemes that fall within the rural nodes as defined by ISRD Programme of the Department of Provincial and Local Government for poverty alleviation. However, other areas with high levels of poverty and unemployment will also be targeted by the programme.

Food security and SMME development must be incorporated in the programme.

Although the main focus of the programme is on promoting sustainable commercial agricultural production, the need for food security must be recognised and supported and SMME development especially when linked to the primary production from the schemes) must be promoted.

Involve Local Government at the outset of the Programme. The involvement of local government and their Integrated Development Programme (IDP) must, wherever possible, be formalised by means of an agreement between the LDA and local government structures.

Communities must choose to be part of the programme. Following interactions with representatives of selected schemes to explain the Irrigation Scheme Revitalisation Programme and its benefits and responsibilities, communities were to freely indicate their desire to be included in the programme.

The core participants in the programme must be farmers. Although the Programme hoped to bring development to all members of the communities in which it will operate, it was crucial that target groups are carefully identified to ensure that core participants in the revitalisation of the irrigation schemes are farmers and not outsiders who may have conflicting agendas.

The revitalisation process must be community-led. This was to be achieved through ensuring that capacity is built within existing institutional structures on schemes, and the creation of additional structures if necessary.

Obtain stakeholder support and commitment. This is to be achieved through careful introduction of the concept of the programme to all stakeholders and to create a broad awareness of the implications of the programme and then to create an Integrated Scheme Development Forum on which local authorities such as the Tribal Authority, Local Government, the Department of Agriculture and civics will be represented to discuss both water and other development related issues that may be relevant to the community.

Capital Resources will not be made public up front. It has been stated as a principle of the Programme that information about capital resources not be made public at the start of the programme. Schemes must identify their needs and apply for funding through their Water User Association to LDA. This relates to the principle that the development must be community driven, must be appropriate, manageable and affordable for the farmers on the schemes.

Capacity building (empowerment) to precede infrastructure rehabilitation. To ensure sustainable development it was deemed essential that the human resources in communities, and particularly in the institutional structures that will eventually become WUA, be developed before infrastructure rehabilitation takes place. Capacity building was to be achieved through training in various fields (including basic management and bookkeeping skills, infrastructure maintenance, water management, crop production and services facilitation), creating awareness of opportunities and risks, allowing for choice and ensuring that farmers take the lead in the revitalisation of their own schemes.

Communication to be regular and transparent. It was deemed critical that open, reliable communication structures exist between all role players, including the communities, their representative bodies, the facilitating agents, government, and any other critical stakeholder

Democratic Institutions. Once development started, it was important to ensure the validity of elected management structures through the re-election of representatives or the various management structures after every 9 - 12 months.

Government and their Implementation agents to act as facilitators, not managers. This related to the principle of community-driven development. Once sufficient capacity had been built in communities, the facilitating team will begin to decrease its involvement in favour of greater community ownership and management of their irrigation schemes. Government's role was to create an enabling environment for self-development and not to manage the process themselves.

Promote joint venture options. Joint ventures between the emerging farmers and the private sector were to be encouraged and facilitated, provided they were equitable, non-exploitive and hence ensure that emerging farmers are equal partners in such ventures.

Apply economic principles in the revitalisation process. The potential viability of individual schemes must be assessed and confirmed (economic benefits must exceed costs in the medium to long-term) before State funds are spent on revitalisation.

The programme must be monitored and evaluated internally and externally (impartial assessment). A rigorous monitoring and evaluate system must be in place to identify strengths and weaknesses in the programme and to provide guidelines for addressing weaknesses.

2.4.3 Strategic Partnership Model

The revitalisation programme was implemented within the framework of defined principles and a strategic model. The model was based on a tripartite alliance between the farmers on each scheme (or cluster of schemes) – the 'producers', the Limpopo Department of Agriculture – the 'facilitator' and a strategic private sector partner the 'investor' (Mothapo et al., 2012).

The roles and responsibilities of each partner are illustrated in Figure 1 below:

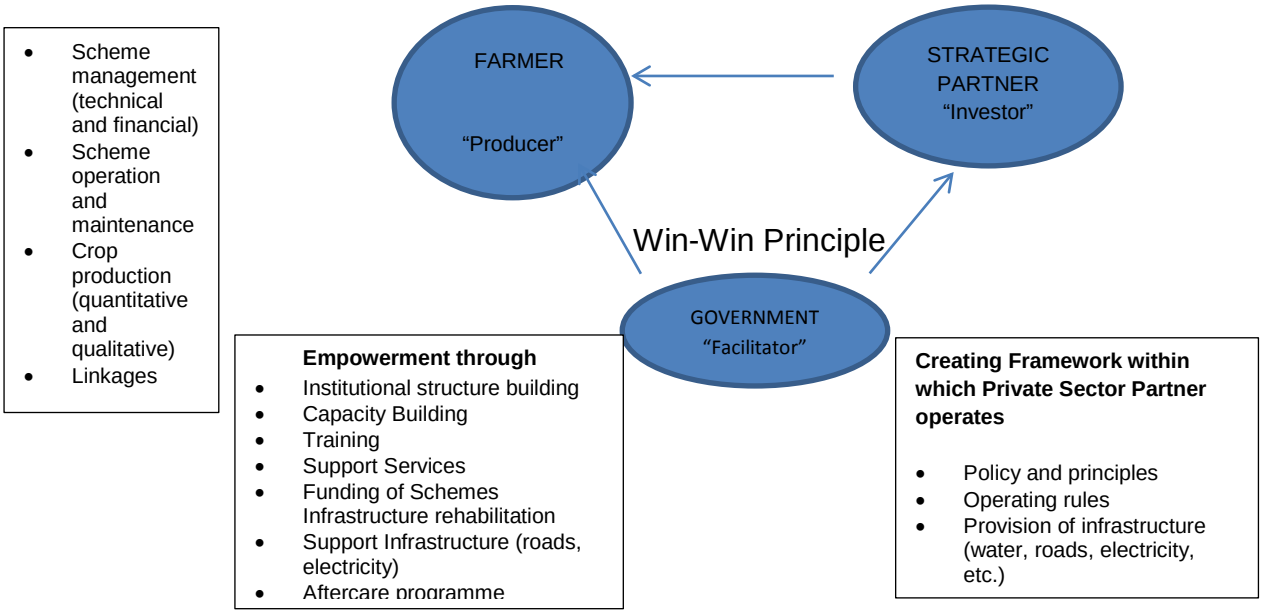

Figure 2.1: Strategic Partnership Model for Revitalization of Smallholder Irrigation Schemes

Source: LDA, A Business Plan for the Revitalisation of Smallholder Irrigation Schemes in Limpopo Province, 2002

The role of Government with respect to the farmers was to empower them through:

- Institutional structure building for the sustainable management of all aspects of the schemes (infrastructure, water management, crop production, marketing and services).
- Capacity building and training in the above responsibilities.
- Providing on-going support services in the form of extension, training and research.
- Providing support infrastructure such as roads and electricity.
- The funding of scheme infrastructure rehabilitation as a once-off grant.

- Providing a well-structured and well-resourced aftercare Programme.

The role of Government with respect to the Strategic Partners was to provide:

- A framework within which private sector partners can operate (this includes appropriate policy and operating principles and guidelines).
- The provision of access and communication infrastructure.

The role of private sector strategic partners was to:

- Provide a secure market for a selected crop, or set of crops, at prices that make production viable for producers.
- Assist farmers acquire production loans and loans for in-field irrigation equipment from the Land Bank.
- Provide technical advice, training and mentorship.

According to LDA (2002), the role of farmers, as equal partners, was:

- The supply of quality crops for marketing or processing,
- Management of their own farming operations.
- Scheme management (including water management)
- Management of service providers with respect to input supplies, mechanisation services, production loans and markets.

2.5 Factors Affecting Success of Small Holder Irrigation Schemes

A number of authors raise important considerations for successful and sustainable smallholder irrigation schemes.

Van Averbeke and Mohamed (2006) raise the importance of considering the livelihood types and farming styles/choices when conceptualizing a smallholder irrigation scheme. They found a positive association between livelihood type and farming style indicating that the role of farming in the livelihood of farmers and the way farming was practiced were related. Livelihood dynamism should also be considered (Mohammed, 2006) as farmers livelihood types change over time.

Diversity among irrigation schemes should also be considered for different schemes have unique set of circumstances including spatial (remote or close to urban markets), ecological, technological, adequacy of land and water, agricultural traditions, historical evolvement, institutional arrangements and social organisation etc. Bembridge (2000). The opportunities for improvement of smallholder irrigation schemes need to be considered within the context of diversity among schemes (Van Averbeke and Mohammed, 2006). It is thus important to investigate all these issues with respect to the smallholder irrigation schemes before implementation efforts are put in place.

2.6 Current Status of the 'Revitalized' Irrigation Schemes

Despite all the key principles the LDA considered in the revitalization of the irrigation schemes and the strategic model adopted to ensure profitable and sustainable operations of the schemes, most of these schemes have become dysfunctional and non-operational (LDA, 2011). Across the Limpopo Province, out of a total 25 schemes, only 4 are operational while in the Sekhukhune District, six out of seven schemes have collapsed. (LDA,2011)It has therefore become imperative to conduct a study that sought to determine the perceptions of farmers regarding the revitalization and interventions by LDA on the irrigations schemes and shortcomings thereof.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Study Area

The study was carried out in Sekhukhune District Municipality, Limpopo Province, South Africa (Figure 3.1). The district is rural in nature and covers an area of about 13 235 square km with a population of about 1 055 881 people and an average population density of 87 people per square km (Local Government Handbook, 2012). It is one of the poorest districts in the province, characterised by poor infrastructure and lack of safe water supply. Some 33% of the population still depend on natural water supply and 7% have no formal means of sanitation. There is a high rate of unemployment (61.6%) (Drimie et al., 2009). The District consists of five local municipalities including Fetakgomo, Greater Marble Hall, Greater Tubatse, Makhuduthamaga and Greater Groblersdal.

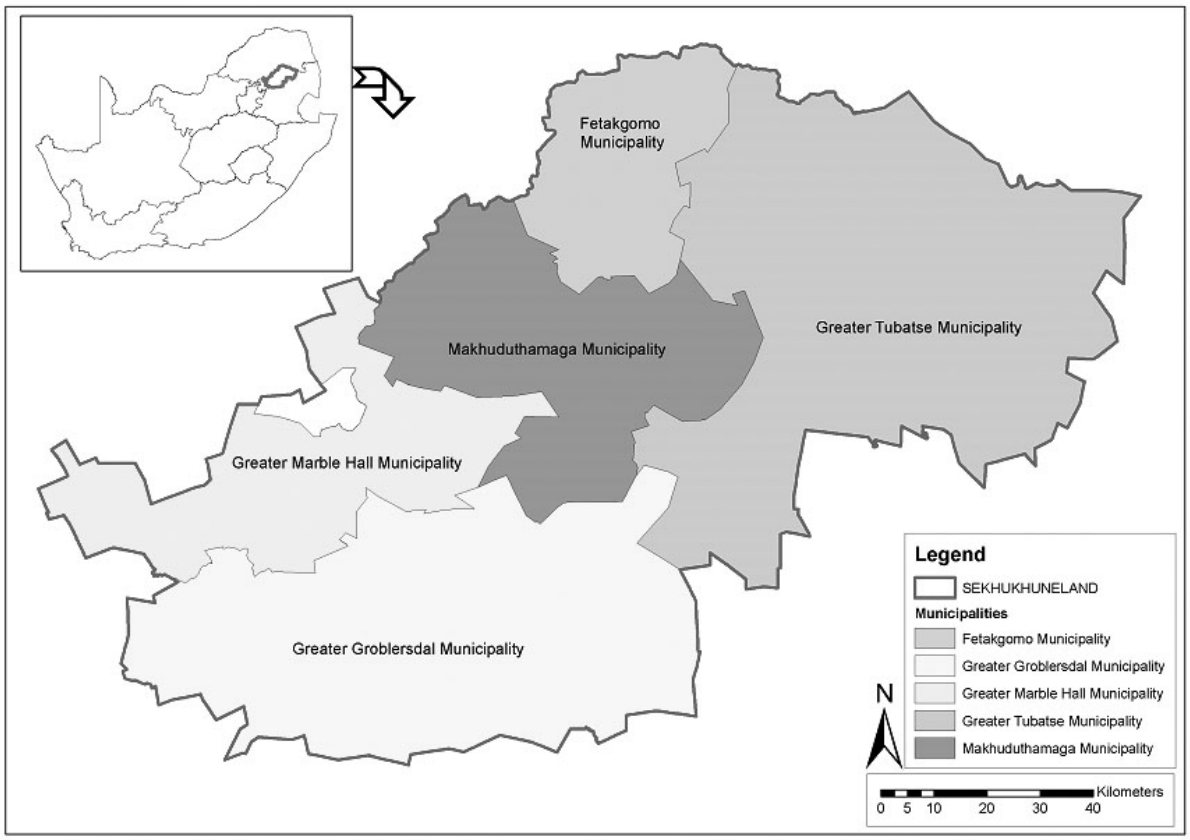

Figure 3.1: Location of the Greater Sekhukhune District Municipality (Drimie et al., 2009)

Sekhukhune District is a semi-arid region receiving 450-500 mm rainfall annually, with most of it in summer. The Hutton soil form dominates in the irrigation schemes with variability in terms of soil depth, soil texture and structure. Generally the soil depth is above 60 cm, with 10% clay (ARD Report No, 21). The agricultural potential of these types of soils is high and is suitable for most agronomic crops and vegetables such as maize, wheat, sorghum, potatoes (ARD Report No, 21, 2012)..

3.2 Brief background of the seven irrigation schemes

3.2.1 Strydkraal Irrigation Scheme

The Strydkraal village has five irrigation schemes namely Strydkraal A, Ikageng, Kgoshi Masha, Mabokotswane, and Mooiplaas which fall under an umbrella body for the Strydkraal irrigation schemes. There were 137 members in the Strydkraal Scheme initially but to date there are 293farmers who constitute the Irrigation Scheme.

Prior to 1977, farmers in the Strydkraal irrigation scheme were using the furrow irrigation system; they owned individual plots and paid taxes for their individual plots. The farmers had agreements in place regarding irrigation scheduling so that all plots could be irrigated. They were not hiring labour but relied on family labour for operations on the plots. The scale of operation was subsistence with no use of inorganic fertilizers.

In 1977, the movable sprinkler system was introduced while farmers still owned individual plots. Arrangements for irrigation scheduling were put in place with the farmers sharing the sprinklers. In order to increase production, farmers used inorganic fertilisers e.g. LAN with this mode of irrigation system. This operation was under a partnership with a commercial farmer and it ended in a sour note when farmers realized that the sharing of dividends was not done fairly.

Between 1984 and 1997 the farmers had a five year contract farming with a strategic partner called Agricultural Management Services (AMS) with the government taking a leading role. AMS sold their produce to Noord Transvaal Korporasie (NTK). The commonly grown crops were maize and wheat. AMS would bring machinery, plough the area, plant crops and provide fertilizers and pesticide for both crops.

Farmers received 100% of the maize harvest and four bags of wheat crop each, while the other wheat harvest went to AMS; this was the part of the agreement between farmers and AMS. At the end of the five year contract, farmers refused to renew the contract with AMS, because they realized that the sharing of dividends was not fair. Farming operations did not take place after this since the farmers did not have tractors, inputs and money to pay for electricity. This was followed by floods which damaged the irrigation scheme and resulted in the fields lying fallow for some time.

The farmers then requested for assistance from the government to resuscitate the infrastructure. Government assessed the situation and proposed that part of the scheme relocate to another site because flooding was going to be a recurring problem. In 2008, the government installed the floppy irrigation system on the portion of the scheme which was not a flood plain through the RESIS program.

After the Tribal Authority allocated land to farmers from the flood plain, the Strydkraal irrigation scheme farmers and LDA held consultative workshops from which the farmers selected the centre pivot irrigation system. Fourteen centre pivot irrigation systems were installed in 2011 at Strydkraal Irrigation Scheme. The LDA identified Arthur William Creighton (AWC) as a potential strategic partner. Meetings between the strategic partner, the umbrella body and the scheme farmers were organized, to discuss how the strategic partnership would work. The irrigation scheme has been operating in partnership for the past three years and the contract was renewed in 2011 for operation until early 2014. Under this partnership, potatoes were the main crop grown with other crops being maize, sugar beans, wheat and butternuts.

3.2.2 Tswelopele Irrigation Scheme

Tswelopele Irrigation Scheme was initiated in 1977 by the Bantu Investment Corporation (BIC). The irrigation scheme is located in the Greater Tubatse Local Municipality along the Steelpoort River outside Burgersfort in Praktiseer. The scheme was managed by the successors of organisations which were Lebowa Development Corporation and the Agricultural Rural Development Corporation (ARDC). After 1994, the process of transferring land to communities started with portions of 5ha being demarcated and leased to individual farmers.

The irrigation scheme was redesigned in 1999 to upgrade it from subsistence to commercial farming. In 2000, potential farmers were screened through interviews. Successful farmers started planting in 2003 in partnership with Noordelike Sentrale Katoen (NSK). Not all farmers agreed to enter into partnership with the strategic partner, NSK because they did not want to plant cotton which was the main crop for the NSK.

Farmers who were not partnering with NSK acquired a loan from the Land Bank and chose to plant tomato. The loan from Land Bank was used to install sprinkler irrigation system and procure production inputs. NSK installed the sprinkler irrigation system for the farmers who they had entered into a contract with. They also provided production inputs such as seeds and fertilizers. During the planting season, fumigation of cotton affected the tomato fields, due to the close proximity of the field. This led to conflict between the cotton and tomato farmers as the pesticide was destroying the tomato crop. Other challenges encountered in the partnership with NSK and those who received loans from Land bank was the payment of electricity costs as they were using the same irrigation pumps. These challenges affected the partnership with NSK negatively and the partnership lasted for only one year. After the collapse of the partnership between the farmers and NSK, the latter removed the sprinkler irrigation systems they installed for the farmers. This this negatively affected even the farmers who acquired loans from the Land Bank and farming operations stopped.

In 2005, LDA started a process of revitalizing Steelpoort and Praktiseer irrigation schemes through the RESIS programme. Farmers who had the sprinkler irrigation system on the ground agreed that the system could be removed without compensation; all farmers participated in clearing the area for the new irrigation equipment. The floppy irrigation system was then installed and four dams were lined and fenced on 440 hectares which accommodated 83 farmers. The process of installing the floppy irrigation system was completed in 2008. After the installation of the new irrigation system the scheme remained fallow due to farmers lacking machinery, production inputs and technical skills to operate the floppy irrigation system.

The strategic partnership model was then introduced in Tswelopele Irrigation Scheme with a strategic partner appointed by LDA. The crops which were planted in the irrigation scheme under the partnership included potato, dry bean and maize.

This choice of crop was in line with the market contract that AWC had already established. Currently the scheme is vandalised and dysfunctional since the strategic partner pulled off because some of the committee members claimed that the strategic partner was not transparent enough and he does not follow what was on the contract.

3.2.3 Setlaboswane Irrigation Scheme

Like all other irrigation schemes Setlaboswane Irrigation Scheme was also established during the homeland tenure in 1977 and it was managed by the Lebowa Development Cooperation. The scheme is situated in Setlaboswane Village in the Makhuduthamaga Municipality. The scheme used furrow irrigation and each individual used to own a piece of a hectare. The Limpopo Department of Agriculture revitalized the infrastructure through the Revitalization of Smallholder Irrigation Schemes(RESIS) in 2004. The scheme is 220 hectare with 192 members. Although the total land size is 220hectares only 195 hectare is developed.

The total number of beneficiaries is currently 96 and they are all beneficiaries of the scheme. The project aimed at addressing rural development issues and provided the farmers with sustainable income. The unemployed members of the community did not want to be forever idling hence the need to farm on a commercial basis.

Currently the scheme has been revitalised and a strategic partner was introduced in 2010 but now he has terminated working with the farmers and the scheme is dysfunctional.

3.2.4 Krokodile Irrigation Scheme

Krokodile Irrigation Scheme is situated in Makhuduthamaga in the Sekhukhune District of the Limpopo province. The scheme is 220hectare with 192 beneficiaries.

The total number of beneficiaries is 192 and all are the beneficiaries of the scheme.

The scheme wanted to address rural development issues and provide the farmers with sustainable income. The revitalization of the scheme was seen as a solution to unemployment in the community.

Since the beneficiaries are mainly old women and men, most of them did not go to the formal mainstream education facilities. Very few of the beneficiaries are literate with some within the group reaching Grade 12.

Very few are literate, thus making the task of working towards a common goal a serious challenge. Because of the levels of illiteracy these farmers are very difficult absorbing modern technology. The scheme operated with a strategic partner for one season and the beneficiaries were not satisfied with the dividends and the strategic partner pulled out of the agreement and the scheme is currently dysfunctional.

3.2.5 Mogalatsane Irrigation Scheme

Mogalatsane Irrigation Scheme under Shikwane Cooperative is practicing its farming in Mogalatsane village which is 2.5 km from the tar road, and is situated in the Ephraim Mogale Municipality which is under Sekhukhune District, 50km from Marble Hall. The cooperative has 98 members which are direct beneficiaries of the farm.

Mogalatsane Irrigation scheme intended to use 132ha of its farm to produce quality maize and dry beans/wheat under floppy irrigation system for the 2012/2013 production season. The beneficiaries were more than willing to participate actively in farming with the aim of having sustainable and profitable production. The cooperative has a history of producing maize and potatoes since 2003 with a strategic partner and the production was good.

The current free market conditions offers the beneficiaries an opportunity to sell their produce to the most profitable markets and that would encourage a positive return on investment, which would contribute positively towards the economic growth of the Province, through job creation.

Mogalatsane Irrigation scheme is 100% Black owned cooperative, and they intended to access financial support from the Government so that they can continue with their farming operations. The farmers have been practicing farming on the farm as farm workers. The scheme also worked with the strategic partner for one season and he pulled out of the scheme since the farmers lost trust and believed he was not transparent on the financials of the farm. The scheme is currently dysfunctional.

3.2.6 Phetwane Agricultural Cooperative

Phetwane irrigation scheme is situated at portion of the Farm Hisdustan in ward nine of greater Ephraim Mogale municipality, in Sekhukhune district. This irrigation scheme occupies an area of about 48 hectares with 48 member beneficiaries. It is situated below Flag Boshielo dam on the right bank of perennial Olifant River.

History of the scheme dates back during the time of homelands under Lebowa government. The scheme was operating under the Lebowa Agricultural Cooperation and they used to plant sweet potato, pumpkins and butternut. The scheme used to operate on crop share principle. Phetwane Irrigation scheme also operated on a strategic partnership agreement for two season but the strategic partner also pulled out sighting crop loss. Although the farm was dysfunctional for one or two seasons, the farmers took it upon themselves to look after the infrastructure and arrange planting on their own. The farm is one of the two functional schemes in the Sekhukhune District.

3.2.7 Elandskraal Irrigation scheme

Elandskraal Irrigation Scheme was established in 1988 when different communities came from different homelands like Kwandebele and Lebowa due to conflicts in their areas. In 1989, Kgotlelelo agricultural cooperative was established to manage the Irrigation scheme on a 130 hectares with 28 members **.** The primary role for the cooperative was to ensure the land is ploughed and the products are sold. The Elandskraal village is not under any Traditional Chief as it was under the then Central government. In 1989 cooperative received funding from an organization called IDEAA which was a regional organization. They started with springler irrigation systems and they planted maize and wheat in 1989. They later planted cotton through a loan from Landbank which they acquired by using Independent Development Trust(IDT) as a guarantee.

The cooperative failed to pay back the loan and the production collapsed. In 2002 the Limpopo Department of Agriculture introduced RESIS program which started with institutional arrangement for the water use management. In 2006 LDA installed nine centre pivot and in 2008 a strategic partner was introduced and wheat and sunflower was planted.

In 2009 they planted potato but after the harvest the Strategic Partner declared a loss and requested the Department to assist. The Department did not assist as the contract was with the farmers. Based on the decline of the Department the Strategic Partner wrote a withdrawal letter and pulled out of the scheme which then became dysfunctional.

All the above-mentioned schemes were revitalized and equipped with different irrigation systems although mostly are dominated by the floppy irrigation system. Two irrigation schemes out of the total of seven are currently working and they are Phetwane and Strykraal. The five dysfunctional irrigation schemes are; Elandskraal, Mogalatsane, Setlaboswane, Krokodil and Tswelopele.

A summary of the schemes is given in Tables 3.1 and 3.2

Table 3.1 Number of farmers in schemes and number interviewed

Name of Scheme	Size in ha	Total number of Farmers	Number of farmers interviewed
Strykraal	330	293	26
Tswelopele	440	76	20
Krokodile	220	192	24
Mogalatsane	132	98	20
Elandskraal	130	28	25
Phetwane	48	48	20
Setlaboswana	115	96	15

Table 3.2 Location of the schemes in the Sekhukhune District

Name of Irrigation Scheme	**Local Municipality**	**Village**	**Coordinates**
Tswelopele	Greator Tubatse	Practiseer	E30.34053 S-24.5849
Strydskraal	Fetakgomo	Strydskraal	E29.72119 S-24.6810
Krokodile	Makhuduthamaga	Krokodile	E29.44749 S-24.6810
Setlaboswana	Makhuduthamaga	Setlaboswana	E29.4689 S--24.6666
Mogalatsane	Ephraim Mogale	Mogalatsane	E29.42766 S -24.7297
Phetwane	Ephraim Mogale	Phetwane	E29.42589 S-24.76152
Elandskraal	Ephraim Mogale	Elandskraal	E29.41483 S-24.7148

3.3 Data Collection

3.3.1 Data Sources

Some aspects of the ARD Learning Cycle (ICRA, 2011a) were followed when carrying out the research. The ARD learning cycle can be described as follows:

- Forming partnership which is very critical during the planning stage when relevant stakeholders are identified and are involved from the beginning of the research.
- Achieving a common understanding of the challenges - the process of interviewing to gain wider context of the challenges of the SP model; areas of improvements should also be defined.
- Screening and evaluating the different options for improvement of the system – this means the consolidation and analysing of the findings and making recommendations for sustainable irrigation schemes management.

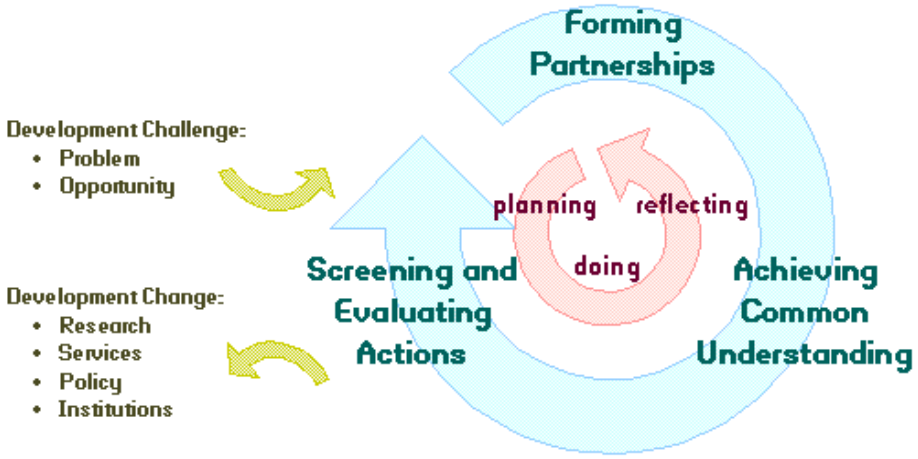

Figure 3.2 The ARD Learning Cycle (http://www.icra-edu.org/objects/anglolearn/ARD_Learning_Cycle.pdf)

The learning cycle also consists of three stages: planning which is the decision on the approach; doing refers to the data collection and the reflection is when the preliminary findings are presented to the stakeholders

Both primary and secondary data sources were used in the research project. Primary data sources included questionnaires(Annexure A), focus group discussions and workshops with various stakeholders. Secondary data sources included documents pertaining to relevant policy, legislation, strategies, programmes and projects, community records etc**. S**ocioeconomic characteristics of respondents such as gender, farm size, level of formal educational attainment, economic status and farming experience were recorded.

3.3.2 Stakeholder Analysis

Stakeholder analysis which is a process of systematically gathering and analysing qualitative information to determine whose interests should be taken into account when developing and/or implementing a policy or program was carried out. The stakeholders were identified and their roles captured using the stakeholder role matrix. The perceptions of the stakeholders (farmers, LDA officials, traditional authority, DWA officials, local municipality officials) on the strategic model were recorded in a stakeholder perception matrix. The stakeholders were asked to cite their perceived positive and negative aspects of the strategic model.

3.3.3 Farmer opinions on irrigation scheme success/failure

Factors that farmers perceive as having influence on the success or failure of the irrigation schemes were grouped into different categories such as climatic/ecological, socio-cultural, economic, competition, management/administrative and technological. The effect of each factor was rated on a 1 to 4 Likert-type scale to depict the perceived impact of each category (strongly agree, agree, disagree, and strongly disagree respectively).

Purposive sampling was used in the study. The target farmers were those who had participated in failed schemes and the surviving schemes. Farmers interviewed were only from the RESIS schemes.

3.4 Data Analysis

Descriptive statistics was performed to provide a profile of the general characteristics of the farmers.

The association between socio-economic characteristics and farmers' perceptions was tested using the following multivariate linear regression analysis model:

$$Y_i = b_o + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e_i$$

Where Y = perception (total Likert's type scale of each respondent)

X_1 = gender (male = 1, female = 0)

X_2 = age (<30, 30-40, 41-50, 51-60, >60)

X_3 = education (primary, secondary, certificate, diploma, no education)

X_4 = literacy (innumeracy, literate, semi-literate, illiterate)

X_5 = Number of households in irrigation scheme

X_6 = irrigation farming training (Yes = 1, No = 2) e_i = error term

The association between socio-economic characteristics and farmers' perceptions was also tested using the multinomial logistic regression treating perception (measured in rank scale) score as categorical or numeric.

Multinomial logistic regression uses a linear predictor function to predict the probability that observation i has outcome k, of the following general form:

$$f(k,i) = \beta_{0,k} + \beta_{1,k}x_{1,i} + \beta_{2,k}x_{2,i} + \cdots + \beta_{M,k}x_{M,i},$$

where β_{mk} is a regression coefficient associated with the mth explanatory variable (age, sex, education etc) and the kth outcome (rank score). The regression coefficients and explanatory variables are normally grouped into vectors of size M+1, so that the predictor function can be written more compactly:

$$f(k,i) = \boldsymbol{\beta}_k \cdot \mathbf{x}_i,$$

where β_k is the set of regression coefficients associated with outcome k, and X_i is the set of explanatory variables associated with observation i.

Statistical Package for Social Sciences (SPSS) and Excel Computer Program were used for data analysis.

The multivariate linear regression was found inappropriate as the measures for goodness of fit were poor. The R-square value was 0.2. The multinomial logistic regression model gave a better fit and thus adopted for the study.

CHAPTER 4

RESULTS

4.0 Results

4.1 Socio-Economic Characteristics of farmers

The socio-economic characteristics of farmers are shown in Table 4.1.

Table 4.1: Socio-economic and farming characteristics of the respondents

Characteristics	***Percentage***
Age (years)	
< 30	8
30-40	8
41-50	20
51-60	24
> 60	40
Gender	
Male	55
Female	45
Educational Level	
No education	18
Primary	40
Secondary	32
Certificate	5
Diploma	5
Literacy Level	
Innumeracy	8
Illiterate	26
Partial literacy	30
Literate	36
Farming Experience/Training	
No training	35
Some form of training	65

A large percentage (64%) of the farmers were over 50 years old with over 40% of the farmers being 60 years and above. 16% of the farmers were 40 years and younger. 55% of the farmers were males while 45% are female. 90% of the farmers had no education beyond secondary level with close to 60% having primary or no formal education. Over a third of the farmers considered themselves either illiterate or innumerate. A large percentage (67%) of farmers with some primary education considered themselves illiterate.

Two-thirds (65%) of the farmers indicated that they had some form of training in irrigation farming. However, over 75% of these farmers indicated that the training did not adequately give them the skills and competence to carry out irrigation farming tasks.

4.2 Stakeholder identification and roles

Table 4.2 shows the stakeholders in the irrigation schemes. The strategic partners, LDA, DWA and Eskom were stakeholders in all schemes. The Department of Rural development and Land Reform (DRDLR) were stakeholders in Tswelopele and Elanskraal schemes while the Traditional Authorities were stakeholders in the rest of the schemes. In schemes where the Traditional Authorities were stakeholders, the land was tribal land while in other schemes where the DRDLR was a stakeholder, the land was state land.

Table 4.2: Stakeholder identification by farmers and their roles

STAKEHOLDER	SK	TL	PT	EK	MT	KK	SB
Irrigation farmers	✓	✓	✓	✓	✓	✓	✓
Strategic Partner	✓	✓	✓	✓	✓	✓	✓
Limpopo Department of Agriculture	✓	✓	✓	✓	✓	✓	✓
Department of Water Affairs	✓	✓	✓	✓	✓	✓	✓
Eskom	✓	✓	✓	✓	✓	✓	✓
Traditional Authority	✓	X	✓	X	✓	✓	✓
Department of Rural Development and Land Reform	X	✓	X	✓	X	X	X

SK: Strydkraal TL: Tswelopele PT: Phetwane EK: Elandskraal MT: Mogalatsana KK: Krokodile SB: Setlaboswana

Note:The tick indicate that the stakeholder has a role in the scheme while the x indicate that the stakeholder has no role in the irrigation scheme as perceived by farmers

4.3 Stakeholder Role Matrix

Table 4.3 shows the stakeholder level of involvement as perceived by the farmers.

Table 4.3: Stakeholder Role Matrix

Stakeholder	**ROLES**				
	Inputs supply	Technical Advise	Marketing	Infrastructure	Water Services
Strategic Partner	Very Good	Moderate	Very Good	_	_
LDA	_	Moderate	_	Very Good	Poor
Irrigation Farmers	_	_	_	_	_
Local Municipality	_	_	_	_	_
Traditional Authority	Very Good (Strydkraal only)	_	_	_	_
DWA	_	_	_	_	Very Good

Key:

Very Good	Fully involved with all users satisfied with performance roles
Good	Fully involved but not all users are satisfied with performance roles
Moderate	Partly involved and in a satisfactory way
Poor	Partly involved but not all users are satisfied
Very Poor	User takes up the role but performs poorly
-	User is not involved

The farmers found the involvement of the strategic partner as being very good in terms of input supply and marketing but found the partner's involvement in technical advice as being moderate. The Limpopo Department of Agriculture played a good role in providing infrastructure.

The farmers did not see themselves playing any role in the identified areas. The local municipality played no role in the identified areas while the Department of Water Affairs played its role to the satisfaction of farmers.

4.4 Stakeholder perception on strategic model

The perceptions of different stakeholders on the strategic partnership model are depicted in Table 4.4.

The overall perception by farmers is that the model though providing low risk for them, it deprived them of the sense of ownership and makes them dependent entirely on the strategic partner.

Table 4.4 Stakeholder Perception Matrix on the Strategic Partnership Model

STAKEHOLDERS	**PERCEPTIONS ON THE STRATEGIC PARTNERSHIP MODEL**	
	Positive	**Negative**
Irrigation farmers	Low risk for farmers	Encourages dependency
		Discourages sense of ownership
		Does not promote commitment
		Requires farmers to operate as co-ops which is not mostly preferred by farmers
		It is not empowering them
LDA officials	Commercially orientated	Rely mostly on the external person
	Low risk for farmers	Does not encourage ownership
		Promote co-op formation though is not well understood by farmers
		Give power to people with capital
		Model is not balanced; in favour of farmers
Strategic partners	Low risk for farmers	SP are more at risk
		Business orientated but farmers more subsistence orientated
		It is not balanced; skewed to the side of SP
		Promote only high capitalised people
Local municipality officials		They are not empowering the community

The LDA and local municipality officials shared similar perceptions as farmers while strategic partners though sharing the same sentiments regarding the balance of power, pointed out the business risk they carry. The model according to the stakeholder perceptions had more negative than positive attributes.

4.5 Major challenges of the schemes

According to the farmers, the major challenges contributing to collapse of schemes are listed on Table 4.5. The factors most frequently cited by farmers as responsible for the collapse of the schemes were disharmony and rifts between farmers themselves and misunderstandings between farmers and the strategic partners.

Another notable factor was the issue of theft and vandalism of irrigation equipment. The strategic partners also pointed out conflicts among farmers as the main issue for their withdrawal from schemes. The farmers lack of understanding of the contract agreement was also cited by strategic partners as the reason for the breakdown in relationships.

Table 4.5. Factors perceived by farmers to be contributing to dysfunctional state of schemes

Major factors perceived as contributing to collapse of schemes
1) Disagreements and conflicts between farmers
2) Strategic partner not transparent and not abiding by contractual obligations
3) No equitable distribution of profits as per the contract between farmers and strategic partner
4) Shares acquisition not done as per the contract agreement
5) Theft and vandalism of farming equipment
6) Lack of leadership
7) Farmers lack basic skills on financial management
8) Conniving between strategic partner and some government officials to cheat farmers of their share of profits

4.6 Famers recommendation on the Strategic Partnership Model

Given the challenges cited above, farmers were asked to give recommendations on how to improve the strategic partnership model.

The recommendations of farmers are shown in Table 4.6.

Table 4.6 Recommendations by farmers on the Strategic Partnership Model.

Recommendations on Strategic Partnership Model
1) Do away with the model
2) Transfer shares and rights to farmers
3) Empower farmers with skills (production, financial and marketing) and financial resources and remove the strategic partner
4) Continue with the model but ensure the strategic partner is transparent in financial matters.
5) Continue with model but work with individuals and not groups.

In schemes that are still functioning, recommendations 4 and 5 were popular among farmers while in schemes that have collapsed the farmers largely recommended 1, 2 and 3.

4.7 Farmers perceptions ranking on factors that have influence on the success of irrigation schemes.

Apart from the strategic partnership model that most farmers found problematic, farmers were asked to rank the following factors that could have influence on the success of the irrigation schemes: Climate and ecological factors - seasonal rainfall amount, pests, dry spells during rainy seasons etc.

Economic factors – high price of inputs, high cost of water use, better off-farm income etc.

Competition factors – price of produce, market access

Management/administrative factors – non maintenance of irrigation equipment and infrastructure, non-timely supply of inputs etc

Socio-cultural factors – land tenure system, level of formal education.

Technological factors – type of irrigation system, skills required for irrigation farming, manual planting, weeding and harvesting.

The perceptions of the influence of the above factors was ranked on a scale of 1 to 4 (1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree). The results are shown in table 4.7.

Table 4.7 Rank of influence of various factors on the success of the schemes

Influence Factor	**Mean**	**Rank**
Climate/Ecological	2.9	5
Economic	2.0	1
Competition	2.2	2
Management/Administrative	2.5	4
Socio-cultural	2.4	3
Technological	3.3	6

The factors mentioned as having influence on the success of the schemes were economic, competition and socio-cultural factors. Under the economic factors, cost of inputs and off-farm financial returns were mentioned as having influence on the success of the schemes. Climate/ecological and technological factors were cited as not having large influence on the success of the schemes. Management and administrative factors were scored at 2.5 indicating that they influence the success of the schemes but were not a major factor of influence.

4.8 Association between farmers' perceptions of factors influencing the success of schemes and socio-economic characteristics.

Results of the association between farmers' perceptions of factors influencing the success of schemes and their socio-economic profiles are shown in Tables 4.8.1 to 4.8.6

Table 4.8.1 Factors affecting farmers perceptions of the success of irrigation schemes – Climate/Ecological Factors

Predictor/Independent Variable	Coefficient, (B)	Standard Error	Wald Chi-Square	P-value	Odds Ratio
Sex	0.52	0.12	11.8	0.38	1.68
Age	-1.39	0.21	17.8	0.08	0.25
Education	0.85	0.27	14.1	0.22	2.34
Literacy	-0.50	0.13	11.5	0.40	0.61
Number of farmers in scheme	0.22	0.09	14.2	0.22	1.25
Training	-0.79	0.26	11.0	0.43	0.45
Constant	7.23	2.71	1.51	0.21	-

Significance test at 5% level

The profile of the farmers and number of farmers in a scheme had no influence on how farmers perceive climate/ecological as a contributing factor to the success of the schemes.

Table 4.8.2 Factors affecting farmers perceptions of the success of irrigation schemes – Economic Factors

Predictor/Independent Variable	Coefficient (B)	Standard Error	Wald Chi-Square	P-value	Odds Ratio
Sex	-4.78	1.12	13.9	0.30	0.008
Age	-1.96	0.07	12.2	0.42	0.14
Education	-2.32	0.43	9.6	0.62	0.09
Literacy	0.74	0.11	20.7	0.04*	2.09
Number of farmers in scheme	-2.77	1.04	9.9	0.61	0.06
Training	-0.77	0.17	12.3	0.41	0.46
Constant	50.5	14.6	0.12	0.73	-

*P<0.05

All socio-economic variables except literacy level had no influence on how farmers perceive economic factors as contributing to the success of the schemes.

A unit increase in the variable literacy (0.74) is associated with an increase of 2.09 in the log odds of farmers perceiving economic factors as having influence on the success of the schemes. .

Table 4.8.3 Factors affecting farmers perceptions of the success of irrigation schemes – Competition factors

Predictor/Independent Variable	Coefficient (B)	Standard Error	Wald Chi-Square	P-value	Odds Ratio
Sex	-1.26	0.33	18.1	0.15	0.28
Age	-1.62	0.34	15.7	0.26	0.20
Education	-0.87	0.37	14.9	0.31	0.42
Literacy	-0.77	0.28	15.2	0.29	0.46
Number of farmers in scheme	1.59	0.55	13.6	0.40	4.90
Training	-3.34	0.98	10.3	0.66	0.03
Constant	11.67	2.63	1.5	0.22	-

None of the socio-economic characteristics of farmers had influence on how they perceive competition factors to be influencing the success of the schemes.

Table 4.8.4 Factors affecting farmers perceptions of the success of irrigation schemes – Management/Administrative factors

Predictor/Independent Variable	Coefficient (B)	Standard Error	Wald Chi-Square	P-value	Odds Ratio
Sex	0.74	0.10	5.8	0.56	2.09
Age	1.05	0.22	16.5	0.02*	2.86
Education	-1.08	0.20	7.6	0.36	0.34
Literacy	-4.03	0.98	11.7	0.11	0.02
Number of farmers in scheme	0.77	0.14	13.6	0.048*	2.16
Training	-3.11	0.76	2.6	0.9	0.04
Constant	4.23	0.99	0.41	0.51	-

Age and number of farmers in a scheme had an association with the farmers' perception of the role of management/administrative factors in influencing the success of the schemes. A one-unit increase in the variables age (1.05) and number of farmers in a scheme (0.77) is associated with increases of 2.86 and 2.16 respectively in the log odds of farmers perceiving management / administrative factors as influencing the success of the schemes

Table 4.8.5 Factors affecting farmers perceptions of the success of irrigation schemes – Socio-cultural factors

Predictor/Independent Variable	Coefficient (B)	Standard Error	Wald Chi-Square	P-value	Odds Ratio
Sex	-16.15	3.67	11.7	0.11	9.68
Age	-2.9	0.51	9.9	0.19	0.05
Education	-8.44	1.96	8.1	0.32	0.002
Literacy	38.43	9.89	14.9	0.04*	4.89
Number of farmers in scheme	7.67	1.00	15.5	0.03*	21.43
Training	-3.23	0.54	9.3	0.22	0.04
Constant	74.49	8.91	0.02	0.88	-

*P<0.05

Literacy level and number of farmers in a scheme had an association with the farmers' perception of the role of management/administrative factors in influencing the success of the schemes. The log odds of literacy (38.43) and number of farmers in a scheme (7.67) of farmers perceiving socio-cultural factors to be influencing the success of the schemes will increase by 4.89 and 21.43 respectively.

Table 4.8.6 Factors affecting farmers perceptions of the success of irrigation schemes – Technological factors

	Coefficient (B)	Standard Error	Wald chi-square	P-value	Odds ratio
Sex	-16.32	3.45	12.8	0.08	0.001
Age	37.15	6.67	17.3	0.02*	19.0
Education	-49.35	7.88	2.5	0.92	0.001
Literacy	5.92	1.11	24.4	0.001*	16.0
Number of farmers in scheme	-6.77	1.21	7.0	0.42	0.001
Training	-0.68	0.21	5.1	0.64	0.51
constant	237.6	33.73	0.47	0.49	-

*P<0.05

Age and literacy level had an association with the farmers' perception of the role of technological factors in influencing the success of the schemes. The log odds of age (37.15) and literacy (5.92) of farmers perceiving technological factors to be influencing the success of the schemes will increase by 19 and 16 respectively.. Similar findings have been observed Kolawole et al.(2011) and Ejieji & Amodu (2008).

CHAPTER 5

DISCUSSION

5.1 Socio-economic profile of farmers

More than two-thirds of the farmers were over 50 years old with only 8% of farmers being less than 30 years old. This poses a problem in terms of the sustainability of the projects and the ability of the farmers to actively participate in the schemes. A number of studies have also shown low involvement of young people in agricultural activities (Kepe, 2002, Sishuta, 2005, Kamara et al., 2001, Tekana and Oladele, 2011). In South Africa, young people tend to associate agriculture with the negative experiences of the past political dispensation and as such there tends to a stigma attached to agriculture Catling and Saaiman, 1996). A large majority (90%) of the farmers had no education beyond secondary level with close to 60% having primary or no formal education. This also poses challenges with regards to farmers' comprehension and understanding of commercial farming operations. With low level of education and literacy, imparting skills technical, marketing and financial skills may not be easy. Low level of education has been associated with low farming productivity and efficiency (Tilak, 1993; Appleton and Balihuta, 1996; Assefa and Asfaw, 1997). Most of farmers in the irrigation schemes indicated that they lack skills in production management, marketing and financial management. They also expressed that they even lack basic book keeping skills. The low level of education has been observed in other schemes (Sishuta, 2005; Wu, 1977, Bembridge, 2000, Mook, 1981). Van Averbeke et al., 1998 and Das and Sahoo (2012) have alluded to the fact that illiteracy and the advanced age of farmers have been linked to the lack of adoption of new technologies, innovations and this has been found to have a negative effect on provision of extension services and as a consequence on agricultural productivity.

5.2 Stakeholder identification and roles

Farmers did not seem to have any major role to play and were largely 'observers' waiting to share on profits accrued from the farming operations.

Though they were involved in the physical farm work (especially in situations where the strategic partner had left the project taking with him some of the farming equipment) they had no role in acquisition of inputs, daily scheduling of farming activities, choice of crops, marketing and selling of produce etc. The farmers were therefore entirely dependent on the strategic partner and other stakeholders such as the Provincial Department of Agriculture.

The lack any meaningful role on the part of the farmers could have been one of the contributing factors to the demise of many of the schemes. The lack of participation by farmers in critical decision making on the farming activities could be responsible for the disagreements with the strategic partners and the breakdown in trust. In all of the schemes, the farmers did not trust the strategic partners, the feeling amongst many farmers was that the strategic partner was not sharing profits according to the contractual agreements. What is clear from these observations is that the strategic partnership was not working as it was supposed to. According to Kittel (2010), strategic alliances are hard – they currently fail far more often than they succeed, always leaving huge untapped and even unseen value potential. Kittel in his evaluation of companies' strategic partnerships noted that interdependency between companies is increasingly important in order to provide the complete solutions customers demand and more and more, business growth is dependent upon the development and management of long-term, value-producing, multidimensional business relationships. The root cause for alliance failure is a lack of respect, confidence and trust in the other partner or the alliance/partnership itself. Kittel (2010) further alludes that trust is affected by the degree of openness in communication; and a lack in trust is also a root cause for poor communication. Therefore trust is a fundamental issue, being both cause and effect. The analysis by Kittel completely fits the situation in most of the schemes. This lack of trust seems to have had a major impact on the success of the irrigation schemes.

The stakeholder perceptions (farmers and LDA officials) on the strategic model allude to the dependency of the farmers on the strategic partner.

The farmers felt no sense of ownership which makes them not to be committed to the projects.

Erasmus (2013) in his report of the success of small-scale ostrich farmers, attributes the success of the ostrich project on the business model of the project which makes farmers take responsibility for their own progress. Kittel (2010) proposes that alliance partners should openly share perspectives and be willing to unemotionally examine as much detail as feasible these different perspectives. Furthermore, communication between partners should stay open as trust is being built. The lack of communication and sharing of perspectives came up frequently during interactions with farmers.

5.3 Factors perceived to be responsible to the failure of schemes

The factors perceived to be contributing to the failure of schemes are varied and include lack of transparency by the strategic partner, theft and vandalising of irrigation infrastructure and equipment, lack of financial management, poor leadership on the part of the scheme committees and conflicts and disagreements within the farmers themselves, the latter together with the non-transparent action of the strategic partner being prominent as the major problems in the schemes.

The conflicts among farmers include: unhappiness with farmers who do not come to work but expect to share in profits; mistrust of committee members who are suspected of conniving with strategic partners to cheat in profit sharing; poor leadership of committee members. There seems to be no attempts either on the part of the LDA or Tribal Authorities to make concerted effort in managing and/or solving conflicts amongst farmers. According to Lecoutere (2010), managing group dynamics and power relations are fundamental in conflict management and consensus building. Farmers indicated that due to their failure to build consensus amongst themselves, they've been able to solve their differences with the strategic partners. It is evident that should the farmers build consensus and act as a unified unit, they could consolidate enough power to engage the strategic partners as equal partners. It is worth noting that in schemes that are still functional, the main problem mentioned was the lack of transparency on the part of the strategic partner though they are generally satisfied with the model. Issues of such as conflicts amongst farmers, theft, poor leadership did not come out strongly as major problems.

The misunderstandings between farmers and strategic partners also stem from the fact that not all farmers seem to know how the partnership model was developed and how the strategic partners were chosen. This in itself causes confusion and conflicts between farmers. According to FAO (2000) farmers should participate throughout project planning, implementation and evaluation phases. A bottom-up approach is ideal for irrigation development, treating farmers as "owners" and not as "beneficiaries" of the projects.

5.4 Farmers' perceptions on the factors influencing the success of the schemes

The socio-cultural characteristics have been observed to have influence on the process of attaining awareness or understanding of sensory information (Ofuoku, 2011).

5.4.1 Climate/Ecological factors

The profile of the farmers and number of farmers in a scheme had no influence on how they perceive climate as a contributing factor to the success of the schemes. Similar studies on the association between socio-economic profile of farmers and their perception on the impact of climate on success of irrigation scheme are not available. However, in a study on climate change perception, Ofuoku (2011) found a relationship between level of education and age on the perception of climate change.

5.4.2 Economic factors

Most of the farmer characteristics had no influence on how they perceive economic factors as contributing to the success of the schemes. However literacy had influence. The literate farmers were three times more likely to indicate the importance of economic factors in influencing the success of the irrigation schemes. This is expected as literate farmers are more likely to comprehend that if input costs are high for-instance, profits will be small. They may also be able to understand trends on market price changes in inputs and farm produce.

5.4.3 Competition factors

Sex, age, education level, literacy level, number of farmers in a scheme and training had no influence on how they perceive competition as a contributing factor to the success of the schemes. This is contrary to findings by Ejieji and Amodu (2008) who found a significant association between education level and perception on competition.

5.4.4. Management and Administrative factors

Age and number of farmers in a scheme had influence on how farmers perceive the influence of management/administrative factors on the success of the schemes. In schemes with a large number of farmers, there was more likelihood of farmers to indicate management and/or administration as having influence on the success of the irrigation schemes. This could be expected since it has been observed in numerous studies that there are always management challenges and conflicts in group farming operations especially where groups are large.

The findings have a bearing on how farmer groups are constituted and point to the need for farmer assistance on individual basis or small groupings.

5.4.5. Socio-cultural factors

Literacy and number of farmers in a scheme had influence on how farmers perceive the influence of socio-cultural factors on the success of the schemes. Farmers in schemes with a large number of beneficiaries and the less literate were about 10 times more likely to perceive land ownership and level of formal education as important in the success of the irrigation schemes. The findings indicate the importance of improving the education and or training of farmers. This also may suggest the need for screening of beneficiaries. The issue of the land tenure system is likely to arise where there are many beneficiaries on a piece of land. The findings are therefore not surprising. The implication of the findings is that group farming with too many beneficiaries is not viable especially when the group dynamics are not closely managed and monitored.

5.4.6 Technological factors

Age and level of literacy had influence on how farmers perceive the influence of technological factors on the success of the schemes.

Farmers in schemes with a large number of beneficiaries were more likely to indicate the importance of technological factors in influencing the success of the irrigation schemes.

Farmers with low level of literacy were also highly likely to indicate the importance of technological factors in influencing the success of the irrigation schemes. Similar findings were observed Kolawole et al.(2011) and Ejieji & Amodu (2008). Illiterate and older farmers are less likely to adopt new technologies which can negatively impact on the success of the schemes. As other findings above, the implication is that there is a need properly screen farmers especially when the objective is to produce at commercial scale where more technological advanced machinery and infrastructure is used.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

The study has shown that socio-economic profiles of farmers have an effect on how some factors are perceived as having influence on the success of the irrigation schemes. The findings suggest that the socio-economic characteristics of farmers should be considered when planning developmental projects of this nature where the typology of farmers varies. The clustering of farmers according to similar characteristics should be matched to an appropriate type of farming operation. The issues related to literacy, education level and age should be considered when projects are planned especially large scale (commercial) farming operations. It is clear from the profile of the farmers and their responses that their experience was in small-scale, rain-fed agriculture and had no prior experience in irrigated farming. This clearly contributed to their inability to survive as soon as the strategic partner left. This suggests that the type of farming (and the scale thereof) should match the experience and capacity of identified beneficiaries.

The main reason perceived to be contributing to the failure of the schemes was the lack of sense of ownership by farmers and the distrust between farmers and the strategic partner. The strategic partner was perceived to be non-transparent and failing to abide by contractual obligation particularly with respect to profit sharing.

The model should be revised and improved where necessary. The lack of sense of ownership has a profound bearing on the success of the schemes. A business model that empowers the farmers should be considered. It is evident that there was no full farmer participation from the inception of the project. Involving farmers in the initial planning develops a sense of ownership, making them willing and empowered to participate fully in the operation and management of the project. The participatory rural appraisal processes seem to have been lacking from the conception of the projects.

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ANNEXURE A

Questionnaire: Sekhukhune Irrigation Schemes

Date: _____

Name of Scheme: _____

Name of Respondent _____

Section A

1. Sex
   a) Male
   b) Female

2. Age
   a) < 30 years
   b) 30 – 40
   c) 41 – 50
   d) 51 – 60
   e) > 60 years
3. Level of Education
   Formal
   a) No education
   b) Primary
   c) Secondary
   d) Certificate
   e) Diploma

   Non-Formal (Adult Education

   No. weeks

4. Literacy Level
   a) Innumeracy
   b) Illiterate
   c) Partially literate
   d) Literate

Section B

1. What was the objective of starting the irrigation scheme? What problem was to be solved? ----------
   ----

   ----
2. Who started the scheme? Whose idea was it?----------

   ----
3. How big is the irrigation scheme? ----------
4. How many households have plots on the scheme?----------
5. How many villages or wards are covered by the scheme? ----------
6. What type of water delivery system is used from source or reservoir to the field?-------
   ----
7. What maintenance activities have to be performed on the scheme?----------
   ----

   7.a How often? ----------

   7.b By whom? ----------

   7.c If by farmers, how many hours are spent working on the scheme on maintenance activities ----------

8. What type of fees do farmers on the scheme pay?----------
9. How much do farmers pay per month?----------
10. How much does operation and maintenance actually cost on the scheme?----------
11. How much do farmers pay for water (water charge)? ----------
12. What are the major problems encountered by farmers on this scheme?----------
13. Do farmers in the scheme have access to dryland plots? ----------
14. What types of records are kept on the scheme?----------
15. What crops are grown?----------
16. In your opinion, what is the impact of the scheme to the members in general? ----------
----

17. Who decides the cropping programme in the irrigation scheme? Is this programme uniform from farmer to farmer? ----------

18. Have you received training in irrigated farming?----------

19. Who provided the training?----------

20. Do you feel you were properly trained to perform your tasks?----------

Section C

Checklist : LDA/Farmers/Local Authorities/Strategic Partner

Background

1) What is the Historical background of the Irrigation schemes?----------

2) Institutional Arrangement----------

3) Stakeholder Involvement:----------

a) Who are the various stakeholders?----------

b) What are the roles of various stakeholders? Who is doing what?----------

c) What is the percentage of stake of various stakeholders?----------

4) LDA Strategic Partnership Model

a) What is the basis of the model? (The reason for introducing the model)----------

b) How was the model introduced?----------

---

c) How was the Strategic Partner appointed?----------

---

d) How was the model implemented? Exit strategy?----------

---

e) What were the challenges & opportunities of the model?----------
---
---

f) Which stakeholders are most affected by the dis/functionality of the irrigation schemes?---
---

g) What are the factors contributing to the Dis/functionality of irrigation schemes?----------
---

---

h) What are you doing?----------

---

i) According to your opinion, how do other stakeholders view the model?-Farmers, SP--------
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---

j) What are your views on the model?----------

---

k) What recommendations do you have to improve the situation?----------
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Section D

Checklist: Farmers/ SP/ LDA

What are your perceptions on the influence of the following on the success of the scheme? Rank on a scale of 1 to 4 (1=Strongly Agree, 2=Agree, 3=Disagree, 4=Strongly Disagree)

1. **Climate/Ecological Factors:**

a)	Seasonal rainfall amount	S	A	D	SD
b)	Unpredictable dry spells during rainy part of the growing period	S	A	D	SD
c)	Low crop yield in the scheme	S	A	D	SD
d)	Pest during the growing season	S	A	D	SD

2. **Economic Factors**

a)	Economic Factors	S	A	D	SD
b)	High cost of water use & electricity	S	A	D	SD
c)	High price of inputs (fertilizers etc)	S	A	D	SD
d)	Better returns from farming and other activities outside the schemes	S	A	D	SD

3. **Competition Factors**

a)	Advantageous located farmers over-appropriating water	S	A	D	SD
b)	Water not reaching tail end of the schemes	S	A	D	SD
c)	Markets access	S	A	D	SD
d)	Price of produce	S	A	D	SD

Management/Administrative Factors

a)	Non-timely cultivation of the crops	S	A	D	SD
b)	Non-timely supply of fertilizers	S	A	D	SD
c)	Non-timely pumping of water	S	A	D	SD

d) Non-maintenance of irrigation structures	S	A	D	SD
e) Non-maintenance of pumps	S	A	D	SD
f) Non-supply of diesel and lubricants	S	A	D	SD
g) Non-supply of fertilizers	S	A	D	SD
h) Poor accessibility of the schemes	S	A	D	SD

Socio-cultural Factors

a) Land tenure system	S	A	D	SD
b) Level of formal education	S	A	D	SD

Technological Factors

a) Type of irrigation system	S	A	D	SD
b) Manual planting, weeding and harvesting	S	A	D	SD

Section E

Checklist: Farmers

Gender Issues

a) How many women are participating in the scheme?----------

b) Are there women in the management committee of the scheme? Yes /No If yes, How many?----------

c) Do women make decision on the daily activities of the scheme?
---

d) What tasks do women perform in the scheme?
---

e) Do you think women are playing a meaningful role in the scheme?
---

f) Should there be more participation of women?
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g) Any other issues

